

Trishna's



Pearson IIT Foundation Series

# Chemistry Practice Book

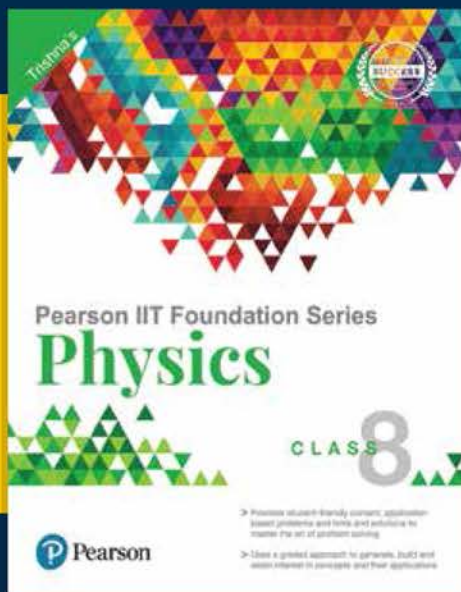
C L A S S 8



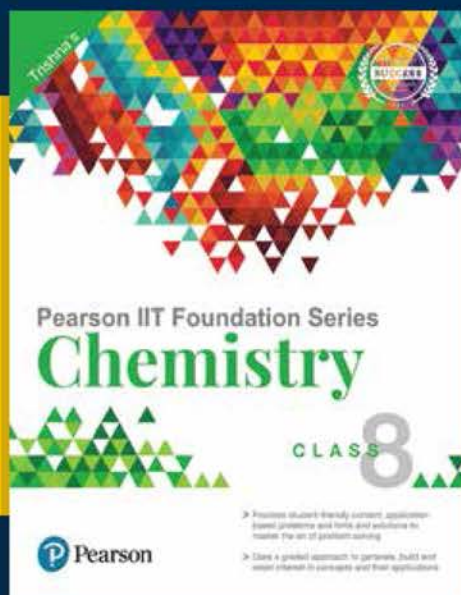
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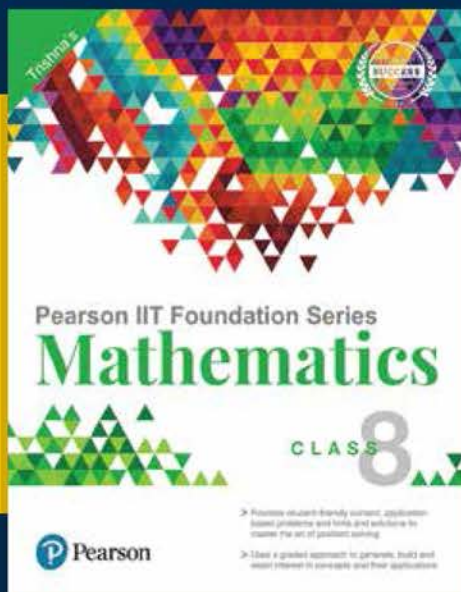
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**CLASS**

**8**

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**Pearson IIT Foundation Series**

**Chemistry Practice Book**

**First Edition**

**Trishna Knowledge Systems**

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# Preface

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*Pearson IIT Foundation Practice Book Series* is designed to accompany the course-books available in this series. Developed by a team of experienced faculties, this workbook series connects the subjective knowledge to its real world applications through various text and chapter level problems. Each chapter has a set of assessment tests which are mapped to chapters covered in the course-book. These worksheets will guide students step-by-step towards understanding the central concept of that particular chapter. These tests are recommended as after class material for further practice.

Any suggestions for added or updated additional readings would also be welcome. Students can share their feedback at [reachus@pearson.com](mailto:reachus@pearson.com).

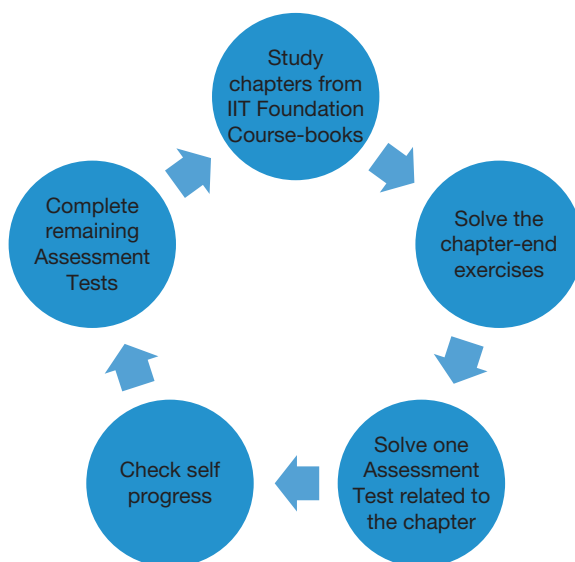
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# How to Use the Practice Book

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Many times, students face significant challenges in answering application level questions in Physics, Chemistry and Mathematics. These Practice Books will enhance their problem-solving skill which will definitely lead to a strong subject foundation. The entire practice book series are recommended to be used alongside IIT Foundation course-books.

Students can refer the following steps while using the practice books:



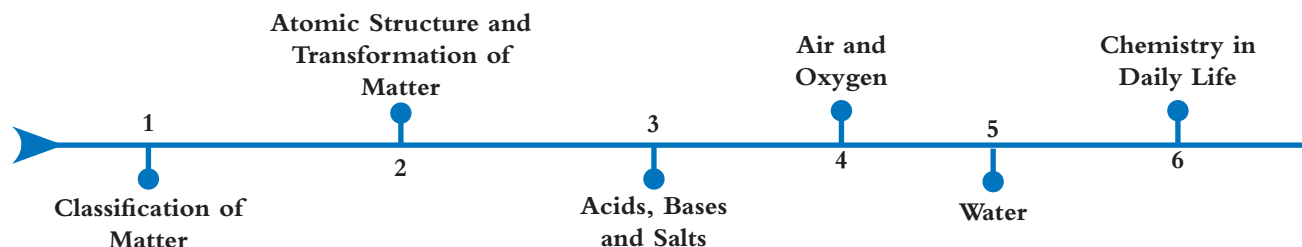
While preparing for Foundation courses, students need to learn the fundamental concepts with utmost clarity. In order to successfully complete the IIT Foundation course, one must prepare profoundly. Consistent hard work, practice and perseverance are needed throughout the year.

During any competitive examination, one must exercise clinical precision with speed since the average time available to respond to a question is hardly a minute. The aspirants should be conceptually excellent in the subject owing to the negative marking in the examination. A better practice to solve the paper would be to go for the easiest questions first and then gradually progress to the more complicated ones.

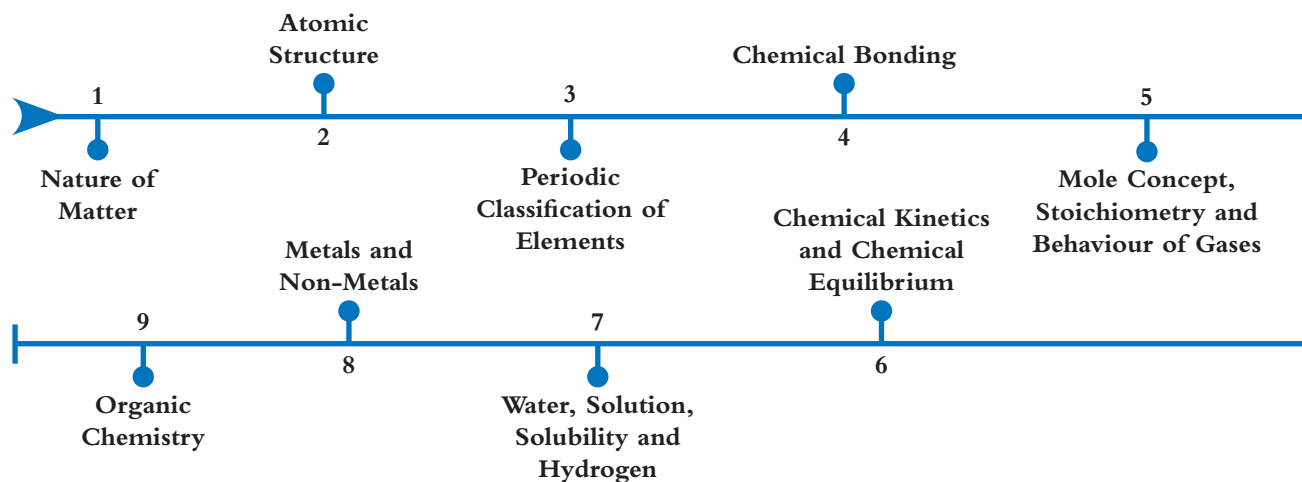
Regular practice of MCQs will assist the aspirants in preparing for the examination. In a nutshell, hard work, conceptual clarity and self-assessment are the essential ingredients to achieve success in competitive examinations. IIT Foundation course-books play an important role in understanding the concepts. Student need to read-up on all concepts/theories in a regular and systematic manner.

# Course-book Chapter Flow

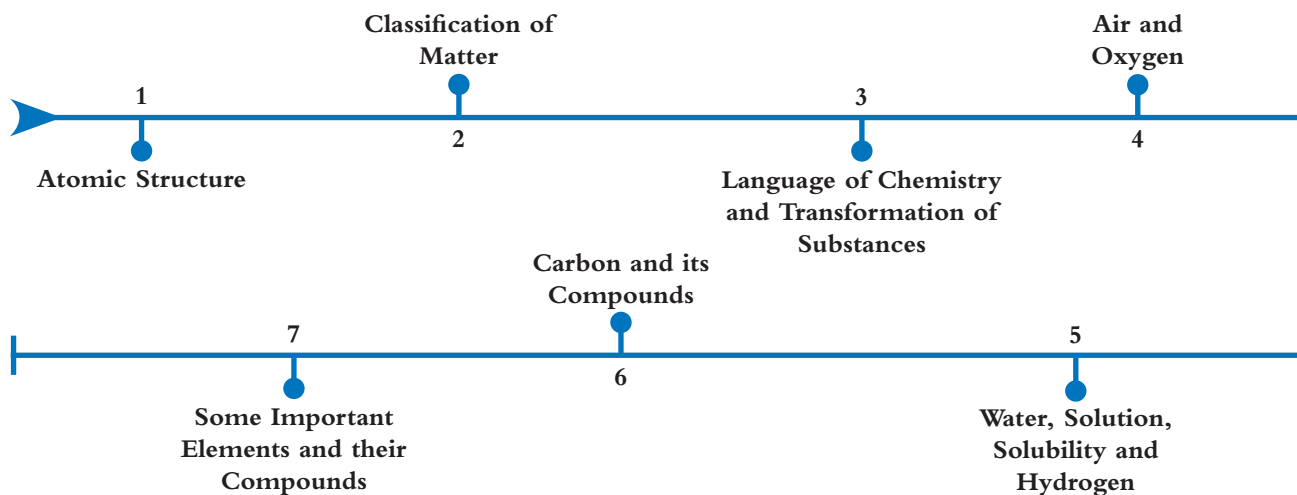
## Class 7



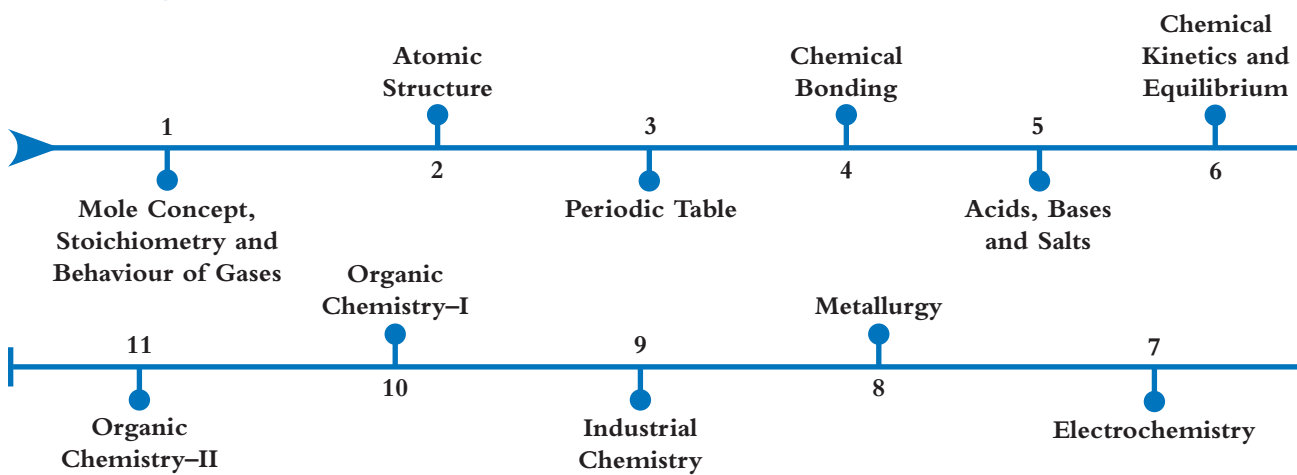
## Class 9



## Class 8



## Class 10



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# Atomic Structure

# 1



16 S Sulfur 32.066	17 Cl Chlorine 35.4527
34 Se Selenium 78.96	35 Br Bromine 79.904
51 Sb Antimony	52 Te Tellurium
	53 I Iodine

**Reference:** Coursebook - IIT Foundation Chemistry Class 8; Chapter - Atomic Structure; Page number - 1.1–1.14

## Assessment Test I

**Time: 30 min.**

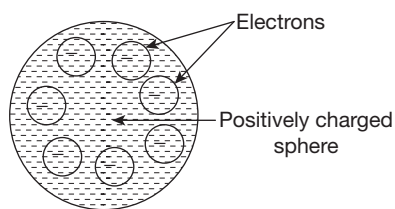
**Directions for questions from 1 to 15:** Select the correct answer from the given options.

**Space** for rough work

1. Which of the following is a contradiction to Dalton's atomic theory?

- (a) Discovery of isotopes
- (b) Law of definite proportions
- (c) Law of conservation of mass
- (d) Discovery of nucleus

2. An atomic model is represented by the figure given below.



Identify the fact (from following statements) which could be successfully explained by the given atomic model.

- (a) Total positive charge is equal to total negative charge.
  - (b) Positively charged particles are shielded from negatively charged particles.
  - (c) The existence of nucleus in an atom.
  - (d) Electrons are universal constituents of matter.
3. Identify the sets of orbits (electronic transitions) associated with release of energy.
- |                       |                       |                       |         |
|-----------------------|-----------------------|-----------------------|---------|
| (A) $L \rightarrow M$ | (B) $K \rightarrow M$ | (C) $L \rightarrow K$ |         |
| (D) $M \rightarrow L$ | (E) $M \rightarrow N$ | (F) $N \rightarrow K$ |         |
| (a) ACD               | (b) BCE               | (c) CDF               | (d) CDE |

4. **Assertion (A):** The orbits in which electrons are present are called stationary orbits.

**Reason (R):** Electrons remain stationary in those orbits.

- (a) Both A and R are true and R is the correct explanation of A.  
 (b) Both A and R are true, but R is not the correct explanation of A.  
 (c) A is true and R is false.  
 (d) A is false and R is true.
5. An atom 'X' has a mass of protons 36,740 times that of electrons. Identify the correct representation of the atom. The number of neutrons is 1 unit less than the protons.  
 (a)  $_{10}\text{X}^{20}$                       (b)  $_{10}\text{X}^{22}$                       (c)  $_{20}\text{X}^{40}$                       (d)  $_{20}\text{X}^{39}$
6. If 'a' is the number of electrons in a dispositive ion and it has three neutrons more than the number of protons, identify the atomic number and mass number.  
 (a)  $a + 2, a + 5$                       (b)  $a + 2, 2a + 7$   
 (c)  $a + 5, 2a + 7$                       (d)  $a + 5, 2a + 5$
7. Which of the following corresponds to the incorrect match with respect to their formation?  
 (A)  $\text{O}^{-2}$  ion – Loss of two electrons    (B)  $\text{N}^{-3}$  ion – Gain of three electrons  
 (C)  $\text{Mg}^{+2}$  ion – Loss of two electrons    (D)  $\text{K}^{+}$  ion – Gain of one electron  
 (a) A and B                      (b) B and C  
 (c) A and D                      (d) C and D
8. Correct the given statements by replacing the underlined words and choose the correct option.  
 (i) Protons and neutrons together correspond to subatomic particles.  
 (ii) Rutherford's theory proposed the concept of stationary orbits.  
 (iii) Isotopes differ in the number of protons.  
 (iv) Isobars possess the same number of neutrons.

(i)	(ii)	(iii)	(iv)
(a) Nucleons	Protons	Neutrons	Electrons
(b) Mass number	Nucleus	Neutrons	Nucleons
(c) Atomic number	Protons	Electrons	Electrons
(d) Nucleons	Nucleus	Electrons	Protons

9. **Assertion (A):** In  $\alpha$ -ray scattering experiment, most of the  $\alpha$  particles were completely rebounded.  
**Reason (R):** The entire positive charge is concentrated in the small central part known as nucleus.  
 (a) Both A and R are true and R is the correct explanation of A.  
 (b) Both A and R are true, but R is not the correct explanation of A.  
 (c) A is true and R is false.  
 (d) A is false and R is true.



Space for rough work

10. Arrange the important points of various theories in chronological order.

- (A) Presence of electrons in K, L, M and N shells.  
 (B) Combination of atoms in simple numerical ratio.  
 (C) Electrical neutrality of atom.  
 (D) The diameter of nucleus is  $10^{-5}$  times that of the atom.

(a) CBAD                      (b) DCBA                      (c) BCDA                      (d) BDAC

11. Arrange the following pairs in the order of metals, non-metals, noble gases, isotopes and isobars:

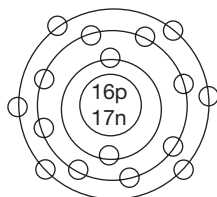
- (A)  ${}_Z A^X, {}_{Z+2} B^X$                       (B)  ${}_{10} X^{20}, {}_{18} Y^{36}$   
 (C)  ${}_Z A^X, {}_Z A^{X+2}$                       (D)  ${}_8 X^{16}, {}_{16} Y^{32}$   
 (E)  ${}_{12} A^{24}, {}_{20} Y^{40}$   
 (a) EDBCA                      (b) DEBAC  
 (c) DBECA                      (d) EBDAC

12. Match the values of Column A with those of Column B.

Column A (Atomic Number)	Column B (Ratio of Electrons in Penultimate Shell to Valence Shell)
-----------------------------	--

- |          |         |
|----------|---------|
| (i) 21   | (A) 8:1 |
| (ii) 30  | (B) 4:1 |
| (iii) 20 | (C) 9:2 |
| (iv) 19  | (D) 1:1 |
| (v) 18   | (E) 9:1 |
- 
- (a) (i) → (C); (ii) → (E); (iii) → (B); (iv) → (A); (v) → (D)  
 (b) (i) → (B); (ii) → (D); (iii) → (E); (iv) → (A); (v) → (C)  
 (c) (i) → (E); (ii) → (B); (iii) → (C); (iv) → (D); (v) → (A)  
 (d) (i) → (C); (ii) → (E); (iii) → (A); (iv) → (B); (v) → (D)

13. The geometric representation of a certain species is given below. On the basis of the representation, identify the wrong statement.



- (a) After its atomic number increases by 3 units, the valence shell becomes the penultimate shell.  
 (b) The outermost shell can accommodate 12 more electrons.  
 (c) The anion formed from it has the configuration of neon.  
 (d) It is the geometric representation of a neutral atom.

14. Which of the following numbers does not correspond to the maximum number of electrons in Bohr's orbit?  
(a) 32                      (b) 36                      (c) 72                      (d) 98
15. An atom of an element 'X' loses an electron to get a stable octet. 'Y' also loses two electrons to form the corresponding ion. However, the resultant ion of Y does not possess an octet. Identify the probable atomic numbers of X and Y.  
(a) 19, 30                      (b) 20, 29                      (c) 3, 20                      (d) 29, 20

**Space** for rough work

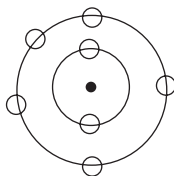
# Assessment Test II

Time: 30 min.

Space for rough work

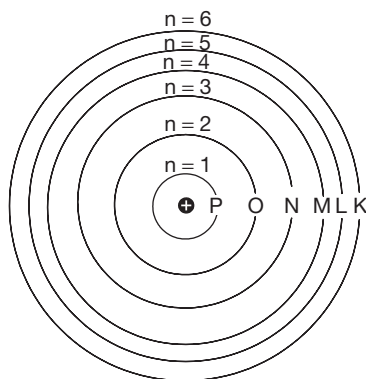
**Directions for questions from 1 to 15:** Select the correct answer from the given options.

- Identify the factor which provided the experimental basis for the postulates of Dalton's atomic theory.
  - Discovery of isobars
  - Discovery of subatomic particles
  - Law of definite proportions
  - Discovery of atomic number as the fundamental property
- The figure given below represents an atomic model:



Which among the following was not supported by the given atomic model?

- Revolution of electrons in stationary orbits.
  - Relatively small size of nucleus in comparison to the size of an atom.
  - Increase in energy of the orbits with distance from the nucleus.
  - Uniform distribution of positive charge in an atom.
- Observe the following figure and identify the one which is in contradiction to the established facts.



- Distance between the orbits is not uniform.
- Size of the nucleus is not in proportion to the size of the atom.
- Naming of orbits is in the reverse order.
- Nucleus is at the centre.

4. **Assertion (A):** Energy of orbits increases with distance from the nucleus.

**Reason (R):** Electrons in the first orbit do not lose energy.

- (a) Both A and R are true and R is the correct explanation of A.  
 (b) Both A and R are true, but R is not the correct explanation of A.  
 (c) A is true and R is false.  
 (d) A is false and R is true.
5. An atom has a mass of protons as much as 18,370 times that of an electron. The mass number is two units more than twice the atomic number. Identify the number of neutrons in the atom.
- (a) 10                      (b) 20                      (c) 22                      (d) 12

6. Assuming that  $x$  is the mass of electron and  $y$  is the total mass of protons in  ${}_8\text{O}^{18}$ , which of the following equations is correct for calculating the total mass of protons?

- (a)  $y = 18x - 10$                       (b)  $8y = \frac{x}{1837}$   
 (c)  $\frac{y}{8} = 1837x$                       (d)  $y = \frac{1837x}{18}$

7. Which of the following corresponds to incorrect matches with respect to their formation?

- (A) Dipositive ion  $\rightarrow$  2 electrons in valence shell in neutral atom.  
 (B) Unipositive ion  $\rightarrow$  7 electrons in valence shell in neutral atom.  
 (C) Trinegative ion  $\rightarrow$  3 electrons in valence shell in neutral atom.  
 (D) Dinegative ion  $\rightarrow$  6 electrons in valence shell in neutral atom.

- (a) A and B                      (b) B and C  
 (c) C and D                      (d) B and D

8. Correct the given statements by replacing the underlined words and choose the correct option.

- (i)  ${}_{17}\text{Cl}^{35}$  has the number of neutrons equal to 35.  
 (ii) The maximum number of electrons in an orbit can be given by  $n^2 + 2$ .  
 (iii)  ${}_{20}\text{Y}^{39}$  is the isobar of  ${}_{20}\text{X}^{40}$ .

- (iv) The isotope of  ${}_Z\text{X}^A$  is  ${}_{Z+2}\text{Y}^A$ .

	(i)	(ii)	(iii)	(iv)
(a)	17	$n^2$	${}_{18}\text{Y}^{40}$	${}_x\text{X}^{A+2}$
(b)	18	$n^2$	${}_{19}\text{Y}^{39}$	${}_z\text{X}^{A+2}$
(c)	18	$2n^2$	${}_{19}\text{Y}^{40}$	${}_z\text{X}^{A+2}$
(d)	17	$2n^2$	${}_{20}\text{Y}^{40}$	${}_z\text{X}^{A+2}$

9. **Assertion (A):** Most of the  $\alpha$  particles in  $\alpha$ -ray scattering experiment passed straight through the gold foil.

**Reason (R):** The size of the nucleus is very small compared to the size of the atom.

Space for rough work

- (a) Both A and R are true and R is the correct explanation of A.  
 (b) Both A and R are true, but R is not the correct explanation of A.  
 (c) A is true and R is false.  
 (d) A is false and R is true.

10. Arrange the following milestones in the depiction of the structure of an atom in chronological order.

- (A) Discovery of nucleus (B) Establishing stability of atom  
 (C) Discovery of protons (D) Discovery of electrons  
 (a) CABD (b) DABC (c) CDAB (d) DACB

11. The electronic configurations and atomic numbers of some species are given below. Arrange them in the order of noble gas, cation, non-metal atom, anion and metal atom.

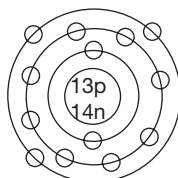
- (A)  $A \rightarrow 2, 8; Z = 11$  (B)  $B \rightarrow 2, 8; Z = 10$   
 (C)  $C \rightarrow 2, 8, 8; Z = 16$  (D)  $D \rightarrow 2, 8, 2; Z = 12$   
 (E)  $E \rightarrow 2, 8, 5; Z = 15$   
 (a) AECDB (b) BCEAD  
 (c) ADECB (d) BAECD

12. Match the values of Column A with those of Column B.

Column A (Atomic Number)	Column B (No. of Electrons in Penultimate Shell)
(i) 36	(A) 2
(ii) 17	(B) 18
(iii) 25	(C) 10
(iv) 9	(D) 8
(v) 22	(E) 13

- (a) (i)  $\rightarrow$  (C); (ii)  $\rightarrow$  (E); (iii)  $\rightarrow$  (B); (iv)  $\rightarrow$  (A); (v)  $\rightarrow$  (D)  
 (b) (i)  $\rightarrow$  (B); (ii)  $\rightarrow$  (D); (iii)  $\rightarrow$  (E); (iv)  $\rightarrow$  (A); (v)  $\rightarrow$  (C)  
 (c) (i)  $\rightarrow$  (E); (ii)  $\rightarrow$  (B); (iii)  $\rightarrow$  (C); (iv)  $\rightarrow$  (D); (v)  $\rightarrow$  (A)  
 (d) (i)  $\rightarrow$  (B); (ii)  $\rightarrow$  (D); (iii)  $\rightarrow$  (A); (iv)  $\rightarrow$  (C); (v)  $\rightarrow$  (E)

13. Observe the geometric representation given below and identify the wrong statement.



- (a) The species can form a trinegative ion.
- (b) The ion resulting from it gets neon configuration.
- (c) The mass number of the atom is 27.
- (d) The atomic number of the atom is 13.

14. The maximum number of electrons in an orbit is 50. Identify the orbit corresponding to the above number of electrons.

- (a) 4                      (b) 6                      (c) 5                      (d) 10

15. The neutral atom corresponding to a positive ion of an element has 2 incomplete shells. The sum of the electrons in the valence shell and the penultimate shell is twice the number of electrons in the antepenultimate shell. Calculate the atomic number of the element.

- (a) 26                      (b) 28                      (c) 30                      (d) 24

Space for rough work

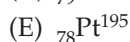
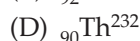
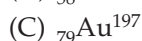
# Assessment Test III

Time: 30 min.

Space for rough work

**Directions for questions from 1 to 15:** Select the correct answer from the given options.

1. Arrange the following elements in the increasing order of the number of neutrons.



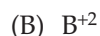
(a) BECDA

(b) BDCEA

(c) AECDB

(d) ADCEB

2. Ions named as 'A', 'B', 'C', 'D' are given below. All of them contain 10 electrons each. Arrange the ions in the increasing order of the atomic numbers.



(a) DCAB

(b) DACB

(c) BCAD

(d) BACD

3. **Assertion (A):** Eight electrons are present in the antepenultimate shell of Al.

**Reason (R):** The electronic arrangement of Al is 2, 8, 3

(a) Both A and R are true and R is the correct explanation of A.

(b) Both A and R are true, but R is not the correct explanation of A.

(c) A is true and R is false.

(d) A is false and R is true.

4. **Assertion(A):** Atoms of the same element possess the same number of total fundamental particles.

**Reason(R):** Atomic number is the characteristic of an element.

(a) Both A and R are true and R is the correct explanation of A.

(b) Both A and R are true, but R is not the correct explanation of A.

(c) A is true and R is false.

(d) A is false and R is true.

5. Mass of total positive charge present in an atom is 23,881 times to that of the mass of an electron. Identify the atomic number.

(a) 6

(b) 12

(c) 13

(d) 14

6. If the mass of a proton is  $m$ , what should be the approximate mass of an  $\alpha$ -particle?

(a)  $m$ (b)  $2m$ (c)  $4m$ (d)  $6m$

7. Identify the drawback of Thomson's atomic model.
- (a) Presence of electrons
  - (b) Cancellation of positive and negative charges in order to maintain the neutrality of the atom
  - (c) Coexistence of opposite charges in the atom
  - (d) Both (b) and (c)
8. An element 'X' has the same number of protons, electrons and neutrons, and its atomic mass is double the atomic number. If the number of neutrons is 20, then the element 'X' is
- (a) Ca                      (b) Mg                      (c) Zn                      (d) Mg
9. Which of the following atomic numbers corresponds to the formation of tripositive ion?
- (a) 10                      (b) 11                      (c) 12                      (d) 13
10. An atom of an element has the electronic configuration 2, 8, 18, and 8. Identify the false statement regarding this element.
- (a) The atom has one incomplete shell.
  - (b) The atom cannot form any ion.
  - (c) The next electron enters the fourth shell.
  - (d) The given element is krypton.
11. An atom A of an element with atomic number  $Z$  has the electronic configuration  $a, a + b, 2b$ , and  $a$ . Which of the following statements is false regarding the element?
- (a) The element has 2 incomplete shells.
  - (b) The element can have more electrons in its penultimate shell.
  - (c) The element with  $Z + 6$  atomic number has 3 electrons in its valence shell.
  - (d) Atomic number of the atom is 24.
12. The velocity of an electron decreases with an increase in the distance from the nucleus. Identify the reason.
- (a) Increase in nuclear force of attraction
  - (b) Decrease in nuclear force of attraction
  - (c) Increase in kinetic energy of electron
  - (d) Increase in radius of the orbit
13. Which postulate of Rutherford's theory was not based on the experimental results of  $\alpha$ -ray scattering experiment?
- (a) Presence of small central nucleus
  - (b) Presence of electrons outside the nucleus



- (c) Revolution of electrons around the nucleus  
 (d) Presence of large empty space in the atom

14. Among the following sets of elements, which set contains the same number of valence electrons?

- (a)  ${}_{12}\text{A}^{24}, {}_{19}\text{B}^{39}$  (b)  ${}_{14}\text{A}^{28}, {}_6\text{B}^{12}$   
 (c)  ${}_{12}\text{A}^{24}, {}_{14}\text{B}^{28}$  (d)  ${}_{15}\text{A}^{30}, {}_8\text{B}^{16}$

15. Match the entries of Column A with those of Column B.

Column A (Element)	Column B (Number of Core Electrons)
(i) Potassium	(A) 2
(ii) Carbon	(B) 10
(iii) Sulphur	(C) 18
(iv) Titanium	(D) 20
	(E) 28

- (a) (i) → (D); (ii) → (C); (iii) → (B); (iv) → (A)  
 (b) (i) → (C); (ii) → (A); (iii) → (B); (iv) → (D)  
 (c) (i) → (C); (ii) → (D); (iii) → (A); (iv) → (B)  
 (d) (i) → (B); (ii) → (A); (iii) → (C); (iv) → (D)

Space for rough work

## Assessment Test IV

Time: 30 min.

Space for rough work

**Directions for questions from 1 to 15:** Select the correct answer from the given options.

1. The atomic numbers of some elements are given below. Arrange the elements in the decreasing order of the number of valence electrons.

(A)  $A \rightarrow 16$  (B)  $B \rightarrow 20$   
(C)  $C \rightarrow 14$  (D)  $D \rightarrow 17$   
(E)  $E \rightarrow 13$   
(a) DECAB (b) BECAD  
(c) BACED (d) DACEB

2. The number of electrons and neutrons in atoms of different elements are given below. Arrange them in the decreasing order of their mass numbers.

(A) 38, 49 (B) 56, 81  
(C) 76, 114 (D) 47, 61  
(E) 44, 57  
(a) CEDBA (b) CBDEA  
(c) ABDEC (d) AEDBC

3. **Assertion (A):**  ${}_1\text{H}^1$  and  ${}_1\text{H}^2$  are the isotopes of hydrogen.

**Reason (R):** Isotopes have the same mass number and different atomic number.

- (a) Both A and R are true and R is the correct explanation of A.  
(b) Both A and R are true, but R is not the correct explanation of A.  
(c) A is true and R is false.  
(d) A is false and R is true.

4. **Assertion (A):** Atoms are divisible.

**Reason (R):** Atoms were found to contain fundamental particles.

- (a) Both A and R are true and R is the correct explanation of A.  
(b) Both A and R are true, but R is not the correct explanation of A.  
(c) A is true and R is false.  
(d) A is false and R is true.

5. The mass of total positively charged particles present in a dinegative ion of an element is 29,392 times that of an electron. Identify the element among the following.

(a)  ${}_8\text{O}^{16}$  (b)  ${}_{16}\text{S}^{32}$  (c)  ${}_{14}\text{Si}^{28}$  (d)  ${}_9\text{F}^{18}$

Space for rough work

6. How many fundamental particles are present in an  $\alpha$ -particle?  
(a) 2 (b) 4 (c) 6 (d) 3
7. Name the scientist who first established the presence of nucleus in an atom.  
(a) J. J. Thomson (b) Rutherford  
(c) Bohr (d) Dalton
8. Which of the following metals can be considered the best substitute of gold in  $\alpha$ -ray scattering experiment?  
(a) Aluminium (b) Iron  
(c) Platinum (d) Copper
9. Which of the following atomic numbers corresponds to the formation of trinegative ion?  
(a) 7 (b) 15  
(c) 18 (d) Both (a) and (b)
10. The number of valence electrons present in noble gases is \_\_\_\_\_.  
(a) 6 (b) 18 (c) 8 (d) 4
11. An atom of an element 'X' has the electronic configuration  $a, a + b, 2(b - 1)$ , and  $a$ . Identify the atomic number of the element.  
(a) 20 (b) 22 (c) 24 (d) 26
12. Identify the false statement according to Bohr's theory.  
(a) Electron absorbs energy when it moves from M shell to L shell.  
(b) Electron releases energy when it jumps from M shell to K shell.  
(c) Electron revolving in K shell does not lose energy at all.  
(d) Energy of electron in a given orbit is constant.
13. What was the expected observation of  $\alpha$ -ray scattering experiment if Thomson's atomic model would be correct?  
(a) All the  $\alpha$ -particles would be completely rebounded.  
(b) All the  $\alpha$ -particles would be deflected at very large angles.  
(c) Absence of scintillations on ZnS screen.  
(d) All the  $\alpha$ -particles would pass straight through the gold foil.
14. Total number of electrons present in the antepenultimate shell of an atom of an element with atomic number 24 is \_\_\_\_\_.  
(a) 2 (b) 8 (c) 13 (d) 1

15. Match the entries of Column A with those of Column B.

Column A (Element)	Column B (Number of Electrons in Penultimate Shell)
(i) Chlorine	(A) 9
(ii) Oxygen	(B) 18
(iii) Zinc	(C) 2
(iv) Scandium	(D) 8

- (a) (i) → (B); (ii) → (C); (iii) → (D); (iv) → (A)  
 (b) (i) → (B); (ii) → (A); (iii) → (D); (iv) → (C)  
 (c) (i) → (B); (ii) → (D); (iii) → (A); (iv) → (C)  
 (d) (i) → (D); (ii) → (C); (iii) → (B); (iv) → (A)

Space for rough work

## Answer Keys

### Assessment Test I

1. (a)    2. (d)    3. (c)    4. (c)    5. (d)    6. (b)    7. (c)    8. (b)    9. (d)    10. (c)  
 11. (a)    12. (a)    13. (c)    14. (b)    15. (a)

### Assessment Test II

1. (c)    2. (d)    3. (c)    4. (b)    5. (d)    6. (c)    7. (b)    8. (c)    9. (a)    10. (b)  
 11. (d)    12. (b)    13. (a)    14. (c)    15. (a)

### Assessment Test III

1. (c)    2. (a)    3. (d)    4. (d)    5. (c)    6. (c)    7. (c)    8. (a)    9. (d)    10. (c)  
 11. (c)    12. (b)    13. (c)    14. (b)    15. (b)

### Assessment Test IV

1. (d)    2. (d)    3. (c)    4. (a)    5. (b)    6. (b)    7. (a)    8. (c)    9. (d)    10. (c)  
 11. (b)    12. (a)    13. (d)    14. (b)    15. (d)

# Classification of Matter

# 2



**Reference:** Coursebook - IIT Foundation Chemistry Class 8; Chapter - Classification of Matter; Page number - 2.1–2.19

## Assessment Test I

**Time: 30 min.**

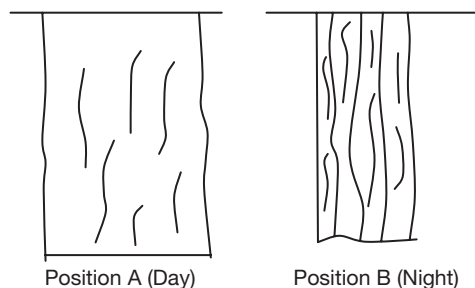
**Directions for questions from 1 to 15:** Select the correct answer from the given options.

**Space** for rough work

- Some amount of water is kept in a vacuum chamber. In which state will the water exist in the chamber?  
(a) Solid                      (b) Liquid                      (c) Vapour                      (d) Gas
- When we exhale air from our mouth on a winter morning, it appears foggy. Which of the following interconversions of states of matter takes place here?  
(a) Melting                      (b) Evaporation  
(c) Condensation                      (d) Solidification
- Which of the following statements is correct?  
(a) Diamond is a very good conductor of heat because of the compact arrangement of small carbon atoms.  
(b) Copper is used as telecommunication cable because of its high density.  
(c) Aluminium is widely used in the manufacture of electric transmission cable only because of its light weight.  
(d) Phosphorus finds application in the match industry because of its resistance to heat.
- Which of the following is not a homogeneous mixture?  
(a) Liquor ammonia                      (b) Hydrochloric acid  
(c) Soda water                      (d) Smoke
- Find the odd one out with respect to hardness.  
(a) Iron                      (b) Copper  
(c) Aluminium                      (d) Sodium
- Alcohol is mixed with sugar solution and benzene is then added to this mixture. Which of the following is the correct sequence of methods to separate this mixture?  
(a) Evaporation, fractional distillation and separating funnel  
(b) Separating funnel, fractional distillation and evaporation

- (c) Evaporation, separating funnel and fractional distillation
- (d) Fractional distillation, separating funnel and evaporation

7. The same fabric is kept for drying in two different ways as shown in the figures given below. In position A, the cloth dries up faster because the rate of evaporation is \_\_\_\_\_.



- (a) directly proportional to temperature
  - (b) directly proportional to surface area
  - (c) inversely proportional to humidity
  - (d) Both (a) and (b).
8. A and B are two gases taken in two different cylinders at  $45^{\circ}\text{C}$ . Their critical temperatures are  $40^{\circ}\text{C}$  and  $50^{\circ}\text{C}$ , respectively. Which of the following statements is correct?
- (a) Only gas A can be liquefied by applying pressure at that temperature.
  - (b) Only gas B can be liquefied by applying pressure at that temperature.
  - (c) Both the gases can be liquefied by applying pressure at that temperature.
  - (d) None of the gases can be liquefied by applying pressure at that temperature.
9. From the description given below, identify the processes in which the potential energy decreases.
- A: Formation of ice  
 B: Melting of ice  
 C: Condensation of water vapour  
 D: Boiling of water
- (a) A and B                                      (b) A and C
  - (c) B and D                                      (d) C and D
10. The boiling point of water is directly proportional to the external pressure. Which of the following statements supports the given statement?
- (a) Addition of a pinch of salt to water makes the cooking of food faster.
  - (b) Pressure cooker decreases the cooking time.
  - (c) Sea water takes more time to be boiled than same mass of normal tap water, if the rate of supply of heat is same.
  - (d) The same amount of water kept in a wide container and in a narrow vessel evaporates at different rates.

11. **Assertion (A):** Metals have lustre.

**Reason (R):** Metals have loosely bound electrons.

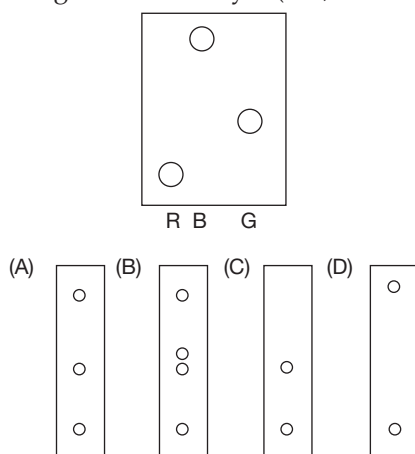
- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true and R is false.
- (d) A is false and R is true.

12. **Assertion (A):** Steel is more resistant to corrosion.

**Reason (R):** Alloying makes the constituent metal less reactive.

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true and R is false.
- (d) A is false and R is true.

13. A standard chromatogram of three dyes (red, blue and green) is given below.



Based on the standard chromatogram analysis and the given chromatograms (A, B, C and D), arrange them in the order of the descriptions given below.

- (i) This chromatogram represents a mixture of all the three dyes along with an impurity.
  - (ii) This chromatogram represents a mixture of red and blue dyes.
  - (iii) This chromatogram represents a mixture of all the three dyes.
  - (iv) This chromatogram represents a mixture of red and green dyes.
- (a) CABD                      (b) BDAC                      (c) ADCB                      (d) DBAC

14. A saturated solution of  $\text{NaCl}$  and  $\text{KNO}_3$  is taken in a beaker. Some amount of carbon tetrachloride is added to it. Then sand is added to it. Four processes given below are carried out to separate the constituents of the above mixture. Arrange them in the proper sequence.

## 2.4 Chapter 2 Classification of Matter

- (A) Evaporation (B) Fractional crystallization  
(C) Separating funnel (D) Filtration  
(a) ACBD (b) BDAC (c) CABD (d) DCBA

15. Match the statements of Column A with those of Column B.

Column A (Mixture)	Column B (Category)
(i) Copper sulphate crystals are dropped in water and stirred.	(A) Liquid–liquid heterogeneous
(ii) Some amount of benzene is poured into water and stirred well.	(B) Liquid–liquid homogeneous
(iii) Finely powdered sulphur is added to water and stirred well.	(C) Solid–liquid homogeneous
(iv) Some amount of vinegar is poured into water and stirred.	(D) Solid–solid homogeneous
(v) Iron is alloyed to manufacture steel.	(E) Solid–liquid heterogeneous

(a) (i) → (E); (ii) → (D); (iii) → (A); (iv) → (B); (v) → (C)

(b) (i) → (A); (ii) → (C); (iii) → (B); (iv) → (E); (v) → (D)

(c) (i) → (C); (ii) → (A); (iii) → (E); (iv) → (B); (v) → (D)

(d) (i) → (B); (ii) → (E); (iii) → (A); (iv) → (C); (v) → (D)

Space for rough work



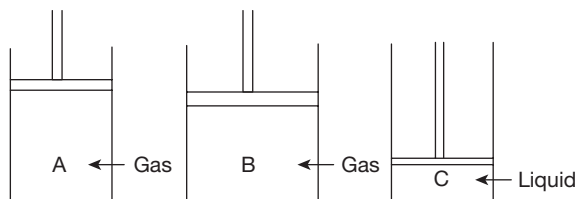
## Assessment Test II

Time: 30 min.

Space for rough work

**Directions for questions from 1 to 15:** Select the correct answer from the given options.

1. Ice is kept in a vacuum chamber. In which state will it exist?  
(a) Solid                      (b) Liquid                      (c) Vapour                      (d) Gas
2. Which of the following interconversions of states of matter is involved in filling up of LPG cylinder?  
(a) Sublimation                      (b) Liquefaction  
(c) Condensation                      (d) Evaporation
3. An element is a good conductor of electricity, lustrous, and it is used as an electrode in electrometallurgical processes due to its high resistance to heat and chemicals. The constituent atom of the element is \_\_\_\_\_.  
(a) Cu                      (b) Fe                      (c) C                      (d) Si
4. Which of the following is a homogeneous mixture?  
(a) Brass                      (b) Milk  
(c) Gun powder                      (d) Muddy water
5. Find the odd one out with respect to the conduction of electricity.  
(a) Red phosphorus                      (b) Rhombic sulphur  
(c) Gas carbon                      (d) Diamond
6. Finely powdered charcoal is added to coconut oil. This mixture is added to glucose solution. How will you separate them?  
(a) Filtration, separating funnel and evaporation  
(b) Evaporation, separating funnel and filtration  
(c) Filtration, followed by evaporation  
(d) Separating funnel, followed by filtration
7. We blow air to cool a hot liquid in order to \_\_\_\_\_.  
(a) create turbulence in the hot liquid  
(b) provide a larger surface area for the liquid  
(c) provide fresh air above the surface of the liquid  
(d) saturate the air above the liquid with water vapour
8. The same amount of three gases 'A', 'B' and 'C' is taken in three different cylinders. All the cylinders are fitted with movable pistons and the gases are kept at room temperature and normal pressure. Then, external pressure is applied on each piston. The changes in the volumes are shown in the figures given below.



Which of the following statements is correct regarding the above processes?

- (a) A has high critical temperature than B.
- (b) Critical temperature of B is above the room temperature.
- (c) Critical temperature of C is the highest.
- (d) Intermolecular forces of attraction among the molecules of gas A is the maximum.

9. In which of the following, does kinetic energy decrease?

- (a) Steam at  $100^{\circ}\text{C}$  gets converted to superheated steam.
- (b) A cup of hot tea at  $60^{\circ}\text{C}$  gets cold.
- (c) Steam at  $100^{\circ}\text{C}$  getting condensed in distillation process.
- (d) Water is getting converted to ice at  $0^{\circ}\text{C}$  in a refrigerator.

10. In which of the following cases, change of state of matter takes place due to the application of pressure?

- (a) Skating on ice
- (b) Formation of snow
- (c) Filling up of cooking gas (LPG) cylinder
- (d) Both (a) and (c)

11. **Assertion (A):** Metals are good conductors of electricity.

**Reason (R):** Metal atoms have completely filled valence shells.

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true and R is false.
- (d) A is false and R is true.

12. **Assertion (A):** Duralumin is as strong as steel.

**Reason (R):** A metal becomes more malleable when it is converted to an alloy.

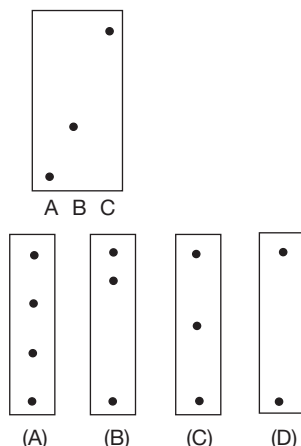
- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true and R is false.
- (d) A is false and R is true.

13. A standard chromatogram of the constituents of a food colour is given below.

Four chromatograms (A, B, C and D) shown below represent four different brands of food colours available in the market.

Arrange them in the order of the descriptions given below.

Space for rough work



- (i) This food colour is constituted of A and C along with another component.  
 (ii) This food colour is constituted of all three components—A, B and C.  
 (iii) The food colour is constituted of A and B, but it contains two other components as well.  
 (iv) This food colour is constituted of A and C only.
- (a) ACBD                      (b) CDBA                      (c) BCAD                      (d) DBAC

14. A solution of common salt is taken in a beaker. Some amount of vinegar is poured into it. Then, a mixture of sawdust and coarsely ground chalk is added to it. Four processes given below are carried out to separate the constituents of the above mixture. Arrange the processes in proper sequence in order to separate the components one by one.

- (a) Fractional distillation                      (b) Filtration  
 (c) Evaporation                      (d) Gravity separation
- (a) DBAC                      (b) BDAC                      (c) CABD                      (d) ABCD

15. Match the statements of Column A with those of Column B.

Column A (Types of Mixtures)	Column B (Examples)
(i) Solid–solid homogeneous mixture	(A) Coconut oil and water
(ii) Solid–liquid homogeneous mixture	(B) Petrol and diesel
(iii) Liquid–liquid heterogeneous mixture	(C) Bronze
(iv) Liquid–liquid homogeneous mixture	(D) Finely powdered charcoal in water
(v) Solid–liquid heterogeneous mixture	(E) Saline water

- (a) (i) → (C); (ii) → (E); (iii) → (A); (iv) → (B); (v) → (D)  
 (b) (i) → (B); (ii) → (C); (iii) → (A); (iv) → (D); (v) → (E)  
 (c) (i) → (E); (ii) → (A); (iii) → (B); (iv) → (C); (v) → (D)  
 (d) (i) → (D); (ii) → (B); (iii) → (A); (iv) → (E); (v) → (C)

## Assessment Test III

Time: 30 min.

Space for rough work

**Directions for questions from 1 to 15:** Select the correct answer from the given options.

1. Which of the following statements is true regarding thermal expansion?
  - (a) Solids show maximum thermal expansion.
  - (b) Liquids show maximum thermal expansion.
  - (c) Gases show maximum thermal expansion.
  - (d) Thermal expansion does not depend on the state of a substance.
2. Which of the following does not help to distinguish evaporation and boiling?
  - (a) Temperature at which the phenomenon occurs
  - (b) Portion of the liquid from which they occur
  - (c) Change of state of matter
  - (d) Speed at which they occur
3. Good conductance of electricity is the characteristic of a \_\_\_\_\_.
  - (a) metal
  - (b) non-metal
  - (c) metalloid
  - (d) solid substance
4. Arrange the following in increasing order of atomicity.
  - (A) Phosphorus
  - (B) Iodine
  - (C) Sulphur
  - (D) Ozone

(a) BDAC      (b) DBCA      (c) DBAC      (d) ACBD
5. Arrange the following alloys in the order of their major components given below.

(copper, iron, nickel and aluminium)

  - (A) Monel metal
  - (A) Duralumin
  - (C) German silver
  - (D) Tungsten steel

(a) DCAB      (b) CDAB      (c) BCDA      (d) CDBA
6. Which of the following processes can separate sodium chloride and potassium nitrate?
  - (a) Sublimation
  - (b) Fractional distillation
  - (c) Distillation
  - (d) Fractional crystallization
7. Which of the following has the least density?
  - (a) Potassium
  - (b) Water
  - (c) Mercury
  - (d) Copper

Space for rough work

8. **Assertion (A):** A mixture of alcohol and water can be separated by using a separating funnel.

**Reason (R):** Alcohol and water are miscible liquids.

- (a) Both A and R are true and R is the correct explanation of A.  
 (b) Both A and R are true, but R is not the correct explanation of A.  
 (c) A is true and R is false.  
 (d) A is false and R is true.

9. **Assertion (A):** Critical temperature of  $\text{CO}_2$  is greater than that of  $\text{O}_2$ .

**Reason (R):** Intermolecular force of attraction of  $\text{CO}_2$  is more than that of  $\text{O}_2$ .

- (a) Both A and R are true and R is the correct explanation of A.  
 (b) Both A and R are true, but R is not the correct explanation of A.  
 (c) A is true and R is false.  
 (d) A is false and R is true.

10. Match the entries of Column A with those of Column B.

Column A (Mixture)	Column B (Principle of Suitable Separation Process)
(i) $\text{NH}_4\text{Cl} + \text{KNO}_3$	(A) Difference in the boiling points of components in their liquid state.
(ii) Sulphur + carbon disulphide	(B) Decrease in solubility of a gas in liquid with the decrease in pressure.
(iii) Soda water	(C) One of the components can sublime on heating
(iv) Air	(D) Non-sublimable solid solute in liquid solvent.

- (a) (i)  $\rightarrow$  (C); (ii)  $\rightarrow$  (D); (iii)  $\rightarrow$  (B); (iv)  $\rightarrow$  (A)  
 (b) (i)  $\rightarrow$  (D); (ii)  $\rightarrow$  (C); (iii)  $\rightarrow$  (B); (iv)  $\rightarrow$  (A)  
 (c) (i)  $\rightarrow$  (B); (ii)  $\rightarrow$  (D); (iii)  $\rightarrow$  (C); (iv)  $\rightarrow$  (A)  
 (d) (i)  $\rightarrow$  (C); (ii)  $\rightarrow$  (D); (iii)  $\rightarrow$  (A); (iv)  $\rightarrow$  (B)

11. The order of critical temperature of four gases A, B, C and D is as follows:

$$A > D > C > B$$

Which of the following has the least vapour pressure?

- (a) A                      (b) B                      (c) C                      (d) D

12. The vapour pressure of liquid A is higher than that of liquid B at a particular temperature. Which of the following statements is true?

- (a) The boiling point of A is greater than that of B.  
 (b) The boiling point of B is greater than that of A.  
 (c) They have the same boiling point.  
 (d) The information provided is not sufficient to compare their boiling points.

13. Which of the following is a heterogeneous mixture?
- (a) Milk (b) Soda water  
(c) Solution of sugar (d) Mixture of  $O_2$  and  $H_2$
14. The boiling point of which of the following is the maximum under normal atmospheric pressure?
- (a) Distilled water  
(b) Tap water  
(c) Sea water  
(d) Rain water
15. Skating on ice is possible because \_\_\_\_\_.
- (a) increase in pressure increases the melting point of ice  
(b) increase in pressure decreases the melting point of ice  
(c) the volume of ice expands when it melts  
(d) the density of ice decreases on the application of pressure

**Space** for rough work

# Assessment Test IV

Time: 30 min.

Space for rough work

**Directions for questions from 1 to 15:** Select the correct answer from the given options.

1. If the same amount of heat is supplied to the following substances, which shows the least expansion?  
(a) Iron block  
(b) Water  
(c) Oil  
(d) O<sub>2</sub> gas kept in a cylinder with a movable piston
2. Which of the following is not a characteristic of boiling?  
(a) It is a bulk phenomenon.  
(b) It occurs at a particular temperature.  
(c) Temperature remains constant during the process.  
(d) It is a very slow process.
3. Which of the following liquids can conduct electricity in pure state?  
(a) Water  
(b) Mercury  
(c) Bromine  
(d) Benzene
4. Which of the following is monoatomic?  
(a) Hydrogen  
(b) Chlorine  
(c) Helium  
(d) Nitrogen
5. Which of the following alloys contains copper as the major component?  
(a) Stainless steel  
(b) Monel metal  
(c) Bell metal  
(d) Magnalium
6. Arrange the following processes of separation in the order of the mixtures given below:  
sand + sugar; components of black ink; iron + iodine; powder of naphthalene + common salt  
(A) Magnetic separation  
(B) Sublimation  
(C) Chromatography  
(D) Solvent extraction  
(a) CDAB      (b) ABCD      (c) DCAB      (d) BCDA
7. Arrange the following in the ascending order of their densities.  
(A) Water  
(B) O<sub>2</sub> gas  
(C) A solid block of aluminium  
(D) Ice  
(a) ADCB      (b) BDCA      (c) ACBD      (d) BDAC

8. **Assertion (A):** Ammonium chloride cannot be separated from water by distillation.

**Reason (R):**  $\text{NH}_4\text{Cl}$  dissolves in water.

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true and R is false.
- (d) A is false and R is true.

9. **Assertion (A):**  $\text{NH}_3$  is an easily liquefiable gas.

**Reason (R):** The intermolecular forces of attraction are very less in  $\text{NH}_3$ .

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true and R is false.
- (d) A is false and R is true.

10. Match the statements of Column A with those of Column B.

Column A (Process of Separation)	Column B (Principle Involved in the Process of Separation)
(i) Distillation	(A) Difference in the ease of liquefaction of the component gases.
(ii) Filtration	(B) Immiscible liquids present in distinct layers.
(iii) Preferential liquefaction	(C) Insoluble solid component present in a liquid.
(iv) Separating funnel	(D) Non-sublimable solid solute in liquid solvent and both can be obtained after separation.

- (a) (i)  $\rightarrow$  (C); (ii)  $\rightarrow$  (D); (iii)  $\rightarrow$  (B); (iv)  $\rightarrow$  (A)
- (b) (i)  $\rightarrow$  (D); (ii)  $\rightarrow$  (C); (iii)  $\rightarrow$  (A); (iv)  $\rightarrow$  (B)
- (c) (i)  $\rightarrow$  (D); (ii)  $\rightarrow$  (C); (iii)  $\rightarrow$  (B); (iv)  $\rightarrow$  (A)
- (d) (i)  $\rightarrow$  (B); (ii)  $\rightarrow$  (C); (iii)  $\rightarrow$  (D); (iv)  $\rightarrow$  (A)

11. Gas A can be liquefied easily, but liquefaction of gas B is difficult at a particular temperature. Which of the following conclusions can be drawn from the given statement?

- (a) Vapour pressure of gas A is more than that of gas B at a particular temperature.
- (b) Boiling point of A is lower than that of B.
- (c) Intermolecular force of attraction of A is more than that of B.
- (d) All the above



Space for rough work

12. Which of the following statements is incorrect?
- The higher the vapour pressure, the lower is the boiling point.
  - The higher the boiling point, the greater is the intermolecular force of attraction.
  - Vapour pressure and boiling point are not related to each other.
  - Boiling point of a liquid can be reduced by decreasing external pressure.
13. Which of the following is a homogeneous mixture?
- Muddy water
  - Air
  - Finely powdered chalk in water
  - Mixture of saw dust and iron powder
14. The presence of impurities \_\_\_\_\_ of a liquid.
- increases the boiling point
  - decreases the boiling point
  - cannot alter the boiling point
  - increases the freezing point
15. The melting point of a solid can be increased by increasing pressure on it. Which of the following conclusions can be drawn from this?
- The solid expands on melting.
  - The solid contracts on melting.
  - The density of the solid is very high.
  - The solid contains some impurities.

## Answer Keys

### Assessment Test I

- |         |         |         |         |         |        |        |        |        |         |
|---------|---------|---------|---------|---------|--------|--------|--------|--------|---------|
| 1. (c)  | 2. (c)  | 3. (a)  | 4. (d)  | 5. (d)  | 6. (b) | 7. (d) | 8. (b) | 9. (b) | 10. (b) |
| 11. (a) | 12. (a) | 13. (b) | 14. (d) | 15. (c) |        |        |        |        |         |

### Assessment Test II

- |         |         |         |         |         |        |        |        |        |         |
|---------|---------|---------|---------|---------|--------|--------|--------|--------|---------|
| 1. (c)  | 2. (b)  | 3. (c)  | 4. (a)  | 5. (c)  | 6. (a) | 7. (c) | 8. (c) | 9. (b) | 10. (d) |
| 11. (c) | 12. (c) | 13. (c) | 14. (a) | 15. (a) |        |        |        |        |         |

### Assessment Test III

- |         |         |         |         |         |        |        |        |        |         |
|---------|---------|---------|---------|---------|--------|--------|--------|--------|---------|
| 1. (c)  | 2. (c)  | 3. (a)  | 4. (a)  | 5. (b)  | 6. (d) | 7. (a) | 8. (c) | 9. (a) | 10. (a) |
| 11. (a) | 12. (b) | 13. (a) | 14. (c) | 15. (b) |        |        |        |        |         |

### Assessment Test IV

- |         |         |         |         |         |        |        |        |        |         |
|---------|---------|---------|---------|---------|--------|--------|--------|--------|---------|
| 1. (a)  | 2. (d)  | 3. (b)  | 4. (c)  | 5. (c)  | 6. (c) | 7. (d) | 8. (b) | 9. (c) | 10. (b) |
| 11. (c) | 12. (c) | 13. (b) | 14. (a) | 15. (a) |        |        |        |        |         |

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# Language of Chemistry and Transformation of Substances

## 3



16 S Sulfur 32.066	17 Cl Chlorine 35.4527
34 Se Selenium 78.96	35 Br Bromine 79.904
51 Sb Antimony	52 Te Tellurium
	53 I Iodine

**Reference:** Coursebook - IIT Foundation Chemistry Class 8; Chapter - Language of Chemistry and Transformation of Substances; Page number - 3.1–3.24

## Assessment Test I

Time: 30 min.

**Directions for questions from 1 to 15:** Select the correct answer from the given options.

- A metallic chloride of a trivalent metal M reacts with  $\text{NH}_4\text{OH}$ . Identify the balanced chemical equation.  
(a)  $\text{M}_2\text{Cl}_3 + \text{NH}_4\text{OH} \rightarrow 3\text{NH}_4\text{Cl} + \text{MOH}$   
(b)  $\text{MCl}_3 + \text{NH}_4\text{OH} \rightarrow \text{MOH} + \text{NH}_4\text{Cl}$   
(c)  $\text{M}_3\text{Cl}_2 + \text{NH}_4\text{OH} \rightarrow 2\text{NH}_4\text{Cl} + \text{M}(\text{OH})_3$   
(d)  $\text{MCl}_3 + 3\text{NH}_4\text{OH} \rightarrow \text{M}(\text{OH})_3 + 3\text{NH}_4\text{Cl}$
- The formula of hydride of non-metal 'X' is  $\text{XH}_3$ . X can form different oxides in which X exhibits valencies one unit lower and one unit higher than that in  $\text{XH}_3$ . The formulae of the oxides are \_\_\_\_\_ and \_\_\_\_\_, respectively.  
(a)  $\text{XO}$ ,  $\text{XO}_2$  (b)  $\text{X}_2\text{O}$ ,  $\text{X}_2\text{O}_3$   
(c)  $\text{XO}_2$ ,  $\text{X}_2\text{O}_3$  (d)  $\text{XO}$ ,  $\text{X}_2\text{O}_3$
- A trivalent metal forms salts with 'ic' and 'per' acids of chlorine. The number of oxygen atoms in the salts is respectively \_\_\_\_\_.  
(a) 9, 12 (b) 6, 8 (c) 8, 6 (d) 12, 9
- A non-metal 'X' with electronic configurations 2, 4 forms two oxides in which 'X' shows valencies two and four. Oxide with higher valency is dissolved in water. The acid so produced is treated with  $\text{NaOH}$  to form salt. What could be the formula of the salt?  
(a)  $\text{NaXO}_3$  (b)  $\text{Na}_2\text{XO}_3$   
(c)  $\text{NaXO}_4$  (d)  $\text{Na}_2\text{XO}_4$
- Both the metals 'X' and 'Y' can form two oxides in which their valencies differ by two units. What could be X and Y?  
(a) Cu, Fe (b) Fe, Pb (c) Pb, Sn (d) Sn, Cu

Space for rough work

### 3.2 Chapter 3 Language of Chemistry and Transformation of Substances

Space for rough work

6. A, B, C and D are four elements which have 1, 2, 3, and 6 electrons in valence M shell. The four elements combine with oxygen to form compounds P, Q, R, and S, respectively. Arrange P, Q, R and S in the decreasing order of number of oxygen atoms which combine with one atom of the corresponding element.  
 (a) SRQP (b) SRPQ (c) RSQP (d) RSPQ
7.  $\text{NaOH} + \text{HClO}_4 \rightarrow \text{salt 1}$   
 $\text{Ca(OH)}_2 + 2\text{HClO}_3 \rightarrow \text{salt 2}$   
 $\text{Pb(OH)}_4 + 4\text{HClO}_2 \rightarrow \text{salt 3}$   
 $\text{Fe(OH)}_3 + \text{HOCl} \rightarrow \text{salt 4}$   
 Arrange the salts in the correct order of their number of oxygen atoms.  
 (a) Salt 3 > salt 2 > salt 1 > salt 4  
 (b) Salt 3 > salt 2 > salt 4 > salt 1  
 (c) Salt 2 > salt 3 > salt 1 > salt 4  
 (d) Salt 2 > salt 3 > salt 4 > salt 1
8. Limestone on heating gives solid 'X' which on dissolution in water forms 'Y'. Formation of X and Y are \_\_\_\_\_ and \_\_\_\_\_ reactions, respectively.  
 (a) endothermic, compound–compound combination  
 (b) exothermic, compound–compound combination  
 (c) combination, exothermic  
 (d) endothermic, displacement
9. Metal M forms an oxide with formula  $\text{M}_2\text{O}$ . What is the formula of the compound formed between M and a non-metal A with six electrons in its M shell?  
 (a)  $\text{M}_3\text{A}_2$  (b)  $\text{M}_2\text{A}$  (c)  $\text{MA}_2$  (d)  $\text{M}_2\text{A}_3$
10. Metal with electronic configuration 2, 8, 14, 2 can form two different hydroxides A and B. Both the hydroxides on reaction with sulphuric acid give two salts 'X' and 'Y'. The two salts X and Y are \_\_\_\_\_ and \_\_\_\_\_, respectively.  
 (a)  $\text{MSO}_3, \text{M}_2(\text{SO}_3)_3$  (b)  $\text{MSO}_4, \text{M}_2(\text{SO}_4)_3$   
 (c)  $\text{M}_2\text{SO}_4, \text{MSO}_4$  (d)  $\text{M}_2\text{SO}_4, \text{M}_2(\text{SO}_4)_3$
11. Match the entries of Column A with those of Column B.

Column A (Compound)		Column B	
		Valency of +ve radical	–ve radical
(i) Cupric phosphate	(A)	2	2
(ii) Stannic sulphite	(B)	4	3
(iii) Barium sulphate	(C)	2	3
(iv) Plumbic phosphate	(D)	4	2

Space for rough work

- (a) (i)  $\rightarrow$  (D); (ii)  $\rightarrow$  (C); (iii)  $\rightarrow$  (B); (iv)  $\rightarrow$  (A)  
(b) (i)  $\rightarrow$  (B); (ii)  $\rightarrow$  (C); (iii)  $\rightarrow$  (D); (iv)  $\rightarrow$  (A)  
(c) (i)  $\rightarrow$  (C); (ii)  $\rightarrow$  (D); (iii)  $\rightarrow$  (B); (iv)  $\rightarrow$  (A)  
(d) (i)  $\rightarrow$  (C); (ii)  $\rightarrow$  (D); (iii)  $\rightarrow$  (A); (iv)  $\rightarrow$  (B)

12. The molecular mass of oxide of a metal M is 40 and percentage of metal is 60%. What is the molecular mass of perchlorate of the metal?

- (a) 191                      (b) 223                      (c) 159                      (d) 255

13. The ratio by weight of oxygen that combines with fixed weight of nitrogen in  $\text{NO}$ ,  $\text{NO}_2$ , and  $\text{N}_2\text{O}_3$  is \_\_\_\_\_.

- (a) 2:4:3                      (b) 1:2:3                      (c) 2:3:4                      (d) 2:1:3

14. **Assertion (A):** The ratio of number of metal atoms to total number of atoms in ferric hydrogen phosphate is 1:10.

**Reason (R):** Ferric hydrogen phosphate contains trivalent positive and monovalent -ve ion.

- (a) Both A and R are true and R is the correct explanation of A.  
(b) Both A and R are true, but R is not the correct explanation of A.  
(c) A is true and R is false.  
(d) A is false and R is true.

15. **Assertion (A):** Green colour of  $\text{FeSO}_4$  solution fades away when Zn rod is dipped in it but not Ni rod.

**Reason (R):** The order of reactivity is  $\text{Ni} > \text{Zn} > \text{Fe}$ .

- (a) Both A and R are true and R is the correct explanation of A.  
(b) Both A and R are true, but R is not the correct explanation of A.  
(c) A is true and R is false.  
(d) A is false and R is true.

## Assessment Test II

Time: 30 min.

Space for rough work

**Directions for questions from 1 to 15:** Select the correct answer from the given options.

- Bivalent metal hydroxide reacts with perchloric acid to form corresponding salt and water. Identify the balanced chemical equation.
  - $M(OH)_2 + 2HClO_4 \rightarrow M(ClO_4)_2 + 2H_2O$
  - $M(OH)_2 + 2HClO_3 \rightarrow M(ClO_3)_2 + 2H_2O$
  - $M(OH)_3 + 3HClO_4 \rightarrow M(ClO_4)_3 + 3H_2O$
  - $M(OH)_3 + 3HClO_3 \rightarrow M(ClO_3)_3 + 3H_2O$
- The formula of hydride of non-metal Y is  $H_2Y$ . Y can form different oxides in which Y shows valencies which differ by two units. The difference in valencies of Y in its lower oxide and hydride is also 2. Then, the formulae of the two oxides are \_\_\_\_\_ and \_\_\_\_\_.
  - YO,  $YO_2$
  - $YO_2$ ,  $YO_3$
  - $Y_2O_3$ ,  $Y_2O_5$
  - $YO_2$ ,  $Y_2O_3$
- The monovalent positive radical has four hydrogen atoms and a bivalent negative radical has four oxygen atoms. What could be the formula of the salt formed by these two radicals?
  - $AH_4(BO_3)_2$
  - $(AH_4)_3BO_4$
  - $AH_3BO_4$
  - $(AH_4)_2BO_4$
- An acid contains three hydrogen atoms, one non-metal 'X', and four oxygen atoms. What could be the formula of the salt formed when the acid is treated with bivalent metal hydroxide?
  - $M_2(XO_4)_3$
  - $MXO_4$
  - $M_3(XO_4)_2$
  - $M(XO_4)_2$
- Both metals 'A' and 'B' can form two oxides, and their valencies differ by one unit. What could be A and B?
  - Cu, Hg
  - Sn, Cu
  - Pb, Hg
  - Pb, Sn
- Non-metal A forms four oxides P, Q, R and S in which the valencies of A are 3, 2, 5 and 1, respectively. Arrange P, Q, R and S in the descending order of number of oxygen atoms which combine with one atom of non-metal A.
  - R, P, Q, S
  - P, R, Q, S
  - R, P, S, Q
  - P, R, S, Q

Space for rough work

7. Arrange the carbonate, sulphate, chlorite, and hydroxide radicals in the correct order of number of oxygen atoms.
- Chlorite > carbonate > sulphate > hydroxide
  - Carbonate > hydroxide > chlorite > sulphate
  - Hydroxide < chlorite < carbonate < sulphate
  - Sulphate > chlorite > carbonate > hydroxide
8. Slaked lime turns milky on treatment with carbon dioxide. The reaction is a \_\_\_\_\_ and \_\_\_\_\_ reaction.
- Precipitation, neutralisation
  - Precipitation, redox
  - Double displacement, redox
  - Redox, displacement
9. The formula of hydride of a metal 'X' is  $\text{XH}_2$ . What will be the formula of compound formed between X and a non-metal 'Y' with five electrons in its M shell?
- $\text{X}_2\text{Y}_3$
  - $\text{X}_3\text{Y}_2$
  - $\text{XY}_2$
  - $\text{X}_2\text{Y}$
10. The electronic configuration of a metal 'M' is 2, 8, 18, 1. What could be the formulae of nitrate and nitrides of metal M?
- $\text{MNO}_3$ ,  $\text{M}(\text{NO}_3)_2$ ,  $\text{M}_3\text{N}$ ,  $\text{M}_3\text{N}_2$
  - $\text{MNO}_3$ ,  $\text{M}_3\text{N}$ ,  $\text{M}_2(\text{NO}_3)_2$ ,  $\text{M}_3\text{N}_2$
  - $\text{M}(\text{NO}_3)_2$ ,  $\text{M}_3\text{N}_2$  only
  - $\text{MNO}_3$ ,  $\text{M}_3\text{N}_2$  only
11. Match the entries of Column A with those of Column B.

Column A (Compound)	Column B (Total No. of Atoms)
(i) Mercuric oxide	(A) 8
(ii) Sodium peroxide	(B) 6
(iii) Ferrous sulphate	(C) 4
(iv) Sodium phosphate	(D) 2

- (i)  $\rightarrow$  (B); (ii)  $\rightarrow$  (C); (iii)  $\rightarrow$  (D); (iv)  $\rightarrow$  (A)
- (i)  $\rightarrow$  (C); (ii)  $\rightarrow$  (D); (iii)  $\rightarrow$  (A); (iv)  $\rightarrow$  (B)
- (i)  $\rightarrow$  (D); (ii)  $\rightarrow$  (A); (iii)  $\rightarrow$  (B); (iv)  $\rightarrow$  (C)
- (i)  $\rightarrow$  (D); (ii)  $\rightarrow$  (C); (iii)  $\rightarrow$  (B); (iv)  $\rightarrow$  (A)

12. Identify the compound with molecular weight 100.
- $\text{H}_2\text{SO}_4$
  - $\text{H}_3\text{PO}_4$
  - $\text{CaCO}_3$
  - $\text{Fe}(\text{OH})_3$

13. The ratio by weight of oxygen that combines with fixed weight of nitrogen in three oxides is 1:5:2. The oxides are \_\_\_\_\_.

- (a)  $\text{N}_2\text{O}_3$ ,  $\text{N}_2\text{O}_5$  and  $\text{NO}_2$
- (b)  $\text{NO}$ ,  $\text{N}_2\text{O}_5$  and  $\text{NO}_2$
- (c)  $\text{N}_2\text{O}$ ,  $\text{N}_2\text{O}_3$  and  $\text{NO}_2$
- (d)  $\text{N}_2\text{O}$ ,  $\text{N}_2\text{O}_5$  and  $\text{NO}$

14. **Assertion (A):** In a compound, the total positive charge is equal to that of negative charge.

**Reason (R):** In a compound, the total number of atoms in positive ion is always equal to that of negative ion.

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true and R is false.
- (d) A is false and R is true.

15. **Assertion (A):** Both Al and Zn liberate hydrogen with dilute hydrochloric acid.

**Reason (R):** Both Al and Zn are more reactive than hydrogen, and the reactivity order is  $\text{Zn} > \text{Al} > \text{H}$ .

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true and R is false.
- (d) A is false and R is true.



# Assessment Test III

Time: 30 min.

Space for rough work

**Directions for questions from 1 to 15:** Select the correct answer from the given options.

1. **Assertion (A):** Burning of a candle involves both physical and chemical changes.

**Reason (R):** During the burning of a candle, the physical state and the composition change.

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true and R is false.
- (d) A is false and R is true.

2. **Assertion (A):** The formula of calcium phosphide is  $\text{Ca}_2\text{P}_3$ .

**Reason (R):** In a molecule of a compound, the total positive charges and the total negative charges are equal.

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true and R is false.
- (d) A is false and R is true.

3. Arrange the following compounds in the increasing order of valency of positive radical.



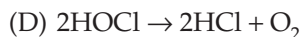
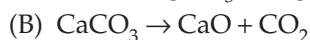
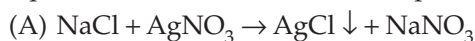
(a) ADCB

(b) DABC

(c) DACB

(d) ADBC

4. Arrange the following reactions in the order of neutralization reaction, precipitation reaction, thermal decomposition and photolysis.



(a) ACDB

(b) CABD

(c) CADB

(d) ACBD

**3.8 Chapter 3 Language of Chemistry and Transformation of Substances**

5. Match the entries of Column A with those of Column B.

Column A	Column B
(i) Sodium chlorate	(A) $\text{NaNO}_3$
(ii) Sodium chlorite	(B) $\text{NaNO}_2$
(iii) Sodium nitrate	(C) $\text{NaClO}_4$
(iv) Sodium nitrite	(D) $\text{NaClO}_3$
	(E) $\text{Na}(\text{NO}_3)_2$
	(F) $\text{NaClO}_2$

- (a) (i)  $\rightarrow$  (D); (ii)  $\rightarrow$  (F); (iii)  $\rightarrow$  (B); (iv)  $\rightarrow$  (A)  
(b) (i)  $\rightarrow$  (D); (ii)  $\rightarrow$  (F); (iii)  $\rightarrow$  (A); (iv)  $\rightarrow$  (B)  
(c) (i)  $\rightarrow$  (F); (ii)  $\rightarrow$  (D); (iii)  $\rightarrow$  (A); (iv)  $\rightarrow$  (B)  
(d) (i)  $\rightarrow$  (F); (ii)  $\rightarrow$  (D); (iii)  $\rightarrow$  (B); (iv)  $\rightarrow$  (A)

6. Which among the following is a balanced chemical equation?

- (a)  $3\text{CuO} + 2\text{NH}_3 \rightarrow \text{Cu} + \text{N}_2 + 3\text{H}_2\text{O}$   
(b)  $2\text{NH}_3 + \text{O}_2 \rightarrow 2\text{NO} + 3\text{H}_2\text{O}$   
(c)  $2\text{Ca}_3(\text{PO}_4)_2 + 2\text{SiO}_2 \rightarrow 6\text{CaSiO}_3 + \text{P}_4\text{O}_{10}$   
(d)  $\text{S} + 2\text{H}_2\text{SO}_4 \rightarrow 3\text{SO}_2 + 2\text{H}_2\text{O}$

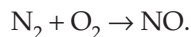
7. The atomic weight of a trivalent metal is 27. Calculate the molecular mass of its sulphate.

- (a) 294                      (b) 342                      (c) 318                      (d) 366

8.  $\text{H}_2 + \text{Cl}_2 \rightarrow 2\text{HCl}$ . The reaction is \_\_\_\_\_ as well as \_\_\_\_\_.

- (a) synthesis, displacement                      (b) analysis, combination  
(c) synthesis, combination                      (d) analysis, displacement

9. Study the reaction given below and calculate the weight of oxygen required to produce 45 g of NO?



- (a) 32 g                      (b) 24 g                      (c) 48 g                      (d) 56 g

10. In which among the following compounds, the metal shows maximum valency?

- (a)  $\text{Na}_2\text{O}$                       (b)  $\text{ZnO}$                       (c)  $\text{Fe}_2\text{O}_3$                       (d)  $\text{PbO}_2$

11. The ratio of weight of oxygen combining with fixed weight of sulphur in  $\text{SO}_2$  and  $\text{SO}_3$  is \_\_\_\_\_.

- (a) 3:2                      (b) 2:3                      (c) 2:1                      (d) 1:2

12. Which among the following elements possesses maximum atomic mass?

- (a) Al                      (b) S                      (c) Ca                      (d) O

Space for rough work

13. Symbol of lead is \_\_\_\_\_.

(a) Pd

(b) W

(c) Pb

(d) Sn

14. Which among the following is a salt of 'ic' acid?

(a)  $\text{NaNO}_2$

(b)  $\text{Na}_2\text{SO}_3$

(c)  $\text{Na}_2\text{SO}_4$

(d)  $\text{NaClO}_2$

15. For which among the following reactions sound energy is required?

(a)  $2\text{KClO}_3 \rightarrow 2\text{KCl} + 3\text{O}_2$

(b)  $\text{C}_2\text{H}_2 \rightarrow 2\text{C} + \text{H}_2$

(c)  $2\text{AgCl} \rightarrow 2\text{Ag} + \text{Cl}_2$

(d)  $2\text{H}_2\text{O} \rightarrow 2\text{H}_2 + \text{O}_2$

Space for rough work

## Assessment Test IV

Time: 30 min.

Space for rough work

**Directions for questions from 1 to 15:** Select the correct answer from the given options.

1. **Assertion (A):** Heating of ammonium chloride involves only physical change.

**Reason (R):** Ammonium chloride on heating decomposes to ammonia and hydrogen chloride.

- (a) Both A and R are true and R is the correct explanation of A.  
 (b) Both A and R are true, but R is not the correct explanation of A.  
 (c) A is true and R is false.  
 (d) A is false and R is true.

2. **Assertion (A):** Criss-cross method is used to derive the formula of the compounds.

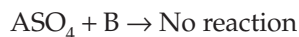
**Reason (R):** The molecule of any compound is neutral.

- (a) Both A and R are true and R is the correct explanation of A.  
 (b) Both A and R are true, but R is not the correct explanation of A.  
 (c) A is true and R is false.  
 (d) A is false and R is true.

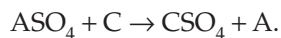
3. Arrange the following negative radicals in the descending order of the magnitude of charges.

- |              |             |
|--------------|-------------|
| (A) Fluoride | (B) Oxide   |
| (C) Nitride  | (D) Carbide |
| (a) DCBA     | (b) DCAB    |
| (c) DCAB     | (d) CDAB    |

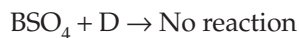
4. A, B, C and D are divalent metals which show the following reactions.



(aq)



(aq)



(aq)

Arrange A, B, C and D in the descending order of their reactivity.

- |          |          |
|----------|----------|
| (a) CABD | (b) CADB |
| (c) ACBD | (d) ACDB |

5. Match the entries of Column A with those of Column B.

Column A (Formula)	Column B (Total Positive Charge)
(i) Zinc nitride	(A) 2
(ii) Plumbic chloride	(B) 3
(iii) Sodium phosphate	(C) 5
(iv) Calcium nitrate	(D) 4
	(E) 1
	(F) 6

- (a) (i) → (D); (ii) → (F); (iii) → (B); (iv) → (A)  
 (b) (i) → (D); (ii) → (F); (iii) → (A); (iv) → (B)  
 (c) (i) → (F); (ii) → (D); (iii) → (A); (iv) → (B)  
 (d) (i) → (F); (ii) → (D); (iii) → (B); (iv) → (A)

6. Identify  $a$  and  $b$  from the following equation:  $a \text{ HNO}_3 + \text{S} \rightarrow \text{H}_2\text{SO}_4 + 6\text{NO}_2 + b \text{H}_2\text{O}$ .

- (a)  $a = 6, b = 2$  (b)  $a = 6, b = 3$   
 (c)  $a = 6, b = 4$  (d)  $a = 4, b = 2$

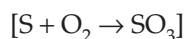
7. Molecular mass of phosphate of divalent metal is 262. Find the atomic mass of the metal.

- (a) 24 (b) 27 (c) 40 (d) 23

8. Which among the following is an analysis reaction?

- (a)  $2\text{Na} + \text{Cl}_2 \rightarrow 2\text{NaCl}$  (b)  $2\text{NaCl} \rightarrow 2\text{Na} + \text{Cl}_2$   
 (c)  $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$  (d)  $2\text{HOCl} \rightarrow 2\text{HCl} + \text{O}_2$

9. 40 g of sulphur on treatment with sufficient amount of oxygen gives how many grams of  $\text{SO}_3$ ?



- (a) 100 g (b) 140 g (c) 75 g (d) 85 g

10. Which among the following metals shows variable valency?

- (a) Fe (b) Mg (c) Zn (d) Al

11. The ratio of weight of nitrogen combining with fixed weight of oxygen in  $\text{N}_2\text{O}$ ,  $\text{NO}$ , and  $\text{N}_2\text{O}_5$  is \_\_\_\_\_.

- (a) 10:5:4 (b) 10:5:2 (c) 10:5:1 (d) 10:5:3

12. The atomic mass of an element is 24. What is the element?

- (a) Mg (b) S (c) Na (d) Cr

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13. Greek name of antimony is\_\_\_\_\_.
- (a) *kalium* (b) *natrium*  
(c) *stannum* (d) *stibnum*
14. Identify the binary acid among the following.
- (a) Nitric acid (b) Hydrochloric acid  
(c) Phosphoric acid (d) Sulphuric acid
15. Identify the photochemical reaction among the following.
- (a) Photosynthesis (b) Respiration  
(c) Rusting (d) Combustion

**Space** for rough work

## Answer Keys

### Assessment Test I

1. (d) 2. (a) 3. (a) 4. (b) 5. (c) 6. (a) 7. (a) 8. (a) 9. (b) 10. (b)  
11. (d) 12. (b) 13. (a) 14. (c) 15. (c)

### Assessment Test II

1. (a) 2. (b) 3. (d) 4. (c) 5. (a) 6. (a) 7. (c) 8. (a) 9. (b) 10. (a)  
11. (d) 12. (c) 13. (d) 14. (c) 15. (c)

### Assessment Test III

1. (a) 2. (d) 3. (b) 4. (b) 5. (b) 6. (d) 7. (b) 8. (c) 9. (b) 10. (d)  
11. (b) 12. (c) 13. (c) 14. (c) 15. (b)

### Assessment Test IV

1. (d) 2. (a) 3. (a) 4. (a) 5. (d) 6. (a) 7. (a) 8. (b) 9. (a) 10. (a)  
11. (b) 12. (a) 13. (d) 14. (b) 15. (a)

# Air and Oxygen

# 4



16 S Sulfur 32.066	17 Cl Chlorine 35.4527
34 Se Selenium 78.96	35 Br Bromine 79.904
51 Sb Antimony	52 Te Tellurium
	53 I Iodine

**Reference:** Coursebook - IIT Foundation Chemistry Class 8; Chapter - Air and Oxygen; Page number - 4.1–4.21

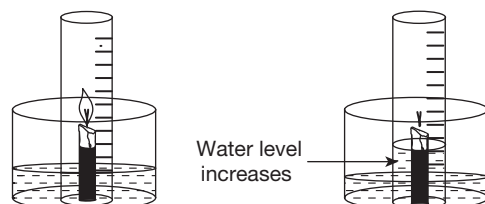
## Assessment Test I

**Time: 30 min.**

**Directions for questions from 1 to 15:** Select the correct answer from the given options.

**Space** for rough work

- In which of the following layers of atmosphere, the temperature increases with the increase in altitude?  
(a) Troposphere (b) Stratosphere  
(c) Mesosphere (d) Thermosphere
- The height of the mercury column in barometer is 19 cm at a certain place. Calculate the pressure in Pascal in that place. (1 atm = 101.3 kilopascals)  
(a) 39,925 (b) 1,01,292 (c) 25,323 (d) 30,353
- Which of the following is the conclusion drawn from the experiment given below?



- Nitrogen is the major component of air.
  - $\text{CO}_2$  is present in air.
  - $\text{O}_2$  is one of the components of air.
  - One-fifth of the volume of air is oxygen.
- Which of the following processes does not consume  $\text{O}_2$ ?  
(a) Photosynthesis (b) Respiration  
(c) Burning of fuel (d) Rusting
  - Which of the following is an example of rapid combustion?  
(a) Burning of white phosphorus  
(b) Burning of petrol  
(c) Burning of crackers  
(d) Burning of sodium in moist air

6. The innermost zone of a candle flame is \_\_\_\_\_.  
(a) the coldest zone (b) the hottest zone  
(c) the luminous zone (d) the non-luminous zone
7. Which of the following metals can form a mixed oxide on reaction with  $O_2$ ?  
(a) Al (b) Cu (c) Ag (d) Fe
8. Identify the products formed when a mixture of  $NH_3$  and  $O_2$  in 4:5 ratio is passed over platinum gauze at  $800^\circ C$ .  
(a) NO and  $H_2O$  (b)  $N_2$  and  $H_2O$   
(c)  $NO_2$  and  $H_2$  (d) NO and  $H_2$
9. Identify the correct product.  
(a)  $H_2S + O_2 \rightarrow H_2O + SO_2$  (b)  $H_2S + O_2 \rightarrow S + H_2O$   
(c)  $H_2S + O_2 \rightarrow H_2SO_4$  (d)  $H_2S + O_2 \rightarrow SO_2 + H_2$
10. For making surgical instruments, which of the following processes can be adopted for prevention of corrosion of iron?  
(a) Galvanization (b) Tinning  
(c) Electroplating (d) Alloying
11. **Assertion (A):** Oxygen is used for the combustion of fuel.  
**Reason (R):** Combustion is an exothermic reaction.  
(a) Both A and R are true and R is the correct explanation of A.  
(b) Both A and R are true, but R is not the correct explanation of A.  
(c) A is true and R is false.  
(d) A is false and R is true.
12. **Assertion (A):** Air supports combustion.  
**Reason (R):** Air is a mixture of different gases.  
(a) Both A and R are true and R is the correct explanation of A.  
(b) Both A and R are true, but R is not the correct explanation of A.  
(c) A is true and R is false.  
(d) A is false and R is true.
13. Arrange the following measures/equipment for controlling pollution in the order of the pollutants mentioned below.  
(A) Usage of scrubber in industries  
(B) Controlling deforestation  
(C) Developing a suitable substituent for the refrigerant used in A/C, refrigerator, etc.  
(D) Usage of electrostatic precipitators in industries



(Suspended particulate matter, CFCs, oxides of sulphur and excess  $\text{CO}_2$  in atmosphere)

- (a) DACB                      (b) BCDA                      (c) DCBA                      (d) DCAB

14. Arrange the following products of oxidation of non-metals in the order of their description given below.

- (A)  $\text{P}_2\text{O}_5$                       (B)  $\text{NO}_2$                       (C)  $\text{CO}_2$                       (D) NO

Description:

- (i) The gas produces a brown coloured gas on oxidation.  
 (ii) The gas used in fire extinguishers.  
 (iii) A brown coloured gas  
 (iv) A dense white fume

- (a) DACB                      (b) DCBA                      (c) BDCA                      (d) CDBA

15. Match the entries of Column A with those of Column B.

Column A (Formation of $\text{O}_2$ From Different Metallic Oxides by Heating)	Column B (Observation)
(i) $\text{PbO}_2$	(A) Reddish brown residue turns yellow on cooling.
(ii) $\text{HgO}$	(B) Silvery white globules are formed.
(iii) $\text{Pb}_3\text{O}_4$	(C) Mirror like surface near the cooler parts of the test tube.
(iv) $\text{Ag}_2\text{O}$	(D) Chocolate brown coloured substance turns yellow.

- (a) (i)  $\rightarrow$  (D); (ii)  $\rightarrow$  (B); (iii)  $\rightarrow$  (C); (iv)  $\rightarrow$  (A)  
 (b) (i)  $\rightarrow$  (D); (ii)  $\rightarrow$  (C); (iii)  $\rightarrow$  (B); (iv)  $\rightarrow$  (A)  
 (c) (i)  $\rightarrow$  (D); (ii)  $\rightarrow$  (A); (iii)  $\rightarrow$  (B); (iv)  $\rightarrow$  (C)  
 (d) (i)  $\rightarrow$  (D); (ii)  $\rightarrow$  (C); (iii)  $\rightarrow$  (A); (iv)  $\rightarrow$  (B)

Space for rough work

## Assessment Test II

Time: 30 min.

Space for rough work

**Directions for questions from 1 to 15:** Select the correct answer from the given options.

1. Which of the following layers of the atmosphere exists in plasma state (ionic state)?  
(a) Troposphere (b) Stratosphere  
(c) Mesosphere (d) Thermosphere
2. At certain altitude, the atmospheric pressure is 0.05 atm. What would be the length of the mercury column in the barometer?  
(a) 3.8 cm (b) 7.6 cm  
(c) 1.9 cm (d) 2.5 cm
3. The percentage of which of the following components of air always varies from one place to the other?  
(a)  $O_2$  (b)  $N_2$   
(c) Water vapour (d)  $CO_2$
4. Which of the following processes does not produce  $O_2$ ?  
(a) Heating of red lead (b) Photosynthesis  
(c) Mixing of  $MnO_2$  and  $H_2O_2$  (d) Combustion
5. Respiration is a \_\_\_\_\_.  
(a) spontaneous combustion (b) rapid combustion  
(c) slow combustion (d) explosion
6. Which of the following is not the characteristic feature of the outermost zone of the flame of a candle?  
(a) This zone is non-luminous. (b) Carbon particles burn here.  
(c) It does not produce any soot. (d) It is the hottest zone.
7. Which of the following metals can protect itself from further oxidation?  
(a) Ca (b) Al (c) Cu (d) K
8. Identify the products formed when ammonia is burnt in limited supply of  $O_2$ .  
(a)  $N_2O$  and  $H_2O$  (b)  $NO$  and  $H_2O$   
(c)  $NO_2$  and  $H_2O$  (d)  $N_2$  and  $H_2O$
9. Identify the correct product.  
(a)  $FeS_2 + O_2 \rightarrow FeO + SO_2$  (b)  $FeS_2 + O_2 \rightarrow FeO + S$   
(c)  $FeS_2 + O_2 \rightarrow Fe_2O_3 + S$  (d)  $FeS_2 + O_2 \rightarrow Fe_2O_3 + SO_2$
10. For manufacturing the containers for storing edible materials like oils, fruit juices, etc., which of the following methods can be adopted for prevention of corrosion of iron?

Space for rough work

- (a) Electroplating (b) Galvanizing  
(c) Tinning (d) Alloying

11. **Assertion (A):** Oxyacetylene flame is used for welding purposes.

**Reason (R):** Combustion of acetylene is an example of rapid combustion.

- (a) Both A and R are true and R is the correct explanation of A.  
(b) Both A and R are true, but R is not the correct explanation of A.  
(c) A is true and R is false.  
(d) A is false and R is true.

12. **Assertion (A):** When air is passed through lime water, it turns milky.

**Reason (R):** Constituents of a mixture retain their properties.

- (a) Both A and R are true and R is the correct explanation of A.  
(b) Both A and R are true, but R is not the correct explanation of A.  
(c) A is true and R is false.  
(d) A is false and R is true.

13. Arrange the following pollutants in the order of their effects mentioned below.

- (A) Fly ash (B) CFCs  
(C)  $\text{SO}_2$  (D) Ozone

(Acid rain, global warming, bronchitis and other respiratory disorders, and ozone depletion)

- (a) DCAB (b) ACBD  
(c) CDAB (d) BCDA

14. Arrange the following oxides of metals in the order of their description given below.

- (A)  $\text{Al}_2\text{O}_3$  (B)  $\text{CuO}$   
(C)  $\text{CaO}$  (D)  $\text{Fe}_3\text{O}_4$

Description:

- (i) This oxide is black in colour.  
(ii) This oxide protects the metal from further oxidation.  
(iii) This brown coloured powdery oxide is formed with a cracking noise when the metal is heated at high temperature.  
(iv) This white coloured oxide is formed on slight heating of the metal.  
(a) BADC (b) DCBA  
(c) ACBD (d) CDAB

15. Match the entries of Column A with those of Column B.

Column A (Compounds Used for the Formation of $O_2$ )	Column B (Related Features of the Reaction Involved)
(i) $H_2O_2$	(A) $MnO_2$ reduces the melting point as well as decomposition temperature of the reactant.
(ii) $KMnO_4$	(B) Metallic nitrite is the solid product.
(iii) $KClO_3$	(C) No heating is required.
(iv) $NaNO_3$	(D) $MnO_2$ is one of the solid products.

- (a) (i)  $\rightarrow$  (C); (ii)  $\rightarrow$  (A); (iii)  $\rightarrow$  (D); (iv)  $\rightarrow$  (B)  
(b) (i)  $\rightarrow$  (C); (ii)  $\rightarrow$  (B); (iii)  $\rightarrow$  (A); (iv)  $\rightarrow$  (D)  
(c) (i)  $\rightarrow$  (C); (ii)  $\rightarrow$  (D); (iii)  $\rightarrow$  (A); (iv)  $\rightarrow$  (B)  
(d) (i)  $\rightarrow$  (C); (ii)  $\rightarrow$  (D); (iii)  $\rightarrow$  (B); (iv)  $\rightarrow$  (A)

Space for rough work

# Assessment Test III

Time: 30 min.

Space for rough work

**Directions for questions from 1 to 15:** Select the correct answer from the given options.

1. **Assertion (A):** At higher altitude, the height of the mercury column in a barometer decreases.

**Reason (R):** Atmospheric pressure decreases with an increase in altitude.

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true and R is false.
- (d) A is false and R is true.

2. **Assertion (A):**  $\text{MnO}_2$  is used in the preparation of  $\text{O}_2$  from  $\text{KClO}_3$ .

**Reason (R):**  $\text{MnO}_2$  acts as a positive catalyst and decreases the melting point of  $\text{KClO}_3$ .

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true and R is false.
- (d) A is false and R is true.

3. Arrange the layers of atmosphere in the order of the descriptions given below.

- (i) Meteorites burn in this layer.
- (ii) This layer reflects radio signals.
- (iii) Ozone layer is present.
- (iv) Weather phenomena occur.

- |                 |                  |
|-----------------|------------------|
| (A) Ionosphere  | (B) Stratosphere |
| (C) Troposphere | (D) Mesosphere   |
| (a) CDAB        | (b) DABC         |
| (c) DCAB        | (d) CDBA         |

4.  $\text{Na} + \text{O}_2 \rightarrow \text{product A}$

$\text{Al} + \text{O}_2 \rightarrow \text{product B}$

$\text{Fe} + \text{O}_2 \rightarrow \text{product C}$

$\text{S} + \text{O}_2 \rightarrow \text{product D}$

Study the following reactions and arrange the products in the increasing order of the number of oxygen atoms present in one molecule, considering product C as mixed oxide and product D as lower oxide.

- |          |          |
|----------|----------|
| (a) DACB | (b) ADBC |
| (c) ADCB | (d) DABC |

5. Match the statements of Column A with those of Column B.

Column A	Column B
(i) Rapid combustion	(A) Substance burns to produce excess amount of gas with the liberation of heat.
(ii) Spontaneous combustion	(B) Substance burns rapidly as long as the combustible substance is available.
(iii) Explosion	(C) Substance burns in air at room temperature.

(a) (i) → (C); (ii) → (A); (iii) → (B)

(b) (i) → (B); (ii) → (C); (iii) → (A)

(c) (i) → (A); (ii) → (C); (iii) → (B)

(d) (i) → (C); (ii) → (B); (iii) → (A)

6. In the process of laboratory preparation of oxygen, oxygen gas is collected by the \_\_\_\_\_.

- (a) downward displacement of water
- (b) downward displacement of air
- (c) upward displacement of water
- (d) upward displacement of air

7. Identify the true statement among the following regarding LPG and kerosene stove.

- (a) Both can be lighted by automatic gas lighter.
- (b) Both cannot be lighted by automatic gas lighter.
- (c) LPG stove can be lighted by automatic gas lighter but not kerosene stove.
- (d) Kerosene stove can be lighted by automatic gas lighter but not LPG stove.

8. Which of the following methods is used to prevent corrosion of containers that are used for storing edible materials?

- (a) Galvanization
- (b) Electroplating
- (c) Painting
- (d) Tinning

9. The major source of most of the air pollutants is \_\_\_\_\_.

- (a) industries
- (b) automobiles
- (c) thermal power
- (d) deforestation

10. Reaction between oxygen and hydrogen produces a lot of heat energy. This is exploited in which of the following uses of  $O_2$ ?

- (a) Stimulation for breathing
- (b) As anaesthetic
- (c) Respiration
- (d) Welding

Space for rough work

Space for rough work

11. In which among the following reactions, white globules are formed?
- (a)  $\text{Pb}_3\text{O}_4 \rightarrow \text{PbO} + \text{O}_2$                       (b)  $\text{Ag}_2\text{O} \rightarrow \text{Ag} + \text{O}_2$   
(c)  $\text{PbO}_2 \rightarrow \text{PbO} + \text{O}_2$                       (d)  $\text{HgO} \rightarrow \text{Hg} + \text{O}_2$
12. Study the following reaction and identify the metal.
- $$3\text{NH}_3 + 5\text{O}_2 \xrightarrow[\text{Metal}]{800^\circ\text{C}} 4\text{NO} + 6\text{H}_2\text{O}$$
- (a) Cr                      (b) Pt                      (c) Pd                      (d) Zn
13. Which among the following gases turns alkaline pyrogallol to dark brown?
- (a)  $\text{O}_2$                       (b)  $\text{CO}_2$   
(c)  $\text{SO}_2$                       (d)  $\text{NO}_2$
14. Identify the true statement regarding the innermost zone of candle flame.
- (a) Flame is orange coloured.  
(b) It is the hottest zone.  
(c) It is also known as zone of unburnt wax vapours.  
(d) It is the luminous zone.
15. Which among the following is not a measure to reduce global warming?
- (a) Controlling deforestation  
(b) Safe disposal of industrial waste  
(c) Reduction in the use of fossil fuels  
(d) Restricting the use of CFCs

## Assessment Test IV

Time: 30 min.

Space for rough work

**Directions for questions from 1 to 15:** Select the correct answer from the given options.

1. **Assertion (A):** Mercury is used as barometric liquid.

**Reason (R):** Mercury can rise to a longer column.

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true and R is false.
- (d) A is false and R is true.

2. **Assertion (A):** Preparation of  $O_2$  from  $H_2O_2$  has an advantage over its preparation from  $KClO_3$  and  $KMnO_4$ .

**Reason (R):**  $H_2O_2$  gives pure oxygen.

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true and R is false.
- (d) A is false and R is true.

3. Arrange the following layers in the order of the descriptions about them given below.

- (i) Very high temperatures are present.
- (ii) Temperature of this layer is lower than other layers.
- (iii) Temperature increases up to a range of  $0^\circ\text{C} - 10^\circ\text{C}$ .
- (iv) Temperature decreases up to about  $-50^\circ\text{C}$ .

- |                  |                 |
|------------------|-----------------|
| (A) Mesosphere   | (B) Ionosphere  |
| (C) Stratosphere | (D) Troposphere |
| (a) BACD         | (b) BADC        |
| (c) ABCD         | (d) ABDC        |

4. The following statements are reactions of various metals with  $O_2$ .

- (i) Reddish brown powder is formed.
- (ii) Black powder is formed.
- (iii) Slight heating is required.
- (iv) Reacts vigorously

Arrange the following metals in the order of the above observations.

- |              |          |
|--------------|----------|
| (A) Cu       | (B) Fe   |
| (C) Moist Na | (D) Ca   |
| (a) BADC     | (b) BACD |
| (c) ABDC     | (d) ABCD |



5. Match the statements of Column A with those of Column B.

Column A	Column B
(i) Rapid combustion	(A) Burning of sodium in moist air
(ii) Explosion	(B) Burning of fuel gas
(iii) Spontaneous combustion	(C) Burning of crackers

- (a) (i) → (C); (ii) → (A); (iii) → (B)  
 (b) (i) → (B); (ii) → (C); (iii) → (A)  
 (c) (i) → (A); (ii) → (C); (iii) → (B)  
 (d) (i) → (C); (ii) → (B); (iii) → (A)

6. Identify the true statement regarding oxygen.

- (a) O<sub>2</sub> is highly soluble in water.  
 (b) O<sub>2</sub> is insoluble in water.  
 (c) O<sub>2</sub> is slightly soluble in water.  
 (d) O<sub>2</sub> is lighter than air.

7. Which among the following has the least ignition temperature?

- (a) Kerosene (b) LPG  
 (c) CNG (d) Petrol

8. Surgical instruments and utensils do not get corroded since the material used to manufacture them is \_\_\_\_\_ for prevention of corrosion.

- (a) alloyed (b) tinned  
 (c) galvanized (d) electroplated

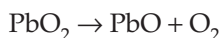
9. Which among the following pairs of pollutants are not produced by automobiles?

- (a) CFC, SO<sub>2</sub> (b) Fly ash, SO<sub>2</sub>  
 (c) CFC, Fly ash (d) SO<sub>2</sub>, CO<sub>2</sub>

10. Which of the following does not involve the usage of oxygen?

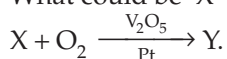
- (a) Combustion (b) Respiration  
 (c) Photosynthesis (d) Manufacture of oxyacids

11. Identify the colour change in the given reaction.



- (a) Yellow to brown (b) Black to yellow  
 (c) Brown to yellow (d) Yellow to black

12. What could be 'X' and 'Y' in the following reaction?



- (a) X → SO<sub>2</sub>, Y → SO<sub>3</sub> (b) X → CO, Y → CO<sub>2</sub>  
 (c) X → NO, Y → NO<sub>2</sub> (d) X → P<sub>2</sub>O<sub>3</sub>, Y → P<sub>2</sub>O<sub>5</sub>

Space for rough work

13. Oxygen turns a colourless gas 'X' to reddish brown colour gas 'Y'. Identify X and Y.
- (a)  $X \rightarrow \text{CO}, Y \rightarrow \text{CO}_2$  (b)  $X \rightarrow \text{SO}_2, Y \rightarrow \text{SO}_3$   
 (c)  $X \rightarrow \text{NO}, Y \rightarrow \text{NO}_2$  (d)  $X \rightarrow \text{N}_2, Y \rightarrow \text{NO}$
14. Which zone of candle flame produces soot due to incomplete combustion?
- (a) Innermost zone (b) Non-luminous zone  
 (c) Outermost zone (d) Luminous zone
15. Which among the following is not an effect of global warming?
- (a) Corrosion of monuments made up of marble  
 (b) Increase in frequency of floods  
 (c) Unseasonal rains  
 (d) Damage of vegetation

Space for rough work

## Answer Keys

### Assessment Test I

1. (b) 2. (c) 3. (d) 4. (a) 5. (b) 6. (a) 7. (d) 8. (a) 9. (a) 10. (d)  
 11. (b) 12. (a) 13. (d) 14. (b) 15. (d)

### Assessment Test II

1. (d) 2. (a) 3. (c) 4. (d) 5. (c) 6. (b) 7. (b) 8. (d) 9. (d) 10. (c)  
 11. (a) 12. (a) 13. (c) 14. (a) 15. (c)

### Assessment Test III

1. (a) 2. (a) 3. (b) 4. (b) 5. (b) 6. (a) 7. (c) 8. (d) 9. (b) 10. (d)  
 11. (b) 12. (b) 13. (a) 14. (c) 15. (b)

### Assessment Test IV

1. (c) 2. (b) 3. (a) 4. (a) 5. (b) 6. (c) 7. (c) 8. (a) 9. (c) 10. (c)  
 11. (c) 12. (a) 13. (c) 14. (d) 15. (a)

# Water, Solution, Solubility and Hydrogen

## 5



16 S Sulfur 32.066	17 Cl Chlorine 35.4527
34 Se Selenium 78.96	35 Br Bromine 79.904
51 Sb Antimony 121.757	52 Te Tellurium 127.6
	53 I Iodine 126.905

**Reference:** Coursebook - IIT Foundation Chemistry Class 8; Chapter - Water, Solution, Solubility and Hydrogen; Page number - 5.1–5.18

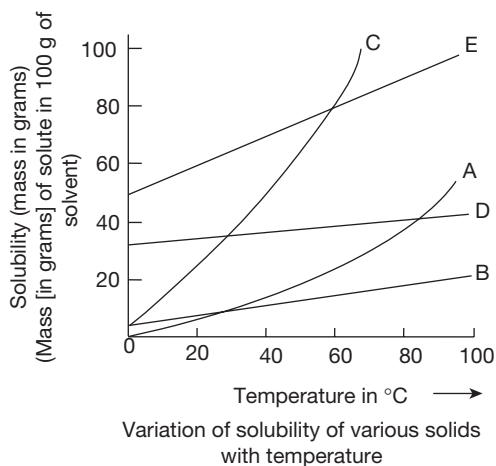
## Assessment Test I

Time: 30 min.

**Directions for questions from 1 to 13:** Select the correct answer from the given options.

- Arrange the following changes in the increasing order of heat required. Specific heat of ice =  $0.5 \text{ cal/g/}^\circ\text{C}$  and specific heat of water vapour =  $0.9 \text{ cal/g/}^\circ\text{C}$   
(A) 100 g ice into water at  $30^\circ\text{C}$   
(B) 50 g boiling water into water at  $120^\circ\text{C}$   
(C) 100 g boiling water into water vapour at  $100^\circ\text{C}$   
(D) 50 g ice into water at  $0^\circ\text{C}$   
(a) CABD                      (b) DABC                      (c) CBAD                      (d) DBAC
- Assertion (A):** Many ionic compounds show appreciable solubility in water.  
**Reason (R):** Water has high value of dielectric constant.  
(a) Both A and R are true and R is the correct explanation of A.  
(b) Both A and R are true, but R is not the correct explanation of A.  
(c) A is true and R is false.  
(d) A is false and R is true.
- Identify the common feature between blue vitriol and washing soda.  
(a) Both of them are efflorescent substances.  
(b) Both of them have the same number of water molecules.  
(c) Both of them possess water of crystallization.  
(d) Both of them are coloured salts and become colourless on heating.
- Based on the following graph, arrange the substances in the increasing order of solubility at  $40^\circ\text{C}$ .

Space for rough work



Space for rough work

- (a)  $B < A < D < C < E$  (b)  $A < B < C < D < E$   
 (c)  $B < D < A < E < C$  (d)  $A < D < B < E < C$
5. The solubility of a substance is 40 at  $25^{\circ}\text{C}$ . What amount of the substance is present in 210 g of saturated solution of that substance at the same temperature?
- (a) 82 g (b) 88 g  
 (c) 60 g (d) 68 g
6. **Assertion (A):** Calcium sulphate shows same solubility at two different temperatures.  
**Reason (R):** Water of crystallization of salt changes with change in temperature.
- (a) Both A and R are true and R is the correct explanation of A.  
 (b) Both A and R are true, but R is not the correct explanation of A.  
 (c) A is true and R is false.  
 (d) A is false and R is true.
7. Under certain conditions, when a mixture of hydrogen and chlorine was exposed to sunlight, no reaction occurred. Which of the following reasons can be attributed to this?
- (a) Absence of moisture  
 (b) Low intensity of sunlight  
 (c) No reaction in presence of light energy  
 (d) Presence of moisture in the reaction mixture
8. Same amount of the same sample of water is taken in four different conditions. The amount of dissolved oxygen in all cases was analysed. Identify the correct order.
- (A) Hill station in summer (B) Sea level in summer  
 (C) Sea level in winter (D) Deep sea in winter

- (a)  $A > B > C > D$  (b)  $D > C > B > A$   
 (c)  $B < C < A < D$  (d)  $D < C < B < A$

9. 10 g of water obtained by melting of ice is subjected to heating. What is the amount of heat required to be supplied to this water to reach its boiling point?

- (a) 4.2 J (b) 42 J  
 (c) 4.2 kJ (d) 42 kJ

10. Which among the following samples when taken in equal volumes freezes at the highest temperature?

- (a) Saline water at hill station (b) Distilled water at hill station  
 (c) Distilled water at plains (d) Saline water at plains

11. Match the statements of Column A with those of Column B.

Column A (Reaction)	Column B (Observation)
(i) Potassium + water	(A) Yellow substance and turns to white on cooling
(ii) Sodium + water	(B) Brown substance
(iii) Magnesium + boiling water	(C) Catches fire with lilac flame
(iv) Zinc + steam	(D) Catches fire with yellow flame
(v) Iron + steam	(E) Brilliant white light and ash

- (a) (i)  $\rightarrow$  (D); (ii)  $\rightarrow$  (C); (iii)  $\rightarrow$  (B); (iv)  $\rightarrow$  (E); (v)  $\rightarrow$  (A)  
 (b) (i)  $\rightarrow$  (D); (ii)  $\rightarrow$  (C); (iii)  $\rightarrow$  (E); (iv)  $\rightarrow$  (A); (v)  $\rightarrow$  (B)  
 (c) (i)  $\rightarrow$  (C); (ii)  $\rightarrow$  (D); (iii)  $\rightarrow$  (E); (iv)  $\rightarrow$  (A); (v)  $\rightarrow$  (B)  
 (d) (i)  $\rightarrow$  (C); (ii)  $\rightarrow$  (D); (iii)  $\rightarrow$  (B); (iv)  $\rightarrow$  (E); (v)  $\rightarrow$  (A)

12. Although all active metals liberate hydrogen gas with acids, zinc is preferentially used in the laboratory preparation of hydrogen. Various metals are not suitable for different reasons. The metals and the reasons for their non-suitability are given below. Identify the wrong set.

- (a) Potassium - Violent explosion  
 (b) Lead - Reversible reaction  
 (c) Aluminium - Formation of protective coating  
 (d) Magnesium - High cost

13. When a glass full of ice is subjected to melting, which of the following statements is correct?

- (a) Water overflows due to increase in density.  
 (b) Water overflows due to decrease in density.  
 (c) Water level in the glass decreases due to increase in density.  
 (d) Water level in the glass remains constant as there is no change in density.

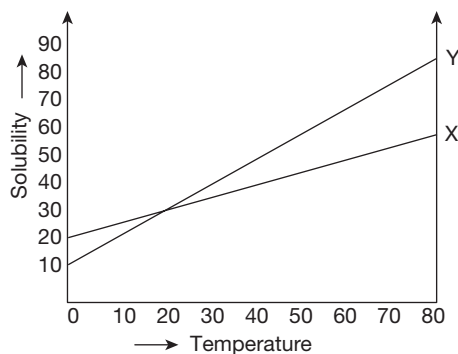
Space for rough work

## 5.4 Chapter 5 Water, Solution, Solubility and Hydrogen

**Directions for questions 14 and 15:** Answer the following questions based on the solubility curves of 'X' and 'Y' shown below and select the correct answer from the given options.

Space for rough work

14.



Two solutions of 'X' and 'Y' each containing 50 g of X and Y, dissolved in 100 mL water at 80°C temperature, are taken and cooled continuously. Below what temperatures do X and Y start crystallizing?

- (a) X → 80°C, Y → 80°C      (b) X → 30°C, Y → 30°C  
(c) X → 80°C, Y → 50°C      (d) X → 50°C, Y → 30°C

15. What are the maximum amounts of 'X' and 'Y' that can be precipitated during the process?

- (a) 30 g, 40 g      (b) 50 g, 50 g  
(c) 20 g, 10 g      (d) 30 g, 70 g

# Assessment Test II

Time: 30 min.

Space for rough work

**Directions for questions from 1 to 13:** Select the correct answer from the given options.

1. Arrange the following changes in the decreasing order of heat evolved.

(A) 100 g water to ice at  $50^{\circ}\text{C}$   
(B) 50 g water to ice at  $0^{\circ}\text{C}$   
(C) 100 g water vapour to water at  $100^{\circ}\text{C}$   
(D) 50 g water vapour to water at  $50^{\circ}\text{C}$

(a) BADC (b) CADB  
(c) BDAC (d) CDAB

2. **Assertion (A):** Glucose is highly soluble in water.

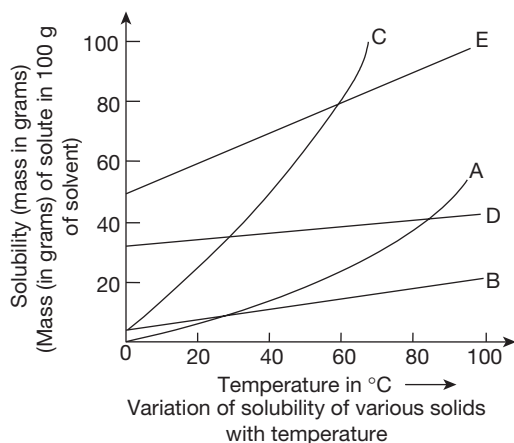
**Reason (R):** Water has a high value of dielectric constant.

(a) Both A and R are true and R is the correct explanation of A.  
(b) Both A and R are true, but R is not the correct explanation of A.  
(c) A is true and R is false.  
(d) A is false and R is true.

3. Two substances 'X' and 'Y' are exposed to air for a long time. X forms an anhydrous salt, whereas Y forms a monohydrate and on heating, its anhydrous salt is obtained. Identify X and Y.

(a) Blue vitriol, Glauber's salt  
(b) Washing soda, Blue vitriol  
(c) Glauber's salt, washing soda  
(d) Blue vitriol, Green vitriol

4. Based on the following graph, arrange the following in the decreasing order of amounts of substances given below present in dissolved state.



(A) B at  $10^{\circ}\text{C}$  (B) A at  $70^{\circ}\text{C}$   
(C) C at  $40^{\circ}\text{C}$  (D) D at  $80^{\circ}\text{C}$

## 5.6 Chapter 5 Water, Solution, Solubility and Hydrogen

Space for rough work

(E) E at  $60^{\circ}\text{C}$

(a) EBCDA

(b) ADCBE

(c) ECDBA

(d) ADBCE

5. 80 g of a saturated solution of a substance contains 16 g of the substance. What is the solubility of the substance at that temperature?

(a) 32

(b) 20

(c) 18

(d) 25

6. **Assertion (A):** Glauber's salt shows same solubility at two different temperatures.

**Reason (R):** Glauber's salt is a hydrated salt.

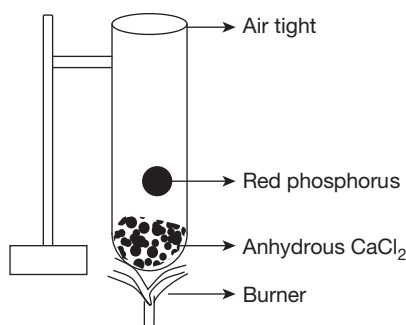
(a) Both A and R are true and R is the correct explanation of A.

(b) Both A and R are true, but R is not the correct explanation of A.

(c) A is true and R is false.

(d) A is false and R is true.

7. What would be the observation of the following experiment?



(a) White dense fumes of  $\text{P}_2\text{O}_5$  are formed.

(b) Colourless vapours of  $\text{P}_2\text{O}_3$  are formed.

(c) Vapours of  $\text{P}_2\text{O}_5$  get condensed on the side of test tube to form fine particles.

(d) There is no reaction.

8. Which of the following applications is not related to the effect of pressure on solubility of gases?

(a) Usage of helium-oxygen mixture by deep sea divers

(b) Preparation of soda water

(c) Difficulty in breathing experienced at higher altitudes

(d) Collection of hydrogen by downward displacement of water

9. 2.1 kJ of heat is supplied to 100 g of water. What would be the expected increase in the temperature of water?

(a)  $1^{\circ}\text{C}$

(b)  $0.5^{\circ}\text{C}$

(c)  $10^{\circ}\text{C}$

(d)  $5^{\circ}\text{C}$

10. Which of the following samples when taken in equal volumes freezes at the lowest temperature?

(a) Brine solution

(b) Saline water

(c) Mineral water

(d) Demineralized water



11. Match the statements of Column A with those of Column B.

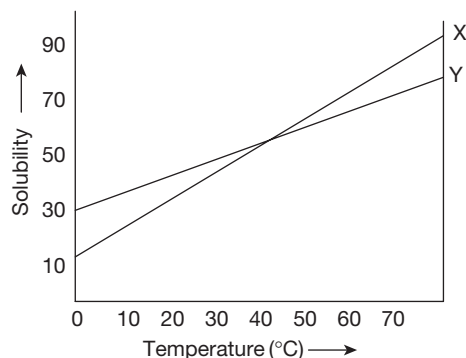
Column A (Reaction with Water or Steam)	Column B (Characteristic Features)
(i) Potassium	(A) Reacts only with boiling water
(ii) Iron	(B) Milky alkaline solution
(iii) Calcium	(C) Vigorous and exothermic
(iv) Magnesium	(D) Reversible when carried out in closed container

- (a) (i)  $\rightarrow$  (C); (ii)  $\rightarrow$  (B); (iii)  $\rightarrow$  (D); (iv)  $\rightarrow$  (A)  
 (b) (i)  $\rightarrow$  (D); (ii)  $\rightarrow$  (B); (iii)  $\rightarrow$  (A); (iv)  $\rightarrow$  (C)  
 (c) (i)  $\rightarrow$  (D); (ii)  $\rightarrow$  (A); (iii)  $\rightarrow$  (B); (iv)  $\rightarrow$  (C)  
 (d) (i)  $\rightarrow$  (C); (ii)  $\rightarrow$  (D); (iii)  $\rightarrow$  (B); (iv)  $\rightarrow$  (A)

12. When iron metal is taken in place of zinc for the laboratory preparation of hydrogen, the volume of hydrogen collected is found to be lower. Identify the reason.
- (a) Metal becomes passive due to the formation of protective coating.  
 (b) Formation of insoluble sulphate stops further reaction.  
 (c) There are impurities in the metal.  
 (d) The reaction becomes reversible.
13. Which of the following is not an application of anomalous expansion of water?
- (a) Floating of human body in the Dead Sea  
 (b) Bursting of water bottle filled with water in freezer  
 (c) Bursting of water pipes in winter season in cold regions  
 (d) Survival of aquatic animals in frozen lakes

**Directions for questions 14 and 15:** Answer the following questions based on the solubility curves of 'X' and 'Y' given and select the correct answer from the given options.

14. Saturated solutions of 'X' and 'Y', each dissolved in 100 mL water, are taken at 80°C and subjected to continuous cooling.



Space for rough work

Which of the following statements regarding the status of the two solutions at  $45^{\circ}\text{C}$  is true?

- (a) X and Y possess the same solubility.
- (b) The same amounts of X and Y get precipitated till that temperature.
- (c) The same amounts of X and Y would be precipitated on further cooling.
- (d) Both (a) and (b)

15. Identify the amounts of 'X' and 'Y' precipitated when the solutions are cooled up to  $60^{\circ}\text{C}$ .

- |                |                |
|----------------|----------------|
| (a) 10 g, 20 g | (b) 20 g, 10 g |
| (c) 60 g, 50 g | (d) 50 g, 60 g |

**Space** for rough work

# Assessment Test III

Time: 30 min.

Space for rough work

**Directions for questions from 1 to 15:** Select the correct answer from the given options.

1. Which of the following forms represents direct conversion of water vapour into ice?

(a) Cloud                      (b) Fog                      (c) Mist                      (d) Snow

2. What could be the density of water at 2°C?

(a) 0.95 g/cc                      (b) 1 g/cc  
(c) 1.1 g/cc                      (d) 1.5 g/cc

3. Which of the following samples of water is a bad conductor of electricity?

(a) Tap water                      (b) Saline water  
(c) Mineral water                      (d) Distilled water (freshly prepared)

4. Heat released during the condensation of 1 g of steam at 100°C, to water at 100°C, is utilized to melt  $x$  g of ice at 0°C to water at 0°C. Identify  $x$ .

(a) 6.75 g                      (b) 5 g                      (c) 5.75 g                      (d) 6 g

5. Calculate the amount of heat released (in joules) when 10 g of water is cooled from 50°C to 30°C

(a) 840                      (b) 420                      (c) 540                      (d) 320

6. **Assertion (A):** Water can dissolve many inorganic salts in it.

**Reason (R):** Dielectric constant of water is relatively lower than other liquids.

(a) Both A and R are true and R is the correct explanation of A  
(b) Both A and R are true, but R is not the correct explanation of A.  
(c) A is true and R is false.  
(d) A is false and R is true.

7. **Assertion (A):**  $\text{SO}_2$  is a basic oxide.

**Reason (R):**  $\text{SO}_2$  forms  $\text{H}_2\text{SO}_3$  when it is dissolved in water.

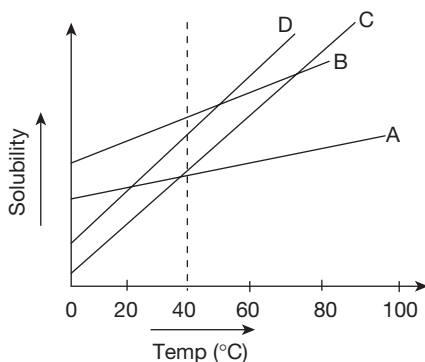
(a) Both A and R are true and R is the correct explanation of A  
(b) Both A and R are true, but R is not the correct explanation of A.  
(c) A is true and R is false.  
(d) A is false and R is true.

8. Arrange the following metals in the increasing order of the number of  $\text{H}_2$  molecules liberated when 1 molecule/atom of the metal reacts with water/steam.

(A) Na                      (B) Ca                      (C) Al                      (D) Fe  
(a) ABDC                      (b) CDBA  
(c) DCBA                      (d) BCDA

**5.10 Chapter 5 Water, Solution, Solubility and Hydrogen****Space** for rough work

9. Arrange the following compartments involved in the purification of water in a proper order.
- (A) Loading tank (B) Filtration tank  
(C) Chlorination tank (D) Sedimentation tank  
(a) BCDA (b) CDBA  
(c) DABC (d) ADBC
10. Calculate the solubility of the salt A if 25 g of A is present in 225 g of the saturated solution at a given temperature.
- (a) 12 (b) 12.5 (c) 1.2 (d) 11.5
11. From the graph given below, identify the amount of salt which is maximum in the same mass of their (A, B, C and D) saturated solutions at 40°C.



- (a) A (b) B (c) C (d) D
12. Efflorescent salts are the salts which \_\_\_\_\_.
- (a) absorb water at room temperature  
(b) release water at room temperature  
(c) absorb water on heating  
(d) release water on heating
13. Solubility of a gas in a liquid \_\_\_\_\_.
- (a) increases with increase in temperature  
(b) increases with increase in pressure  
(c) does not alter with temperature  
(d) does not alter with pressure
14. Identify the composition of water gas among the following.
- (a)  $C + H_2O$  (b)  $CO + H_2O$   
(c)  $CO + H_2$  (d)  $CO_2 + H_2$

15. Match the statements of Column A with those of Column B.

Column A	Column B
(i) Removal of $\text{AsH}_3$ , $\text{PH}_3$ from $\text{H}_2$	(A) Lead nitrate solution
(ii) Reaction of Na/K with dilute acid	(B) Reversible
(iii) Reaction of iron with dilute acid	(C) Reaction with sodium
(iv) Removal of $\text{H}_2\text{S}$ from $\text{H}_2$	(D) Silver nitrate solution
(v) Hydrogen gets reduced	(E) Violent
(vi) Hydrogen gets oxidized	(F) Reaction with chlorine

- (a) (i)  $\rightarrow$  (A); (ii)  $\rightarrow$  (B); (iii)  $\rightarrow$  (E); (iv)  $\rightarrow$  (D); (v)  $\rightarrow$  (F); (vi)  $\rightarrow$  (C)  
(b) (i)  $\rightarrow$  (A); (ii)  $\rightarrow$  (B); (iii)  $\rightarrow$  (E); (iv)  $\rightarrow$  (D); (v)  $\rightarrow$  (C); (vi)  $\rightarrow$  (F)  
(c) (i)  $\rightarrow$  (D); (ii)  $\rightarrow$  (E); (iii)  $\rightarrow$  (B); (iv)  $\rightarrow$  (A); (v)  $\rightarrow$  (F); (vi)  $\rightarrow$  (C)  
(d) (i)  $\rightarrow$  (D); (ii)  $\rightarrow$  (E); (iii)  $\rightarrow$  (B); (iv)  $\rightarrow$  (A); (v)  $\rightarrow$  (E); (vi)  $\rightarrow$  (F)

Space for rough work

## Assessment Test IV

Time: 30 min.

Space for rough work

**Directions for questions from 1 to 15:** Select the correct answer from the given options.

1. What kind of conversion of state of matter takes place during the formation of dew?  
(a) Water vapour to water                      (b) Water to water vapour  
(c) Water vapour to ice                        (d) Ice to water vapour
2. Which of the following statements is correct regarding equal masses of ice and water at  $0^{\circ}\text{C}$ ?  
(a) Ice occupies slightly less volume than water.  
(b) Ice occupies slightly more volume than water.  
(c) Ice and water occupy exactly the same volume.  
(d) The volume of ice is half the volume of water.
3. The electrical conductivity of water is due to \_\_\_\_\_.  
(a) the presence of dissolved salts  
(b) low dielectric constant  
(c) high specific heat  
(d) high latent heat of vaporisation
4. Compare the mass of ice at  $0^{\circ}\text{C}$  and water at  $100^{\circ}\text{C}$  which can be converted to water at  $0^{\circ}\text{C}$  and steam at  $100^{\circ}\text{C}$ , respectively, when an equal amount of heat energy is supplied to each of them.  
(a) 4:27                      (b) 27:4                      (c) 5:20                      (d) 20:5
5. What is the amount of heat (in joules) required to be supplied to 5 g of water to raise its temperature from  $25^{\circ}\text{C}$  to  $75^{\circ}\text{C}$ ?  
(a) 2050                      (b) 1050                      (c) 1000                      (d) 2000
6. **Assertion (A):** Different inorganic salts dissolve in water to a different extent at a particular temperature.  
**Reason (R):** Dielectric constant of water changes with the nature of salts dissolved in it.  
(a) Both A and R are true and R is the correct explanation of A.  
(b) Both A and R are true, but R is not the correct explanation of A.  
(c) A is true and R is false.  
(d) A is false and R is true.
7. **Assertion:** Metallic oxides react with the base.  
**Reason:** Metallic oxides form bases when they are dissolved in water.

Space for rough work

- (a) Both A and R are true and R is the correct explanation of A.  
(b) Both A and R are true, but R is not the correct explanation of A.  
(c) A is true and R is false.  
(d) A is false and R is true.
8. Arrange the following metals in descending order of the number of molecules of water/steam with which one molecule/atom of the metal reacts.  
(A) K (B) Fe (C) Al  
(a) CAB (b) BCA (c) ACD (d) CBA
9. Arrange the following processes involved in the purification of water in water works in proper order.  
(A) Fine sand and gravel are used.  
(B) Suspended impurities are allowed to settle.  
(C) Chlorine gas is passed through the water.  
(a) CAB (b) BAC (c) BCA (d) CBA
10. The solubility of the salt B is 30 at 25°C. Calculate the amount of B present in 390 g of the saturated solution of B at 25°C.  
(a) 90 g (b) 30 g (c) 100 g (d) 130 g
11. Solubilities of four different salts is given in the table below. 150 g of each salt is mixed in 750 g of water separately at 25°C.  
Identify the incorrect statements.

Name of the salt	Solubility at 25°C
M	25
N	30
O	20
P	15

- (a) O is saturated. (b) P is supersaturated.  
(c) N supersaturated. (d) M is unsaturated.
12. Which among the following is a deliquescent salt?  
(a) Glauber's salt (b) Blue vitriol  
(c) Washing soda (d) Hydrated calcium chloride
13. Dissolved gases in water can be expelled by boiling since solubility of a gas in a liquid is \_\_\_\_\_.  
(a) proportional to temperature  
(b) inversely proportional to temperature  
(c) proportional to pressure  
(d) independent of temperature and pressure
14. Which of the following chemical reaction is involved in the Bosch process for the manufacture of hydrogen?

**5.14 Chapter 5 Water, Solution, Solubility and Hydrogen**

- (a) CO is oxidized. (b) CO<sub>2</sub> is reduced.  
(c) H<sub>2</sub>O is the reducing agent. (d) CO is the oxidizing agent.

15. Match the statements of Column A with those of Column B.

Column A	Column B
(i) Removal of acidic gases present in H <sub>2</sub>	(A) Fe catalyst
(ii) Formation of NH <sub>3</sub> from its constituents	(B) Protective coating
(iii) Reaction of Al with dilute acid	(C) P <sub>2</sub> O <sub>5</sub>
(iv) Removal of water vapour from H <sub>2</sub>	(D) Sunlight
(v) Formation of HCl gas from its constituents	(E) Formation of insoluble compounds
(vi) Reaction of Pb with dilute acid	(F) Caustic potash solution

- (a) (i) → (F); (ii) → (A); (iii) → (B); (iv) → (C); (v) → (D); (vi) → (E)  
(b) (i) → (F); (ii) → (A); (iii) → (B); (iv) → (C); (v) → (E); (vi) → (D)  
(d) (i) → (C); (ii) → (D); (iii) → (E); (iv) → (F); (v) → (A); (vi) → (B)  
(d) (i) → (C); (ii) → (D); (iii) → (E); (iv) → (F); (v) → (B); (vi) → (A)

Space for rough work

## Answer Keys

### Assessment Test I

1. (b) 2. (a) 3. (c) 4. (a) 5. (c) 6. (b) 7. (a) 8. (b) 9. (c) 10. (b)  
11. (c) 12. (b) 13. (c) 14. (c) 15. (a)

### Assessment Test II

1. (d) 2. (b) 3. (c) 4. (c) 5. (d) 6. (b) 7. (d) 8. (d) 9. (d) 10. (a)  
11. (d) 12. (d) 13. (a) 14. (a) 15. (b)

### Assessment Test III

1. (d) 2. (a) 3. (d) 4. (a) 5. (a) 6. (c) 7. (d) 8. (a) 9. (c) 10. (b)  
11. (b) 12. (b) 13. (b) 14. (c) 15. (d)

### Assessment Test IV

1. (a) 2. (b) 3. (a) 4. (b) 5. (b) 6. (c) 7. (d) 8. (d) 9. (b) 10. (a)  
11. (c) 12. (d) 13. (b) 14. (a) 15. (a)



# Carbon and Its Compounds

# 6



**Reference:** Coursebook - IIT Foundation Chemistry Class 8; Chapter - Carbon and its Compounds; Page number - 6.1–6.20

## Assessment Test I

**Time: 30 min.**

**Directions for questions from 1 to 15:** Select the correct answer from the given options.

**Space** for rough work

1. **Assertion (A):** Diamond is a good thermal conductor.

**Reason (R):** Diamond is a crystalline allotrope of carbon in which carbon exhibits tetravalency.

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true and R is false.
- (d) A is false and R is true.

2. **Assertion (A):** Dry ice is used for cloud seeding.

**Reason (R):** Dry ice sublimates.

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true and R is false.
- (d) A is false and R is true.

3. Match the statements of Column A with those of Column B.

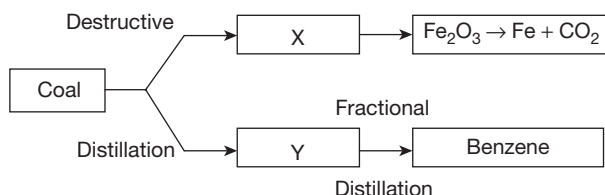
Column A	Column B
(i) Layer lattice structure	(A) Gas carbon
(ii) Spherical cage molecules	(B) Lamp black
(iii) Rigid three-dimensional structure	(C) Graphite
(iv) Amorphous grey solid	(D) Fullerene
(v) Powdery black substance with velvet touch	(E) Diamond

- (a) (i) → (C); (ii) → (A); (iii) → (E); (iv) → (B); (v) → (D)
- (b) (i) → (D); (ii) → (A); (iii) → (C); (iv) → (B); (v) → (D)
- (c) (i) → (C); (ii) → (D); (iii) → (E); (iv) → (A); (v) → (B)
- (d) (i) → (E); (ii) → (D); (iii) → (B); (iv) → (C); (v) → (C)

4. Arrange the allotropes in their order of their importance.
- (i) Extraction of yellow phosphorus
  - (ii) Preparation of artificial diamond
  - (iii) Gas masks
  - (iv) Moderator in nuclear reactors
  - (v) Abrasive for cutting glass
- (A) Wood charcoal (B) Bone charcoal  
(C) Graphite (D) Diamond  
(E) Sugar charcoal
- (a) CDEBA (b) BEACD  
(c) CAEDB (d) BCAED
5. The descriptions of some reactions are given below. Arrange the formula of products of the reactions in the order of the descriptions.
- (i) Passing carbon monoxide gas over finely divided iron
  - (ii) Passing carbon dioxide through powdered magnesium
  - (iii) Heating metal oxide ( $M_2O_3$ ) with carbon monoxide
  - (iv) Passing carbon dioxide through sodium
- (A)  $M_2CO_3$  (B) M  
(C) MO (D)  $M(CO)_5$   
(a) CABD (b) DACB  
(c) DCBA (d) CBDA
6. Which of the following reactions does not produce  $CO_2$ ?
- (a) Heating of  $Na_2CO_3$  (b) Reaction of  $K_2CO_3$  with HCl  
(c) Heating of  $Ca(HCO_3)_2$  (d) Heating of  $NaHCO_3$
7. Identify the principle involved in the usage of baking powder in cakes.
- (a) Acid base neutralization
  - (b) Thermal decomposition
  - (c) Dissolution in water
  - (d) Sublimation
8. Which of the following fire extinguishers, when used, involves a physical process instead of a chemical reaction?
- (a) Dry powder extinguisher
  - (b) Foam-type extinguisher
  - (c) Soda-acid extinguisher
  - (d) Liquid  $CO_2$  fire extinguisher
9. Graphite is used for various purposes. Which of the following uses is not related to its layer lattice structure?
- (a) Refractory crucible (b) Pencil lead  
(c) Lubricant (d) Both (b) and (c)

Space for rough work

10. Identify the reaction which does not involve the formation of a white precipitate.
- (a) Reaction of carbonic acid with NaOH
  - (b) Reaction of carbonic acid with  $\text{Ca}(\text{OH})_2$
  - (c) Reaction of sodium carbonate with  $\text{MgSO}_4$
  - (d) Reaction of calcium bicarbonate with NaOH
11. Observe the following flow chart and identify 'X' and 'Y'.



- (a) Coal gas, coal tar
  - (b) Coke, coal gas
  - (c) Coke, coal tar
  - (d) Ammonia, naphthalene
12. If a saturated hydrocarbon has 4 carbon atoms, then the formula of the hydrocarbon could be \_\_\_\_.
- (a)  $\text{C}_4\text{H}_6$
  - (b)  $\text{C}_4\text{H}_8$
  - (c)  $\text{C}_4\text{H}_{10}$
  - (d)  $\text{C}_4\text{H}_{12}$
13. Identify the name of the harmful gas released in coal mines.
- (a) Carbogen
  - (b) Natural gas
  - (c) Phosgene
  - (d) Marsh gas
14. Which of the following processes is involved in the preparation of carbon black from methane?
- (a) Pyrolysis
  - (b) Carbonization
  - (c) Combustion
  - (d) Catenation
15. Identify the false statement regarding ideal fuel.
- (a) No residue is left over after burning.
  - (b) It has high caloric value.
  - (c) It has high ignition temperature.
  - (d) It burns without producing flames.

## Assessment Test II

Time: 30 min.

Space for rough work

**Directions for questions 1 to 15:** Select the correct answer from the given options.

1. **Assertion (A):** Graphite is a good electrical conductor.

**Reason (R):** Carbon exhibits a valency of three in graphite.

- (a) Both A and R are true and R is the correct explanation of A.  
 (b) Both A and R are true, but R is not the correct explanation of A.  
 (c) A is true and R is false.  
 (d) A is false and R is true.

2. **Assertion (A):** A sealed bottle containing dry ice explodes after some time.

**Reason (R):** Dry ice produces very low temperature.

- (a) Both A and R are true and R is the correct explanation of A.  
 (b) Both A and R are true, but R is not the correct explanation of A.  
 (c) A is true and R is false.  
 (d) A is false and R is true.

3. Match the statements of Column A with those of Column B.

Column A (Characteristic Feature)	Column B (Allotrope)
(i) Bucky balls	(A) Coke
(ii) Calcium phosphate is in major proportion	(B) Graphite
(iii) Purest amorphous form of carbon	(C) Diamond
(iv) Hexagonal rings	(D) Animal charcoal
(v) Tetrahedral units	(E) Fullerene

- (a) (i) → (E); (ii) → (A); (iii) → (D); (iv) → (B); (v) → (C)  
 (b) (i) → (C); (ii) → (A); (iii) → (D); (iv) → (E); (v) → (B)  
 (c) (i) → (C); (ii) → (D); (iii) → (A); (iv) → (E); (v) → (B)  
 (d) (i) → (E); (ii) → (D); (iii) → (A); (iv) → (B); (v) → (C)

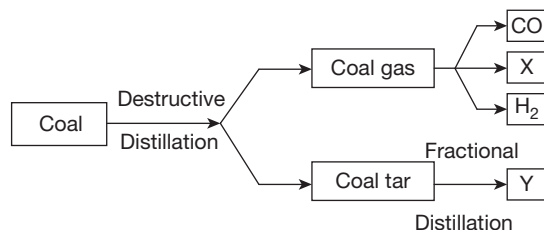
4. Arrange the following allotropes in the order of the raw material used for their preparation, given below.

- (i) Sugar and molten iron                      (ii) Coke and silicon dioxide  
 (iii) Graphite                                      (iv) Coal  
 (v) Mustard oil  
 (A) Coke    (B) Fullerene  
 (C) Lamp black                                    (D) Diamond  
 (E) Graphite  
 (a) DEBAC    (b) BECAD  
 (c) DABEC    (d) BACED

Space for rough work

5. Arrange the products given below in the order of the reactions as follows.
- (i) Neutralization of  $\text{CO}_2$  by caustic soda.
  - (ii) Combination of  $\text{CO}_2$  and water in the presence of sunlight.
  - (iii) Reaction of  $\text{CO}_2$  with  $\text{Cl}_2$  gas.
  - (iv) Oxidation of Carbon by  $\text{CO}_2$ .
  - (v) CO is passed through blood.
- (A) Lower oxide of carbon                      (B) Carbohydrate  
(C) Carbonate of sodium                      (D) Carboxy haemoglobin  
(E) Phosgene
- (a) CBEDA    (b) CBEAD  
(c) DCBAE    (d) DEBAC
6. Two substances  $x$  and  $y$  are taken in two test tubes and heated. The gas coming out of only  $y$  when passed through lime water turns it milky. Identify  $x$  and  $y$ .
- (a)  $\text{ZnCO}_3$  and  $\text{MgCO}_3$                       (b)  $\text{KHCO}_3$  and  $\text{MgCO}_3$   
(c)  $\text{K}_2\text{CO}_3$  and  $\text{ZnCO}_3$                       (d)  $\text{Na}_2\text{CO}_3$  and  $\text{K}_2\text{CO}_3$
7. Under normal conditions,  $\text{CO}_2$  is sparingly soluble in water. In which of the following uses of  $\text{CO}_2$ , is the above property exploited?
- (a) Preparation of soft drinks  
(b) Preservation of food  
(c) Usage of mortar to join bricks  
(d) Survival of aquatic plants
8. A fire extinguisher has been used for putting off petrol fire. It involves the principle of neutralization. Identify the extinguisher.
- (a) Dry powder extinguisher  
(b) Foam-type extinguisher  
(c) Liquid  $\text{CO}_2$  extinguisher  
(d) Soda-acid extinguisher
9. In which application are both layer lattice structure and high melting point of graphite exploited?
- (a) Refractory crucibles                      (b) Lubricant in machines  
(c) Reinforced plastics                      (d) Moderator in nuclear reactor
10. Which of the following reactions involve both precipitation as well as release of a gaseous product?
- (a) Action of HCl on sodium bicarbonate  
(b) Action of HCl on magnesium bicarbonate  
(c) Action of HCl on sodium carbonate  
(d) Action of HCl on sodium hydroxide

11. Observe the following flow chart and identify 'X' and 'Y'.



- (a)  $\text{NH}_3$ , benzene (b) Butane, naphthalene  
(c) Methane, ethyl alcohol (d) Methane, naphthalene
12. A saturated hydrocarbon contains 14 hydrogen atoms. What could be the number of carbon atoms in it?  
(a) 6 (b) 7  
(c) 8 (d) 9
13. Among the following gases, identify the one which is not harmful.  
(a) Phosgene (b) Coal gas  
(c) Butane (d) Carbon monoxide
14. The name given to the heating of methane in the absence of air is  
(a) Carbonization (b) Destructive distillation  
(c) Combustion (d) Pyrolysis
15. 'X' and 'Y' are two gaseous fuels and X is found to be a better fuel than Y. Which of the following assumptions regarding X and Y would comply with the above fact?  
(i) X has a higher calorific value than Y.  
(ii) Y produces ash on combustion at the end.  
(iii) X gets ignited at a lower temperature than Y.  
(iv) Y catches fire at room temperature whereas X does not.  
(a) (i) and (iii) (b) (ii) and (iv)  
(c) (i) and (iv) (d) (ii) and (iii)

Space for rough work

# Assessment Test III

Time: 30 min.

Space for rough work

**Directions for questions from 1 to 15:** Select the correct answer from the given options.

1. Identify the allotrope of carbon that exists in crystalline form.  
(a) Graphite (b) Coal  
(c) Coke (d) Lamp black
2. Which of the following is the raw material for the manufacture of graphite in Acheson process?  
(a) Silicon carbide (b) Silicon  
(c) Silicone (d) Sand
3. In which of the following purposes can diamond be not used?  
(a) Tip of deep boring drills  
(b) For cutting glasses  
(c) As solid lubricant  
(d) Generating laser beam in electronics
4. Which of the following can be used to extract metals from their oxides?  
(a) Sugar charcoal (b) Bone charcoal  
(c) Graphite (d) Fullerene
5. Which of the reactions do not produce CO?  
(a)  $C + CO_2 \rightarrow$  (b)  $H_2C_2O_4 + \text{Conc. } H_2SO_4 \rightarrow$   
(c)  $HCOOH + \text{Conc. } H_2SO_4 \rightarrow$  (d)  $CaCO_3 + HCl \rightarrow$
6. **Assertion (A):** CO is collected in the laboratory by downward displacement of water.  
**Reason (R):** CO is a neutral oxide.  
(a) Both A and R are true and R is the correct explanation of A.  
(b) Both A and R are true, but R is not the correct explanation of A.  
(c) A is true and R is false.  
(d) A is false and R is true.
7. **Assertion (A):** CO is one of the components of coal gas, water gas and producer gas.  
**Reason (R):** The combustion of CO is highly exothermic.  
(a) Both A and R are true and R is the correct explanation of A.  
(b) Both A and R are true, but R is not the correct explanation of A.  
(c) A is true and R is false.  
(d) A is false and R is true.
8. Arrange the following fuels in the ascending order of their calorific values.  
(A) Hydrogen (B) LPG (C) Petrol (D) Wood  
(a) ABCD (b) BCDA (c) CDBA (d) DCBA

9. Arrange the following compounds in the order of their formation during chlorination of methane.
- (A) Chloroform (B) Dichloromethane  
(C) Methyl chloride (D) Carbon tetrachloride  
(a) BADC (b) CDAB  
(c) DBCA (d) CBAD
10. Hydrolysis of calcium carbide liberates \_\_\_\_.
- (a) CO (b)  $C_2H_2$   
(c)  $CO_2$  (d)  $CH_4$
11. The reaction given below is associated with \_\_\_\_.
- $$Al_2(SO_4)_3 + 6NaHCO_3 \rightarrow 3Na_2SO_4 + 2Al(OH)_3 + 6CO_2$$
- (a) dry powder fire extinguisher (b) soda-acid fire extinguisher  
(c) foam-type extinguisher (d) liquid  $CO_2$  fire extinguisher
12. Which of the following makes lime water milky?
- (a)  $Ca(HCO_3)_2$  (b)  $CaCO_3$   
(c)  $CaC_2$  (d)  $NaHCO_3$
13. Which of the following types of coal contains the highest percentage of carbon?
- (a) Anthracite (b) Bituminous  
(c) Lignite (d) Peat
14. In which of the following ways is atmospheric  $CO_2$  trapped?
- (a) Respiration (b) Photosynthesis  
(c) Consumption of fossil fuel (d) Decomposition of organic matter
15. Match the statements of Column A with those of Column B.

Column A	Column B
(i) Lamp black	(A) Destructive distillation of coal
(ii) Coke	(B) Heating wood saving in absence of air
(iii) Gas carbon	(C) Burning mustard oil in inadequate supply of air
(iv) Wood charcoal	(D) Destructive distillation of animal bones
(v) Bone charcoal	(E) Thermal vaporization of coal followed by condensation

- (a) (i)  $\rightarrow$  (C); (ii)  $\rightarrow$  (A); (iii)  $\rightarrow$  (E); (iv)  $\rightarrow$  (B); (v)  $\rightarrow$  (D)  
 (b) (i)  $\rightarrow$  (A); (ii)  $\rightarrow$  (C); (iii)  $\rightarrow$  (D); (iv)  $\rightarrow$  (E); (v)  $\rightarrow$  (B)  
 (c) (i)  $\rightarrow$  (C); (ii)  $\rightarrow$  (A); (iii)  $\rightarrow$  (E); (iv)  $\rightarrow$  (D); (v)  $\rightarrow$  (B)  
 (d) (i)  $\rightarrow$  (A); (ii)  $\rightarrow$  (D); (iii)  $\rightarrow$  (C); (iv)  $\rightarrow$  (E); (v)  $\rightarrow$  (B)



# Assessment Test IV

Time: 30 min.

Space for rough work

**Directions for questions from 1 to 15:** Select the correct answer from the given options.

1. In which of the following are carbon atoms not present in a regular pattern?

- (a) Graphite (b) Diamond  
(c) Fullerene (d) Sugar charcoal

2. Which of the following gas is liberated during the manufacture of graphite in Acheson process?

- (a)  $\text{CO}_2$  (b)  $\text{CO}$   
(c)  $\text{O}_2$  (d)  $\text{O}_3$

3. Which of the following forms of carbon can be used as solid lubricant and why?

- (a) Coal, as it is brittle and high heat resistant.  
(b) Fullerene, as it is spherical in shape.  
(c) Coke, as it contains less impurities.  
(d) Graphite, as it has layered structure and high resistance to heat.

4. Identify the allotrope of carbon used for making electrodes for dry cell.

- (a) Coke (b) Diamond  
(c) Wood charcoal (d) Gas carbon

5. Which of the following reactions do not produce  $\text{CO}_2$ ?

- (a) Metal carbonate + dilute acid  
(b) Metal bicarbonate + dilute acid  
(c) Thermal decomposition of lime stone ( $\text{CaCO}_3$ )  
(d) Thermal decomposition of  $\text{Na}_2\text{CO}_3$

6. **Assertion (A):**  $\text{CO}_2$  is collected in the laboratory by upward displacement of air.

**Reason (R):**  $\text{CO}_2$  is a non-supporter of combustion.

- (a) Both A and R are true and R is the correct explanation of A.  
(b) Both A and R are true, but R is not the correct explanation of A.  
(c) A is true and R is false.  
(d) A is false and R is true.

7. **Assertion (A):**  $\text{CO}_2$  is extensively used in fire extinguishers.

**Reason (R):**  $\text{CO}_2$  is a good reducing agent.

- (a) Both A and R are true and R is the correct explanation of A.  
(b) Both A and R are true, but R is not the correct explanation of A.  
(c) A is true and R is false.  
(d) A is false and R is true.

8. Arrange the following fuels in the descending order of the ignition temperature.  
(A) Charcoal (B) Petroleum gas  
(C) Natural gas (D) Gasoline  
(a) DBCA (b) ADBC (c) CDBA (d) DCBA
9. Arrange the following reactants associated with methane in the order of their categories given below.  
(Substitution reaction, combustion reaction, cracking and manufacture)  
(A) Heating of  $\text{CH}_4$  in absence of air.  
(B) Reaction between  $\text{CH}_4$  and  $\text{Cl}_2$  in the presence of sunlight.  
(C) Heating anhydrous sodium acetate with soda lime.  
(D) Reaction between  $\text{CH}_4$  and  $\text{O}_2$ .  
(a) CDBA (b) ACBD (c) BDAC (d) BDCA
10. The nature of the product which is not a gas obtained during hydrolysis of calcium carbide is \_\_\_\_\_.  
(a) basic (b) strongly acidic  
(c) neutral (d) weakly acidic
11. Thermal decomposition of sodium bicarbonate is associated with \_\_\_\_\_.  
(a) dry powder fire extinguisher  
(b) liquid  $\text{CO}_2$  fire extinguisher  
(c) soda-acid fire extinguisher  
(d) foam-type of fire extinguisher
12. Passing excess  $\text{CO}_2$  through milky lime water makes it clear due to the formation of \_\_\_\_\_.  
(a)  $\text{CaCO}_3$  (b)  $\text{Na}_2\text{CO}_3$   
(c)  $\text{NaHCO}_3$  (d)  $\text{Ca}(\text{HCO}_3)_2$
13. Which of the following types of coal, on destructive distillation, gives rise to the minimum yield of coke?  
(a) Peat (b) Bituminous  
(c) Lignite (d) Anthracite
14. Identify the process of releasing  $\text{CO}_2$  in the atmosphere.  
(a) Dissolution of  $\text{CO}_2$  in water bodies  
(b) Formation of fossil fuel from dead remains  
(c) Respiration  
(d) Afforestation

15. Match the statements of Column A with those of Column B.

Column A	Column B
(i) Lamp black	(A) Dull grey solid and good conductor of electricity.
(ii) Coke	(B) Light powdery substance, having a velvet touch.
(iii) Gas carbon	(C) Hardest naturally occurring substance.
(iv) Graphite	(D) Greyish black porous solid.
(v) Diamond	(E) Metallic lustre and good conductor of electricity.

- (a) (i) → (D); (ii) → (B); (iii) → (A); (iv) → (E); (v) → (A)  
 (b) (i) → (B); (ii) → (D); (iii) → (A); (iv) → (E); (v) → (C)  
 (c) (i) → (B); (ii) → (A); (iii) → (D); (iv) → (E); (v) → (C)  
 (d) (i) → (B); (ii) → (D); (iii) → (A); (iv) → (C); (v) → (E)

Space for rough work

## Answer Keys

### Assessment Test I

1. (b)    2. (a)    3. (c)    4. (b)    5. (c)    6. (a)    7. (b)    8. (d)    9. (a)    10. (a)  
 11. (c)    12. (c)    13. (d)    14. (a)    15. (c)

### Assessment Test II

1. (a)    2. (b)    3. (d)    4. (a)    5. (b)    6. (c)    7. (d)    8. (b)    9. (b)    10. (b)  
 11. (d)    12. (a)    13. (c)    14. (d)    15. (a)

### Assessment Test III

1. (a)    2. (d)    3. (c)    4. (a)    5. (d)    6. (a)    7. (a)    8. (d)    9. (d)    10. (b)  
 11. (c)    12. (b)    13. (a)    14. (b)    15. (a)

### Assessment Test IV

1. (d)    2. (b)    3. (d)    4. (d)    5. (d)    6. (b)    7. (c)    8. (b)    9. (c)    10. (a)  
 11. (a)    12. (d)    13. (a)    14. (c)    15. (b)

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# Some Important Elements and their Compounds

# 7



16 <b>S</b> Sulfur 32.066	17 <b>Cl</b> Chlorine 35.4527
34 <b>Se</b> Selenium 78.96	35 <b>Br</b> Bromine 79.904
51 <b>Sb</b> Antimony	52 <b>Te</b> Tellurium
	53 <b>I</b> Iodine

**Reference:** Coursebook - IIT Foundation Chemistry Class 8; Chapter - Some Important Elements and their Compounds;  
Page number - 7.1–7.36

## Assessment Test I

Time: 30 min.

**Directions for questions from 1 to 15:** Select the correct answer from the given options.

Space for rough work

- Arrange the following in the increasing order of temperature range in which they are obtained during heating of sulphur.  
(A) Less viscous mobile liquid      (B) Monoclinic sulphur  
(C) Sulphur vapour      (D) Viscous liquid  
(E) Pale yellow mobile liquid  
(a) BEADC      (b) BECDA  
(c) BEDAC      (d) BECAD
- Arrange the following reactions in the order of formation of  $\text{NO}_2$ ,  $\text{NO}$ ,  $\text{N}_2\text{O}$ , and  $\text{H}_2$ .  
(A)  $\text{Zn} + \text{HNO}_3$  (dil.)      (B)  $\text{Cu} + \text{HNO}_3$  (dil.)  
(C)  $\text{Cu} + \text{HNO}_3$  (conc.)      (D)  $\text{Mg} + \text{HNO}_3$  (dil.)  
(a) CBAD      (b) CBDA      (c) BCAD      (d) BCDA
- Assertion (A):** Bleaching action of  $\text{SO}_2$  is temporary.  
**Reason (R):** In bleaching action,  $\text{SO}_2$  acts as a reducing agent.  
(a) Both A and R are true and R is the correct explanation of A.  
(b) Both A and R are true, but R is not the correct explanation of A.  
(c) A is true and R is false.  
(d) A is false and R is true.
- Assertion (A):** Nitric acid is used in the purification of gold.  
**Reason (R):**  $\text{HNO}_3$  is strong reducing agent.  
(a) Both A and R are true and R is the correct explanation of A.  
(b) Both A and R are true, but R is not the correct explanation of A.  
(c) A is true and R is false.  
(d) A is false and R is true.

## 7.2 Chapter 7 Some Important Elements and their Compounds

5. Match the statements of Column A with those of Column B.

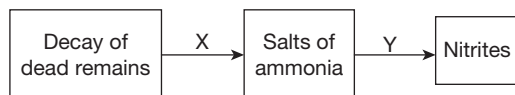
Column A	Column B
(i) Nitrogen	(A) Gunpowder
(ii) Phosphorus	(B) Storage batteries
(iii) Sulphur	(C) Rat poison
(iv) Hydrogen sulphide	(D) Refrigerant
(v) Sulphuric acid	(E) Analytical reagent

- (a) (i)  $\rightarrow$  (D); (ii)  $\rightarrow$  (C); (iii)  $\rightarrow$  (A); (iv)  $\rightarrow$  (E); (v)  $\rightarrow$  (B)  
 (b) (i)  $\rightarrow$  (C); (ii)  $\rightarrow$  (D); (iii)  $\rightarrow$  (E); (iv)  $\rightarrow$  (A); (v)  $\rightarrow$  (B)  
 (c) (i)  $\rightarrow$  (D); (ii)  $\rightarrow$  (E); (iii)  $\rightarrow$  (A); (iv)  $\rightarrow$  (B); (v)  $\rightarrow$  (C)  
 (d) (i)  $\rightarrow$  (E); (ii)  $\rightarrow$  (C); (iii)  $\rightarrow$  (D); (iv)  $\rightarrow$  (B); (v)  $\rightarrow$  (A)

6. Aqueous solution of 'X' on treatment with copper sulphate solution gives a pale blue precipitate of 'Y'. What could be X and Y?

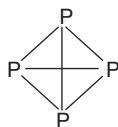
- (a) X is  $\text{NH}_3$ ;  $\text{Y} \rightarrow \text{Cu}(\text{OH})_2$       (b) X is  $\text{NH}_3$ ;  $\text{Y} \rightarrow \text{CuOH}$   
 (c) X is  $\text{H}_2\text{S}$ ;  $\text{Y} \rightarrow \text{CuS}$       (d) X is  $\text{H}_2\text{S}$ ;  $\text{Y} \rightarrow \text{Cu}_2\text{S}$

7. Identify 'X' and 'Y' in the following flowchart.

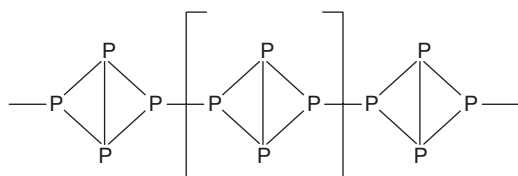


- (a) X is ammonifying bacteria. Y is symbiotic bacteria.  
 (b) X is denitrifying bacteria. Y is *Nitrobacter* bacteria.  
 (c) X is ammonifying bacteria. Y is *Nitrosomonas* bacteria.  
 (d) X is *Nitrosomonas* bacteria. Y is *Nitrobacter* bacteria.
8. Study the diagrams given below and answer the questions.

Structure of 'X'.



Structure of 'Y'.



- (A) X is red phosphorous and Y is white phosphorous.  
 (B) Y is used in match industry in preference to X.

Space for rough work

(C) Both X and Y are allotropes and possess same chemical properties and different physical properties.

(D) Both X and Y are allotropes and possess same physical and chemical properties.

Identify true statements.

(a) (A) and (B) (b) (B) and (C)

(c) (A) and (C) (d) (B) and (D)

9. Identify true statements regarding rhombic sulphur and monoclinic sulphur.

(a) Both are crystalline and insoluble in  $\text{CS}_2$ .

(b) Both are amorphous and soluble in  $\text{CS}_2$ .

(c) Both are crystalline and soluble in  $\text{CS}_2$ .

(d) Both are amorphous and insoluble in  $\text{CS}_2$ .

10. Sugar, on treating with sulphuric acid, turns to a black coloured mass. The property of sulphuric acid exploited in this process is \_\_\_\_\_.

(a) Acid nature (b) Oxidizing property

(c) Dehydrating property (d) Bleaching property

11. Aqueous solutions of two metal sulphates on treatment with hydrogen sulphide separately give flesh coloured and white precipitates. What are the two metals?

(a) Mn, Zn (b) Pb, Cu

(c) Pb, Mn (d) Zn, Cu

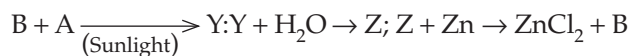
12. Identify 'X' in the following reactions.



(a) NaCl (b)  $\text{NaClO}_4$

(c) NaOCl (d)  $\text{NaClO}_3$

13. Identify 'A', 'Y' and 'Z' in the following reaction.



(a)  $\text{A} \rightarrow \text{Cl}_2$ ,  $\text{Y} \rightarrow \text{HCl}$   $\text{Z} \rightarrow$  Hydrochloric acid

(b)  $\text{A} \rightarrow \text{Cl}_2$ ,  $\text{Y} \rightarrow \text{HCl}$   $\text{Z} \rightarrow$  Hypochlorous acid

(c)  $\text{A} \rightarrow \text{H}_2$ ,  $\text{Y} \rightarrow \text{HCl}$   $\text{Z} \rightarrow$  Hydrochloric acid

(d)  $\text{A} \rightarrow \text{Cl}_2$ ,  $\text{Y} \rightarrow \text{HCl}$   $\text{Z} \rightarrow$  Chloric acid

14. **Assertion (A):** Thermosetting plastics are used for making handles of kitchenware.

**Reason (R):** Thermosetting plastics are made up of cross linked polymeric chains.

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- (a) Both A and R are true and R is the correct explanation of A.
  - (b) Both A and R are true, but R is not the correct explanation of A.
  - (c) A is true and R is false.
  - (d) A is false and R is true.
15. In olden days, white phosphorus was used in safety matches. Now, it has been replaced by red phosphorus. Identify the property due to which the replacement has been made.
- (a) Red phosphorus being red in colour evolves more light and heat energy.
  - (b) White phosphorus has a very low ignition temperature than red phosphorus.
  - (c) Red phosphorus has isolated  $P_4$  tetrahedral units under normal conditions and hence is not poisonous in nature.
  - (d) White phosphorus sublimes under normal conditions and hence, the material is wasted.

**Space** for rough work



# Assessment Test II

Time: 30 min.

Space for rough work

**Directions for questions from 1 to 15:** Select the correct answer from the given options.

1. Action of heat on sulphur is described below.

- (i) Lambda sulphur  $\rightarrow S_\mu$  - dark.
- (ii) Rhombic sulphur  $\rightarrow$  Monoclinic sulphur.
- (iii) Long chain of sulphur atoms  $\rightarrow S_2$  and  $S_4$  units.
- (iv) Monoclinic sulphur  $\rightarrow$  Lambda sulphur.
- (v)  $S_2$  and  $S_4$  units  $\rightarrow$  Atoms of sulphur.

Arrange the following temperatures in the order of statements given below.

- (A)  $114^\circ\text{C}$  (B)  $95.6^\circ\text{C}$
- (C)  $445^\circ\text{C}$  (D)  $160^\circ\text{C}$
- (E)  $200^\circ\text{C}$
- (a) DBAEC (b) DBEAC
- (c) DEBAC (d) DEABC

2. Arrange the following reactions involved in Brown ring test for metal nitrate in the correct order.

- (A)  $2\text{HNO}_3 \rightarrow \text{H}_2\text{O} + 2\text{NO} + 3[\text{O}]$
- (B)  $\text{NaOH} + \text{HNO}_3 \rightarrow \text{NaNO}_3 + \text{H}_2\text{O}$
- (C)  $\text{FeSO}_4 + \text{NO} \rightarrow \text{FeSO}_4 \cdot \text{NO}$
- (D)  $\text{NaNO}_3 + \text{H}_2\text{SO}_4 \rightarrow \text{NaHSO}_4 + \text{HNO}_3$
- (a) BDAC (b) BDCA
- (c) DBAC (d) DBCA

3. **Assertion (A):**  $\text{SO}_2$  is used in the sugar industry.

**Reason (R):**  $\text{SO}_2$  decolourizes sugarcane juice due to its bleaching action.

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true and R is false.
- (d) A is false and R is true.

4. **Assertion (A):** Metals such as iron, cobalt, etc., do not react with  $\text{HNO}_3$ .

**Reason (R):** Fe and Co become passive on treatment with  $\text{HNO}_3$ .

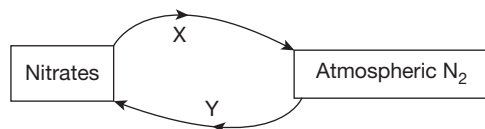
- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true and R is false.
- (d) A is false and R is true.

## 7.6 Chapter 7 Some Important Elements and their Compounds

5. Match the statements of Column A with those of Column B.

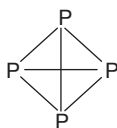
Column A	Column B
(i) Nitrogen	(A) Yellow colour substance
(ii) White Phosphorus	(B) Rotten egg smell
(iii) Sulphur	(C) Corrosive in nature
(iv) Hydrogen sulphide	(D) Unreactive substance
(v) Sulphuric acid	(E) Garlic smell

- (a) (i)  $\rightarrow$  (D); (ii)  $\rightarrow$  (C); (iii)  $\rightarrow$  (A); (iv)  $\rightarrow$  (E); (v)  $\rightarrow$  (B)  
 (b) (i)  $\rightarrow$  (C); (ii)  $\rightarrow$  (D); (iii)  $\rightarrow$  (E); (iv)  $\rightarrow$  (A); (v)  $\rightarrow$  (B)  
 (c) (i)  $\rightarrow$  (D); (ii)  $\rightarrow$  (E); (iii)  $\rightarrow$  (A); (iv)  $\rightarrow$  (B); (v)  $\rightarrow$  (C)  
 (d) (i)  $\rightarrow$  (E); (ii)  $\rightarrow$  (C); (iii)  $\rightarrow$  (D); (iv)  $\rightarrow$  (B); (v)  $\rightarrow$  (A)
6. Copper sulphate on treatment with excess aqueous solution of 'X' gives a dark blue solution of 'Y'. Identify X and Y.
- (a)  $X \rightarrow \text{NH}_3$ ;  $Y \rightarrow [\text{Cu}(\text{NH}_3)_2]\text{SO}_3$   
 (b)  $X \rightarrow \text{NH}_3$ ;  $Y \rightarrow [\text{Cu}(\text{NH}_3)_2]\text{SO}_4$   
 (c)  $X \rightarrow (\text{NH}_4)_2\text{SO}_4$ ;  $Y \rightarrow [\text{Cu}(\text{NH}_3)_2]\text{SO}_3$   
 (d)  $X \rightarrow (\text{NH}_4)_2\text{SO}_4$ ;  $Y \rightarrow [\text{Cu}(\text{NH}_3)_2]\text{SO}_4$
7. Identify 'X' and 'Y' in the following figure.

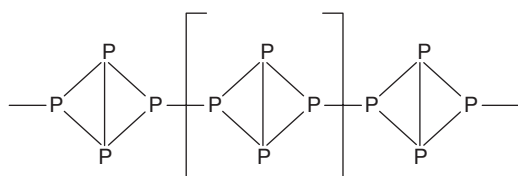


- (a) X is ammonifying bacteria. Y is *Nitrobacter* bacteria.  
 (b) X is denitrifying bacteria. Y is symbiotic bacteria.  
 (c) X is ammonifying bacteria. Y is *Nitrosomonas* bacteria.  
 (d) X is *Nitrosomonas* bacteria. Y is *Nitrobacter* bacteria.
8. Study the diagram given below and identify the wrong statements.

Structure of 'X'.



Structure of 'Y'.



Space for rough work

Space for rough work

- (A) X is poisonous and Y sublimates at 565 K.  
(B) X is a brittle powder and Y possesses the smell.  
(C) X gradually changes its colour. Y exists in dark of garlic colour.  
(D) X is amorphous and Y is crystalline.  
(a) (A) and (B) (b) (B) and (C)  
(c) (B) and (D) (d) (A), (C), and (D)
9. Identify the true statements regarding alpha sulphur (X), beta sulphur (Y), and gamma sulphur (Z).  
(A) X → Rhombic sulphur; Y → Prismatic sulphur; Z → Plastic sulphur  
(B) Both X and Y are more stable at normal temperature.  
(C) X possesses octahedral shape and Y has a needle shape.  
(D) Z does not have a sharp melting point.  
(a) ABC (b) ACD (c) BCD (d) ABD
10. In which among the following reactions does  $\text{H}_2\text{SO}_4$  show oxidizing property?  
(a)  $\text{Zn} + \text{H}_2\text{SO}_4 \rightarrow \text{ZnSO}_4 + \text{H}_2$   
(b)  $\text{C} + 2\text{H}_2\text{SO}_4 \rightarrow 2\text{H}_2\text{O} + 2\text{SO}_2 + \text{CO}_2$   
(c)  $2\text{KOH} + \text{H}_2\text{SO}_4 \rightarrow \text{K}_2\text{SO}_4 + 2\text{H}_2\text{O}$   
(d)  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O} \rightarrow \text{CuSO}_4 + 5\text{H}_2\text{O}$
11. Hydrogen sulphide, on combustion, gives sulphur and water. This reaction indicates the \_\_\_\_\_ of hydrogen sulphide.  
(a) acidic nature (b) basic nature  
(c) reducing property (d) oxidizing property
12. Manganese dioxide, on treatment with conc. HCl, gives gas 'X'. Identify the false statement regarding X.  
(a) It is a good bleaching agent and an oxidizing agent.  
(b) It is collected by the downward displacement of water.  
(c) It is used in the manufacture of bleaching powder.  
(d) It is greenish yellow in colour.
13. Identify the reaction which correctly represents the laboratory method of preparation of hydrogen chloride gas.  
(a)  $\text{H}_2 + \text{Cl}_2 \xrightarrow{\text{Sunlight}} 2\text{HCl}$   
(b)  $2\text{HI} + \text{HgCl}_2 \longrightarrow 2\text{HCl} + \text{HgI}_2$   
(c)  $\text{NaHSO}_4 + \text{NaCl} \xrightarrow{> 200^\circ \text{C}} (> 200^\circ \text{C}) \text{Na}_2\text{SO}_4 + \text{HCl}$   
(d)  $\text{NaCl} + \text{H}_2\text{SO}_4 \xrightarrow{200^\circ \text{C}} \text{NaHSO}_4 + \text{HCl}$
14. **Assertion (A):** Bakelite is a plastic which cannot be remoulded.  
**Reason (R):** Bakelite is a thermoplastic polymer.

- (a) Both A and R are true and R is the correct explanation of A.
  - (b) Both A and R are true, but R is not the correct explanation of A.
  - (c) A is true and R is false.
  - (d) A is false and R is true.
15. 'X' and 'Y' are two allotropic forms of phosphorus and Y is used preferably in match industry. Which of the following statements is true regarding the two samples X and Y?
- (a) 'X' has greater density than 'Y'.
  - (b) In X,  $P_4$  units are linked by P-P bonds.
  - (c) In Y,  $P_4$  units are linked by P-P bonds.
  - (d) Both of them undergo sublimation.

**Space** for rough work

# Assessment Test III

Time: 30 min.

Space for rough work

**Directions for questions from 1 to 15:** Select the correct answer from the given options.

- Which of the following methods can be adopted for the removal of dust particles from air?
  - By using an electrostatic precipitator.
  - By passing air through a strong acidic solution.
  - By passing air through a strong alkaline solution.
  - By passing air through  $P_2O_5$ .
- By which of the following processes can nitrogen be isolated from liquid air?
  - By fractional crystallization
  - By evaporation
  - By dissolving liquid air in water
  - By fractional distillation
- Which of the following gases is evolved when  $(NH_4)_2Cr_2O_7$  is heated?
  - $N_2$
  - $O_2$
  - NO
  - $NO_2$
- Assertion (A):** Red phosphorus is less reactive than white phosphorus.  
**Reason (R):** Red phosphorus exists in the form of puckered rings.
  - Both A and R are true and R is the correct explanation of A.
  - Both A and R are true, but R is not the correct explanation of A.
  - A is true and R is false.
  - A is false and R is true.
- Assertion(A):** In the laboratory preparation of chlorine,  $MnO_2$  is used.  
**Reason(R):**  $MnO_2$  is used as a catalyst in the laboratory preparation of chlorine.
  - Both A and R are true and R is the correct explanation of A.
  - Both A and R are true, but R is not the correct explanation of A.
  - A is true and R is false.
  - A is false and R is true.
- Arrange the following forms of sulphur in the ascending order of temperature at which they exist.

(A) $\mu$ sulphur	(B) Rhombic sulphur
(C) Monoclinic sulphur	(D) Lambda sulphur
(E) Flower of sulphur	
(a) BCDAE	(b) CDBAE
(c) ACBDE	(d) EDBAC
- Arrange the following processes involved in contact process in a proper sequence.

- (A) Dissolution of an oxide in an acid  
 (B) Hydrolysis (reaction with water) of an acid  
 (C) Combustion of a substance  
 (D) A reversible redox reaction  
 (a) DCAB                      (b) BCAD                      (c) CDAB                      (d) ACBD

8. Which of the following elements is not present in bleaching powder?  
 (a) Ca                      (b) O                      (c) H                      (d) Cl
9. The coefficient of thermal expansion of which of the following types of glasses is low?  
 (a) Borosilicate glass                      (b) Lead glass  
 (c) Optical glass                      (d) Alkali silicate glass
10. Which of the following fertilizers cannot replenish the soil with nitrogen?  
 (a) Ammonium sulphate                      (b) Urea  
 (c) Superphosphate                      (d) Ammonium phosphate
11. Which of the following processed glasses is used for reinforcing purpose?  
 (a) Laminated glass                      (b) Fibre glass  
 (c) Foam glass                      (d) Opaque glass
12. Which of the following polymers contains cross-linked polymeric chains?  
 (a) Polyethylene                      (b) PVC  
 (c) Teflon                      (d) Melamine
13. Which of the following fibres does not originate from living beings?  
 (a) Silk                      (b) Wool  
 (c) Cotton                      (d) Acrylic
14. Which of the following gases is widely used as an analytical reagent?  
 (a)  $\text{Cl}_2$                       (b)  $\text{H}_2\text{S}$                       (c)  $\text{SO}_2$                       (d)  $\text{O}_2$
15. Match the entries of Column A with those of Column B.

Column A (Compounds)	Column B (Uses)
(i) $\text{NH}_4\text{Cl}$	(A) Dehydrating agent
(ii) $\text{P}_2\text{O}_5$	(B) Flux in the extraction of metals like iron
(iii) $\text{CaO}$	(C) Preparation of soaps and detergents
(iv) $\text{CaOCl}_2$	(D) Electrolyte in dry cell
(v) $\text{NaOH}$	(E) In the manufacture of chloroform

- (a) (i)  $\rightarrow$  (D); (ii)  $\rightarrow$  (A); (iii)  $\rightarrow$  (B); (iv)  $\rightarrow$  (E); (v)  $\rightarrow$  (C)  
 (b) (i)  $\rightarrow$  (D); (ii)  $\rightarrow$  (A); (iii)  $\rightarrow$  (B); (iv)  $\rightarrow$  (C); (v)  $\rightarrow$  (E)  
 (c) (i)  $\rightarrow$  (B); (ii)  $\rightarrow$  (C); (iii)  $\rightarrow$  (A); (iv)  $\rightarrow$  (B); (v)  $\rightarrow$  (D)  
 (d) (i)  $\rightarrow$  (B); (ii)  $\rightarrow$  (C); (iii)  $\rightarrow$  (A); (iv)  $\rightarrow$  (D); (v)  $\rightarrow$  (B)

# Assessment Test IV

Time: 30 min.

Space for rough work

**Directions for questions from 1 to 15:** Select the correct answer from the given options.

1. In which of the following ways can  $\text{CO}_2$  be removed from air?
  - (a) By using an electrostatic precipitator.
  - (b) By passing air through a strong acidic solution.
  - (c) By passing air through a strong alkaline solution.
  - (d) By passing air through  $\text{P}_2\text{O}_5$ .
2. Which of the following principles is used to separate nitrogen from liquid air?
  - (a) Difference in freezing points of nitrogen and oxygen
  - (b) Difference in rates of diffusion of nitrogen
  - (c) Difference in solubilities of nitrogen and oxygen in water
  - (d) Difference in the boiling points of liquid nitrogen and liquid oxygen

3. When excess of ammonia gas is made to react with chlorine, \_\_\_\_\_ and \_\_\_\_\_ are formed.

- |  |   |
|--|---|
| (a) $\text{NCl}_3, \text{H}_2$         | (b) $\text{N}_2, \text{HCl}$              |
| (c) $\text{N}_2, \text{NH}_4\text{Cl}$ | (d) $\text{N}_2, \text{H}_2, \text{Cl}_2$ |

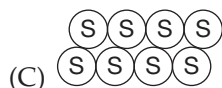
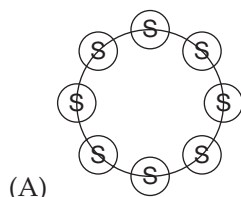
4. **Assertion (A):** Monoclinic sulphur is less dense than its allotrope rhombic sulphur.

**Reason (R):** The shapes of crystals of monoclinic sulphur and rhombic sulphur are needle-shaped and octahedral, respectively.

- (a) Both A and R are true and R is the correct explanation of A.
  - (b) Both A and R are true, but R is not the correct explanation of A.
  - (c) A is true and R is false.
  - (d) A is false and R is true.
5. **Assertion (A):**  $\text{HCl}$  gets oxidized to form  $\text{MnCl}_2$  during the laboratory preparation of chlorine.

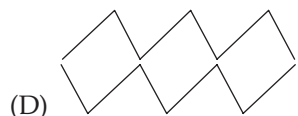
**Reason (R):**  $\text{MnO}_2$  acts as an oxidizing agent in the laboratory preparation of chlorine.

    - (a) Both A and R are true and R is the correct explanation of A.
    - (b) Both A and R are true, but R is not the correct explanation of A.
    - (c) A is true and R is false.
    - (d) A is false and R is true.
  6. Arrange the following forms of sulphur (represented diagrammatically) obtained during the heating of sulphur from room temperature.



(a) DCAB

(b) BDAC



(c) CDBA

(d) ADBC

7. Arrange the following substances used in different steps for the industrial preparation of  $\text{H}_2\text{SO}_4$ .

(A) Sulphuric acid

(B)  $\text{O}_2$  and  $\text{V}_2\text{O}_5$  (Catalyst)

(C) Water

(D)  $\text{O}_2$

(a) CDBA

(b) DBAC

(c) ACBD

(d) BADC

8. Which of the following gases is used in the manufacture of bleaching powder?

(a)  $\text{Cl}_2$

(b)  $\text{O}_2$

(c)  $\text{H}_2$

(d)  $\text{H}_2\text{O}_2$

9. Which of the following types of glass is soluble in water?

(a) Borosilicate glass

(b) Lead glass

(c) Optical glass

(d) Alkali silicate glass

10. Which of the following fertilizers replenishes the soil with a metal that plays an important role in the growth of plants?

(a) Urea

(b) Ammonium sulphate

(c) Ammonium phosphate

(d) Potassium chloride

11. Which of the following types of processed glass is light in weight and used for civil construction and insulation purposes?

(a) Laminated glass

(b) Fibre glass

(c) Foam glass

(d) Opaque glass

12. A polymer is widely used in lining cooking pans with a non-stick coating. Which of the following statements is not true regarding this polymer?

(a) It is a cross-linked polymer.

(b) It is made up of linearly linked polymeric units.

(c) It is resistant to chemicals.

(d) It is heat-resistant.

13. Which of the following synthetic fibres are similar to the natural fibres, silk, and wool, respectively?

(a) Nylon and rayon

(b) Acrylic and rayon

(c) Polyester and acrylic

(d) Rayon and acrylic



14. Which of the following gases is a reducing agent and is used to identify certain metals present in the given salt?

- (a)  $\text{Cl}_2$                       (b)  $\text{H}_2\text{S}$                       (c)  $\text{SO}_2$                       (d)  $\text{O}_2$

15. Match the entries of Column A with those of Column B.

Column A	Column B
(i) Electrolysis of saturated brine solution	(A) $\text{CaOCl}_2$
(ii) Thermal decomposition of limestone	(B) $\text{NH}_4\text{Cl}$
(iii) On decomposition produces two gases	(C) $\text{CaO}$
(iv) Produces nascent oxygen	(D) Conc. $\text{H}_2\text{SO}_4$
(v) Removes hydrogen and oxygen in the form of a water molecule from a compound	(E) $\text{NaOH}$

- (a) (i)  $\rightarrow$  (E); (ii)  $\rightarrow$  (C); (iii)  $\rightarrow$  (B); (iv)  $\rightarrow$  (A); (v)  $\rightarrow$  (D)  
 (b) (i)  $\rightarrow$  (E); (ii)  $\rightarrow$  (C); (iii)  $\rightarrow$  (B); (iv)  $\rightarrow$  (D); (v)  $\rightarrow$  (A)  
 (c) (i)  $\rightarrow$  (B); (ii)  $\rightarrow$  (C); (iii)  $\rightarrow$  (D); (iv)  $\rightarrow$  (A); (v)  $\rightarrow$  (E)  
 (d) (i)  $\rightarrow$  (B); (ii)  $\rightarrow$  (C); (iii)  $\rightarrow$  (D); (iv)  $\rightarrow$  (E); (v)  $\rightarrow$  (A)

Space for rough work

## Answer Keys

### Assessment Test I

1. (c)    2. (a)    3. (a)    4. (c)    5. (a)    6. (a)    7. (c)    8. (b)    9. (c)    10. (c)  
 11. (a)    12. (a)    13. (a)    14. (a)    15. (b)

### Assessment Test II

1. (b)    2. (a)    3. (a)    4. (a)    5. (c)    6. (b)    7. (b)    8. (c)    9. (b)    10. (b)  
 11. (c)    12. (b)    13. (c)    14. (c)    15. (c)

### Assessment Test III

1. (a)    2. (d)    3. (a)    4. (c)    5. (c)    6. (a)    7. (c)    8. (c)    9. (a)    10. (c)  
 11. (b)    12. (d)    13. (d)    14. (b)    15. (a)

### Assessment Test IV

1. (c)    2. (d)    3. (c)    4. (b)    5. (d)    6. (b)    7. (b)    8. (a)    9. (d)    10. (d)  
 11. (c)    12. (a)    13. (d)    14. (b)    15. (a)

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# Hints and Explanations

## CHAPTER 1 Atomic Structure

### Assessment Test I

1. Discovery of isotopes led to contradiction of the postulate of Dalton's atomic theory that atoms of the same element are alike in all aspects.

Hence, the correct option is (a).

2. The figure represents Thomson's atomic model. From Thomson's experiment, it can be concluded that electrons are the universal constituent of matter.

Hence, the correct option is (d).

3. The energy of orbits increases with distance from the nucleus in the order  $K < L < M < N$ . Energy is released when an electron jumps from a higher energy orbit to a lower energy orbit. Among the given transitions, such transitions from higher orbit to lower orbit are  $L \rightarrow K$ ,  $M \rightarrow L$ , and  $N \rightarrow K$ .

Hence, the correct option is (c).

4. The orbits in which electrons revolve around the nucleus are called stationary orbits since the energy of electrons remains constant in those orbits. The electrons are in continuous motion around the nucleus in those orbits and never remain stationary.

Hence, the correct option is (c).

5. Mass of electron =  $m$

$$\text{Mass of proton} = 1837 \times m$$

$$\text{No. of protons} = \frac{36,740}{1837} = 20$$

$$\text{No. of neutrons} = 19$$

$$\text{Mass number} = 39$$

$$\text{Atomic number} = 20$$

$$\text{Representation of the atom or nuclide} \rightarrow {}_{20}\text{X}^{39}.$$

Hence, the correct option is (d).

6. No. of electrons in a dispositive ion =  $a$

$$\text{No. of electrons in neutral atom} = a + 2$$

$$\text{Atomic number} = \text{No. of protons} = a + 2 = b$$

$$\text{No. of neutrons} = a + 2 + 3 = a + 5$$

$$\text{Mass number} = (a + 2) + (a + 5) = 2a + 7$$

Hence, the correct option is (b).

7.  $\text{O}^{-2}$  ion is formed by the gain of two electrons by neutral atom and  $\text{K}^{+}$  ion is formed by the loss of one electron by neutral atom.

Hence, the correct option is (c).

8. (i) The sum of the number of protons and neutrons is called mass number.

(ii) Rutherford's theory proposed the concept of nucleus.

(iii) Isotopes differ in the number of neutrons.

(iv) Isobars possess same number of nucleons.

Hence, the correct option is (b).

9. A few of the  $\alpha$  particles in the experiment were completely rebounded because they hit the nucleus that is a positively small central part and experience repulsion from the positively the  $\alpha$  particles charged nucleus.

Hence, the correct option is (d).

10. (i) Combination of atoms in a simple numerical ratio.  
 (ii) Electrical neutrality of atom.  
 (iii) The diameter of nucleus as  $10^{-5}$  times that of an atom.  
 (iv) Presence of electrons in K, L, M, and N shells.  
 Hence, the correct option is (c).

11. (E)  ${}_{12}\text{X}^{24}$  &  ${}_{20}\text{Y}^{40} \rightarrow$  Metals  
 (D)  ${}_8\text{X}^{16}$  &  ${}_{16}\text{Y}^{32} \rightarrow$  Non-metals  
 (B)  ${}_{10}\text{X}^{20}$  &  ${}_{18}\text{Y}^{36} \rightarrow$  Noble gases  
 (C)  ${}_Z\text{A}^X$  &  ${}_Z\text{A}^{X+2} \rightarrow$  Isotopes  
 (A)  ${}_Z\text{A}^X$  &  ${}_{Z+2}\text{B}^X \rightarrow$  Isobars

Hence, the correct option is (a).

12. (i)  $\rightarrow$  (C)  
 $Z = 21$  corresponds to electronic configuration 2, 8, 9, and 2. The ratio of electrons in penultimate shell to valence shell is 9:2.  
 (ii)  $\rightarrow$  (E)  
 $Z = 30$  corresponds to electronic configuration 2, 8, 18, and 2. The ratio of electrons in penultimate shell to valence shell is 9:1.  
 (iii)  $\rightarrow$  (B)  
 $Z = 20$  corresponds to electronic configuration 2, 8, 8, and 2. The ratio of electrons in penultimate shell to valence shell is 4:1.  
 (iv)  $\rightarrow$  (A)  
 $Z = 19$  corresponds to electronic configuration 2, 8, 8 and 1. The ratio of electrons in penultimate shell to valence shell is 8:1.  
 (V)  $\rightarrow$  (D)  
 $Z = 18$  corresponds to electronic configuration 2, 8 and 8. The ratio of electrons in penultimate shell to valence shell is 1:1.

Hence, the correct option is (a).

13. The anion formed from the given neutral atom is a dinegative ion which has the configuration of argon the electronic configuration of the element is 2, 8 and 6.

Hence, the correct option is (c).

14. The electrons number 36 does not correspond to  $2n^2$  which gives the maximum number of electrons in Bohr's orbit.

Hence, the correct option is (b).

15. Y can have an atomic number 30. The electronic configuration for  $Z = 30$  is 2, 8, 18, and 2. On losing two electrons, the resultant dipositive ion gets the configuration of 2, 8, and 18, and does not have an octet. X is K(19) and its electronic configuration is 2, 8, 8, and 1. On losing one electron, the resultant mono positive ion gets the configuration of 2, 8, and 8.

Hence, the correct option is (a).

### Assessment Test II

1. Law of definite proportions provided experimental basis for the postulate of Dalton's atomic theory that atoms of different elements combine in a simple whole number ratio.

Hence, the correct option is (c).

2. The given atomic model is Bohr's atomic model, which supported the presence of a nucleus at the centre of an atom. Thus, it contradicted the idea of uniform distribution of positive charge in an atom.

Hence, the correct option is (d).

3. In the given figure, the naming of orbits is in the order M, N, L, and K, whereas the usual order is K, L, M, and N, which corresponds to 1, 2, 3, and 4. All the other aspects are in accordance with the established facts.

Hence, the correct option is (c).

4. The energy of orbits increases with increase in distance because the nuclear force of attraction decreases with increase in distance. Since the first orbit is associated with the lowest energy, electrons in that orbit do not lose energy at all. Both the statements are correct.

Hence, the correct option is (b).

5. No. of protons =  $\frac{18370}{1837} = 10$

Atomic number = 10

Mass number =  $20 + 2 = 22$

No. of neutrons =  $22 - 10 = 12$ .

Hence, the correct option is (d).

6. Mass of electron =  $x$

Mass of protons =  $y$

No. of protons in  ${}_8\text{O}^{18} = 8$

Mass of one proton =  $y/8 = 1837x$

$$y = 8 \times 1837x$$

Hence, the correct option is (c).

7. Neutral atom with 7 electrons in valence shell corresponds to the formation of uninegative ion as it can gain one electron to get an octet. A neutral atom with 3 electrons in valence shell corresponds to the formation of tripositive ion as it can lose 3 electrons to get an octet.

Hence, the correct option is (b).

8. (i) The number of neutrons in  ${}_{17}\text{Cl}^{35}$  is 18.  
 (ii) Maximum number of electrons in an orbit can be given by  $2n^2$ .  
 (iii)  ${}_{19}\text{Y}^{40}$  is the isobar of  ${}_{20}\text{X}^{40}$ .  
 (iv) Isotope of  ${}_Z\text{X}^A$  is  ${}_Z\text{Y}^{A+2}$ .

Hence, the correct option is (c).

9. Both the statements are true. Most of the  $\alpha$  particles in the experiment pass straight through the gold foil which signifies that most part of the atom is empty.

Hence, the correct option is (a).

10. (i) Discovery of electrons  
 (ii) Discovery of nucleus  
 (iii) Establishing stability of atom  
 (iv) Discovery of protons

Hence, the correct option is (b).

11. (B)  $B \rightarrow 2, 8; Z = 10 \rightarrow$  Noble gas  
 (A)  $A \rightarrow 2, 8; Z = 11 \rightarrow$  Cation  
 (E)  $E \rightarrow 2, 8, 5; Z = 15 \rightarrow$  Non-metal atom  
 (C)  $C \rightarrow 2, 8, 8; Z = 16 \rightarrow$  Anion  
 (D)  $D \rightarrow 2, 8, 2; Z = 12 \rightarrow$  Metal atom

Hence, the correct option is (d).

12. (i)  $\rightarrow$  (B)

$Z = 36$  corresponds to electronic configuration 2, 8, 18, and 8. There are 18 electrons in the penultimate shell.

- (ii)  $\rightarrow$  (D)

$Z = 17$  corresponds to electronic configuration 2, 8, and 7. There are 8 electrons in the penultimate shell.

- (iii)  $\rightarrow$  (E)

$Z = 25$  corresponds to electronic configuration 2, 8, 13, and 2. There are 13 electrons in the penultimate shell.

- (iv)  $\rightarrow$  (A)

$Z = 9$  corresponds to electronic configuration 2 and 7. There are 2 electrons in the penultimate shell.

- (v)  $\rightarrow$  (C)

$Z = 22$  corresponds to electronic configuration 2, 8, 10, and 2. There are 10 electrons in penultimate shell.

Hence, the correct option is (b).

13. The given species is a neutral atom with 13 electrons that means 3 electrons in the valence shell. It can lose three electrons to form a tripositive ion with the configuration of neon.

Hence, the correct option is (a).

14. The maximum number of electrons in an orbit is given by  $2n^2$ . If  $2n^2 = 50$ , then  $n = 5$ .

Hence, the correct option is (c).

15. The electronic configuration of the element is 2, 8, 14, and 2. The atomic number of the element is 26.

Hence, the correct option is (a).

### Assessment Test III

1. (A) 82 neutrons  
 (B) 146 neutrons  
 (C) 118 neutrons  
 (D) 142 neutrons  
 (E) 117 neutrons  
 AECDB

Hence, the correct option is (c).

2. (A)  $A^+ \rightarrow$  11 protons  $Z = 11$   
 (B)  $B^{+2} \rightarrow$  12 protons  $Z = 12$   
 (C)  $C^- \rightarrow$  9 protons  $Z = 9$   
 (D)  $D^{-2} \rightarrow$  8 protons  $Z = 8$   
 DCAB

Hence, the correct option is (a).

3. In the antepenultimate shell of Al, only 2 electrons are present.  
Hence, the correct option is (d).
4. Isotopes of an element do not possess the same number of fundamental particles. They possess the same number of protons and electrons but differ with respect to the number of neutrons. Atomic number is the number of protons which is the characteristic of an element.  
Hence, the correct option is (d).
5. No. of protons =  $\frac{23881}{1837} = 13$   
Atomic number = 13.  
Hence, the correct option is (c).
6.  $\alpha$  particle has 2 protons and 2 neutrons. A proton and a neutron have almost equal mass. So, the mass of  $\alpha$  particle is  $4m$ .  
Hence, the correct option is (c).
7. Thomson's model failed because it could not explain how the positive charge and electrons coexist in an atom without getting neutralized.  
Hence, the correct option is (c).
8. Number of neutron = Number of proton = Number of electron.  
= Atomic number = 20  
Mass Number is =  $2 \times \text{Atomic number}$   
=  $20 \times 20 = 40$   
So,  ${}_{20}\text{X}^{40} \Rightarrow$ . This element is Ca.  
Hence, the correct option is (a).
9. An atom with  $Z = 13$  has the electronic configuration 2, 8, and 3. It can form tripositive ion.  
Hence, the correct option is (d).
10. An atom with electronic configuration 2, 8, 18, and 8 is an inert gas and has one incomplete shell. It cannot form ions as it has an octet configuration and does not take part in chemical reactions. The next electron extends into the fifth shell as valence shell can have a maximum of 8 electrons.  
Hence, the correct option is (c).

11.  $a = 2$  electrons,  $a + b = 8$  electrons,  $b = 6$  electrons, and  $2b = 12$  electrons  
The electrons configuration of atom A should be 2, 8, 12, and 2. This element has 2 incomplete shells. Electrons can be added to penultimate shell till 18 electrons are filled in it. An element with  $Z + 7$  has 3 electrons in its valence shell. It can form a dipositive ion.  
Hence, the correct option is (c).
12. As the electron goes away from the nucleus, the nuclear force of attraction decreases and hence, the electron revolves round with lesser velocity.  
Hence, the correct option is (b).
13. The postulate that electrons are in continuous motion around the nucleus was not based on the experimental results.  
Hence, the correct option is (c).
14.  ${}_{14}\text{A}^{28} \rightarrow 2, 8, 4$   
 ${}_6\text{B}^{12} \rightarrow 2, 4$   
Hence, the correct option is (b).
15. (i)  $\rightarrow$  (C); (ii)  $\rightarrow$  (A); (iii)  $\rightarrow$  (B); (iv)  $\rightarrow$  (D)  
Hence, the correct option is (b).

### Assessment Test IV

1. (A)  $A \rightarrow 16; 2, 8, 6$   
(B)  $B \rightarrow 20; 2, 8, 8, 2$   
(C)  $C \rightarrow 14; 2, 8, 4$   
(D)  $D \rightarrow 17; 2, 8, 7$   
(E)  $E \rightarrow 13; 2, 8, 3$   
DACEB  
Hence, the correct option is (d).
2. (A)  $A = 87$   
(B)  $A = 137$   
(C)  $A = 190$   
(D)  $A = 108$   
(E)  $A = 101$   
AEDBC  
Hence, the correct option is (d).
3. Isotopes have the same atomic number but different mass number.  
Hence, the correct option is (c).

4. Since atoms were found to contain fundamental particles, they must be divisible.  
Hence, the correct option is (a).
5.  $Z = \frac{29392}{1837} = 16$   
Hence, the correct option is (b).
6. A dipositively charged helium ion is  $\alpha$  particle. A helium atom has 2 electrons, 2 protons, and 2 neutrons. When 2 electrons are removed, it is left with 2 protons and 2 neutrons that means 4 fundamental particles.  
Hence, the correct option is (b).
7. The presence of nucleus in an atom was first established by Rutherford.  
Hence, the correct option is (a).
8. Platinum is also highly malleable and has high nuclear charge. So, it can replace gold foil in  $\alpha$ -ray scattering experiment.  
Hence, the correct option is (c).
9. An atom with  $Z = 7$  and  $Z = 15$  has electronic configurations 2, 5 and 2, 8, 5. These two can form trinegative ions.  
Hence, the correct option is (d).
10. Noble gases or inert gases have 8 valence electrons.  
Hence, the correct option is (c).
11. The electronic configuration of element X is 2, 8, 10, and 2. The atomic number of the element is 22.  
Hence, the correct option is (b).
12. Electron releases energy when it moves from M shell to L shell, since M shell has greater energy than L shell.  
Hence, the correct option is (a).
13.  $\alpha$ -ray scattering experiment was conducted to prove the validity of Thomson's model. All the  $\alpha$ -particles were expected to pass straight through the gold foil since the positively charged mass is uniformly distributed.  
Hence, the correct option is (d).
14. Electronic arrangement of an element having atomic number 24  $\rightarrow$  2, 8, 13, 1  
K L M N  
So, the antepenultimate shell has 8 electrons.  
Hence, the correct option is (b).
15. (i)  $\rightarrow$  (D); (ii)  $\rightarrow$  (C); (iii)  $\rightarrow$  (B); (iv)  $\rightarrow$  (A)  
Hence, the correct option is (d).

## CHAPTER 2

### Classification of Matter

#### Assessment Test I

1. Water will be in vapour state because there is no external pressure.  
Hence, the correct option is (c).
2. When we exhale air from our mouth on a winter morning, the warm water vapour present in the exhaled air condenses to form water droplets.  
Hence, the correct option is (c).
3. Diamond is a very good conductor of heat because of the compact arrangement of small carbon atoms.  
Hence, the correct option is (a).
4. Smoke is not a homogeneous mixture.  
Hence, the correct option is (d).
5. Sodium is a soft metal and others are hard.  
Hence, the correct option is (d).
6. The correct sequence is using separating funnel for separating benzene, then fractional distillation to separate alcohol and finally evaporation to obtain sugar.  
Hence, the correct option is (b).
7. In position A, it will dry up faster because the rate of evaporation is directly proportional to both temperature and surface area.  
Hence, the correct option is (d).
8. B can be liquefied by the application of pressure at that temperature, not A.  
Hence, the correct option is (b).
9. Formation of ice from water and condensation of water vapour involve decrease in potential energy.  
Hence, the correct option is (b).
10. Pressure cooker reduces the cooking time by increasing the boiling point of water due to increase in the external pressure.  
Hence, the correct option is (b).
11. Metals have lustre because of transition of loosely bound electrons.  
Hence, the correct option is (a).
12. Steel is more resistant to corrosion because alloying makes the constituent metal less reactive.  
Hence, the correct option is (a).
13. Chromatogram (a) represents a mixture of R, B, and G dyes. Chromatogram (b) represents a mixture of R, B, and G dyes and some other impurity also. Chromatogram (c) represents a mixture of red and green dyes. Chromatogram (d) represents a mixture of red and blue dyes.  
 $\therefore$  The order is BDAC.  
Hence, the correct option is (b).
14. At first, sand has to be filtered.  $\text{CCl}_4$  has to be separated by using separating funnel. Then, fractional crystallization is done to separate  $\text{KNO}_3$ . To separate  $\text{NaCl}$ , evaporation is required.  
 $\therefore$  The order is DCBA.  
Hence, the correct option is (d).
15. (i) Copper sulphate + water  $\rightarrow$  Solid-liquid homogeneous mixture  
(ii) Benzene + water  $\rightarrow$  Liquid-liquid heterogeneous mixture  
(iii) Fine powdered sulphur + water  $\rightarrow$  Solid-liquid heterogeneous mixture  
(iv) Vinegar + water  $\rightarrow$  Liquid-liquid homogeneous mixture  
(v) Steel  $\rightarrow$  Solid-solid homogeneous mixture  
Hence, the correct option is (c).

#### Assessment Test II

1. Ice kept in a vacuum chamber sublimates and gets converted to vapour state.  
Hence, the correct option is (c).



2. Cooking gas (LPG) is liquefied by the application of pressure.  
Hence, the correct option is (b).
3. It is graphite, and so the constituent atoms are carbon.  
Hence, the correct option is (c).
4. Brass, being an alloy of copper, is a homogeneous mixture.  
Hence, the correct option is (a).
5. Among the given substances only gas carbon is a good conductor of electricity.  
Hence, the correct option is (c).
6. At first, charcoal should be separated by filtration. Then coconut oil can be separated by using separating funnel and glucose can be obtained by evaporation.  
Hence, the correct option is (a).
7. We blow air to cool a hot liquid in order to provide fresh air above the surface of the liquid.  
Hence, the correct option is (c).
8. Critical temperature of C is the highest because it can only be liquefied at that temperature.  
Hence, the correct option is (c).
9. A cup of hot tea at 60°C gets cold.  
Hence, the correct option is (b).
10. During skating, pressure is applied on ice and it melts, and during filling up of cooking gas cylinder also, pressure is applied to liquefy the cooking gas.  
Hence, the correct option is (d).
11. Metals are good conductors of electricity because of the presence of free electrons. Metal atoms have generally 1 or 2 or 3 electrons in their valence shell.  
Hence, the correct option is (c).
12. Duralumin is as strong as steel because it is an alloy of aluminium, and alloying improves

the mechanical properties of metal. Alloying reduces the malleability of the metal.

Hence, the correct option is (c).

13. Chromatogram (a) contains A, B, and two other components. Chromatogram (b) contains A, C, and another component. Chromatogram (c) contains A, B, and C. Chromatogram (d) contains A and C.

∴ The order is BCAD.

Hence, the correct option is (c).

14. At first, gravity separation can be carried out to separate sawdust. Then filtration can be done to remove coarsely ground chalk, followed by fractional distillation for removing vinegar. Then evaporation can be done to obtain the common salt.

∴ The order is DBAC.

Hence, the correct option is (a).

15. (i) Solid–solid homogeneous mixture → Bronze  
(ii) Solid–liquid homogeneous mixture → Saline water  
(iii) Liquid–liquid heterogeneous mixture → Coconut oil and water  
(iv) Liquid–liquid homogeneous mixture → Petrol and diesel  
(v) Solid–liquid heterogeneous mixture → Finely powdered charcoal in water.

Hence, the correct option is (a).

### Assessment Test III

1. The thermal expansion is maximum in gases.  
Hence, the correct option is (c).
2. In both evaporation and boiling, liquid changes to its gaseous state.  
Hence, the correct option is (c).
3. Good conductance of electricity is the characteristic of a metal. Non-metals are generally poor conductors of electricity.  
Hence, the correct option is (a).

4. Phosphorus – 4

Iodine – 2

Sulphur – 8

Ozone – 3

∴ The increasing order of atomicity is BDAC.

Hence, the correct option is (a).

5. (i) German silver → Copper

(ii) Tungsten steel → Iron

(iii) Monel metal → Nickel

(iv) Duralumin → Aluminium

∴ The required order is CDAB.

Hence, the correct option is (b).

6. Fractional crystallization is used since both sodium chloride and potassium nitrates are soluble in water and have different solubilities.

Hence, the correct option is (d).

7. Potassium has the least density.

Hence, the correct option is (a).

8. Since alcohol and water are miscible, they cannot be separated by using a separating funnel. They have to be separated by fractional distillation.

Hence, the correct option is (c).

9. If intermolecular force of attraction of a gas is more, then its critical temperature is higher. Critical temperature is the temperature above which it is not possible to liquefy a gas by applying pressure. That means, critical temperature is proportional to the intermolecular force of attraction. Between  $\text{CO}_2$  and  $\text{O}_2$ ,  $\text{CO}_2$  has greater intermolecular force of attraction and hence, greater critical temperature.

Hence, the correct option is (a).

10.

(i) $\text{NH}_4\text{Cl} + \text{KNO}_3$	One of the components can sublime on heating
---	--

(ii) Sulphur + carbon disulphide	Non-sublimable solid solute in liquid solvent.
(iii) Soda water	Decrease in solubility of a gas in liquid with the decrease in pressure.
(iv) Air	Difference in the boiling points of components in their liquid state.

Hence, the correct option is (a).

11. The higher is the vapour pressure, the lower is the intermolecular forces of attraction. The lower is the intermolecular force of attraction, the lower is the critical temperature. Therefore, A has the least vapour pressure.

Hence, the correct option is (a).

12. The boiling point of liquid B is greater than that of A since a liquid boils at a temperature when its vapour pressure becomes equal to the atmospheric pressure.

Hence, the correct option is (b).

13. Milk is a heterogeneous mixture as it is a colloid.

Hence, the correct option is (a).

14. Sea water, because it contains maximum percentage of dissolved salts.

Hence, the correct option is (c).

15. Skating of ice is possible because increase in pressure decreases the melting point of ice. This is because ice is a solid, which contracts on melting.

Hence, the correct option is (b).

### Assessment Test IV

1. If the same amount of heat is supplied, then the iron block shows the least expansion since it is a solid substance.

Hence, the correct option is (a).

2. Boiling is a fast process.  $\therefore$  Option (d) follows.  
Hence, the correct option is (d).
3. Mercury can conduct electricity in pure state since it is a metal.  
Hence, the correct option is (b).
4. The atomicity of helium is 1. Hydrogen, chlorine, and nitrogen have atomicity 2.  
Hence, the correct option is (c).
5. In bell metal, the major component is copper.  
Hence, the correct option is (c).
6. (i) Solvent extraction  $\rightarrow$  Sand is insoluble whereas sugar soluble in water.  
(ii) Chromatography  $\rightarrow$  A technique used for the separation of colours of pigments.  
(iii) Magnetic separation  $\rightarrow$  Iron is magnetic whereas iodine is nonmagnetic.  
(iv) Sublimation  $\rightarrow$  Naphthalene is sublimable whereas common salt is not.  
Hence, the correct option is (c).
7. (i)  $O_2$  gas  $\rightarrow$  Gas has the least density.  
(ii) Ice  $\rightarrow$  Ice has less density.  
(iii) Water  $\rightarrow$  Water has greater density.  
(iv) A solid block of aluminium  $\rightarrow$  Solids have maximum density.  
Hence, the correct option is (d).
8. Although  $NH_4Cl$  dissolves in water, it sublimes on heating. So, it cannot be separated by distillation.  
Hence, the correct option is (b).
9.  $NH_3$  is an easily liquefiable gas because of its high intermolecular forces of attraction.  
Hence, the correct option is (c).

10.

(i) Distillation	Non-sublimable solid solute in liquid solvent and can be obtained after separation.
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(ii) Filtration	Insoluble solid component present in a liquid.
(iii) Preferential liquefaction	Difference in the ease of liquefaction of the component gases.
(iv) Separating funnel	Immiscible liquids present in distinct layers.

Hence, the correct option is (b).

11. Easily liquefiable gas has greater intermolecular force of attraction. Intermolecular force of attraction of A is more than that of B.  
Hence, the correct option is (c).
12. The higher is the vapour pressure, the lower is the boiling point. The liquid with lower vapour pressure boils at a higher temperature, whereas the liquids having higher vapour pressure have higher intermolecular force of attraction.  
Hence, the correct option is (c).
13. Air is a homogeneous mixture since it is a mixture of various gases.  
Hence, the correct option is (b).
14. Presence of impurities increases the boiling point of a liquid.  
Hence, the correct option is (a).
15. Increases in pressure increases the melting point for solids which expand on melting. For solids which contract on melting, increase in pressure decreases the melting point for solids.  
Hence, the correct option is (a).

## CHAPTER 3

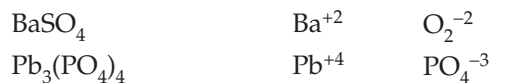
### Language of Chemistry and Transformation of Substances

#### Assessment Test I

- Formula of chloride of trivalent metal M is  $\text{MCl}_3$ .  
 $\therefore$  Balanced chemical equation is  $\text{MCl}_3 + 3\text{NH}_4\text{OH} \rightarrow \text{M}(\text{OH})_3 + 3\text{NH}_4\text{Cl}$ .  
 Hence, the correct option is (d).
- Valency of non-metal X in  $\text{XH}_3$  with respect to H is 3. Given that valencies of X in the two oxides are 2 and 4 with respect to oxygen, and formulae of oxides are  $\text{XO}$  and  $\text{XO}_2$ .  
 Hence, the correct option is (a).
- IC and per acids of chlorine are  $\text{HClO}_3$  and  $\text{HClO}_4$ , respectively.  
 $\therefore$  The formulae of salts with trivalent metal are  $\text{M}(\text{ClO}_3)_3$  and  $\text{M}(\text{ClO}_4)_3$ . The number of oxygen atoms in these salts, respectively, are 9 and 12.  
 Hence, the correct option is (a).
- Carbon forms two oxides  $\text{CO}$  and  $\text{CO}_2$ , and the valencies of carbon are 2 and 4, respectively.  
 $\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{CO}_3$  carbonic acid  
 $\text{NaOH} + \text{H}_2\text{CO}_3 \rightarrow \text{NaHCO}_3$  (or)  $\text{Na}_2\text{CO}_3$   
 Hence, the correct option is (b).
- Both Pb and Sn form two oxides  $\text{PbO}$ ,  $\text{PbO}_2$  and  $\text{SnO}$ ,  $\text{SnO}_2$ , respectively. In  $\text{PbO}$  and  $\text{SnO}$ , the valencies of Pb and Sn are two, and in  $\text{PbO}_2$  and  $\text{SnO}_2$  the valencies of Pb and Sn are four.  
 Hence, the correct option is (c).
- A can form  $\text{A}^+$  ion and B can form  $\text{B}^{+2}$  ion.  
 C can form  $\text{C}^{+3}$  ion and D can form  $\text{D}^{+4}$  or  $\text{D}^{+6}$  ion.  
 $\therefore$  P is  $\text{A}_2\text{O}$ , Q is  $\text{BO}$ , R is  $\text{C}_2\text{O}_3$ , and S is  $\text{DO}_2$  or  $\text{DO}_3$ .  
 Hence, the correct option is (a).
- $\text{NaOH} + \text{HClO}_4 \rightarrow \text{NaClO}_4 + \text{H}_2\text{O}$   
 (salt 1)  
 $\text{Ca}(\text{OH})_2 + 2\text{HClO}_3 \rightarrow \text{Ca}(\text{ClO}_3)_2 + 2\text{H}_2\text{O}$   
 (salt 2)  
 $\text{Pb}(\text{OH})_4 + 4\text{HClO}_2 \rightarrow \text{Pb}(\text{ClO}_2)_4 + 4\text{H}_2\text{O}$   
 (salt 3)  
 $\text{Fe}(\text{OH})_3 + 3\text{HOCl} \rightarrow \text{Fe}(\text{OCl})_3 + 3\text{H}_2\text{O}$   
 (salt 4)  
 Hence, the correct option is (a).
- $\text{CaCO}_3 \xrightarrow{\text{Heat}} \text{CaO} + \text{CO}_2 - \text{Energy}$   
 (X)  
 $\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca}(\text{OH})_2 + \text{Energy}$   
 (Y)  
 Formation of X is endothermic and decomposition.  
 Formation of Y is exothermic and compound–compound combination.  
 Hence, the correct option is (a).
- Valency of metal M is 1 and metal ion is  $\text{M}^{+1}$ .  
 Anion formed by non-metal A is  $\text{A}^{-2}$ .  
 $\therefore$  Formula of compound is  $\text{M}^{+1}, \text{A}^{-2} \Rightarrow \text{M}_2\text{A}$ .  
 Hence, the correct option is (b).
- Metal with electronic configuration 2, 8, 14, 2 is Fe. Fe can form two hydroxides  $\text{Fe}(\text{OH})_2$  and  $\text{Fe}(\text{OH})_3$ . The formulae of salts of these hydroxides with sulphuric acid are  $\text{FeSO}_4$  and  $\text{Fe}_2(\text{SO}_4)_3$ .  
 $\text{Fe}(\text{OH})_2 + \text{H}_2\text{SO}_4 \rightarrow \text{FeSO}_4 + \text{H}_2\text{O}$   
 $\text{Fe}(\text{OH})_3 + 3\text{H}_2\text{SO}_4 \rightarrow \text{Fe}_2(\text{SO}_4)_3 + 3\text{H}_2\text{O}$   
 Hence, the correct option is (b).

11.

Compound	+ve radical	–ve radical
$\text{Cu}_3(\text{PO}_4)_2$	$\text{Cu}^{+2}$	$\text{PO}_4^{-3}$
$\text{Sn}_2(\text{SO}_3)_4 = \text{Sn}(\text{SO}_3)_2$	$\text{Sn}^{+4}$	$\text{SO}_4^{-2}$



Hence, the correct option is (d).

12. Given that 100 g of metal oxide contains 60 g of metal.

$\therefore$  40 g of metal oxide contains ? g of metal.

$$= \frac{40 \times 60}{100} = 24 \text{ g of metal}$$

$\therefore$  Atomic weight of metal is 24 and the metal is Mg.

$\therefore$  Molecular weight of  $\text{Mg}(\text{ClO}_4)_2 = 24 + 71 + 128 = 223$

Hence, the correct option is (b).

13. The ratio by weight of oxygen that combine with fixed weight of nitrogen in  $\text{NO}$ ,  $\text{NO}_2$ , and  $\text{N}_2\text{O}_3$  is  $1:2:3/2 = 2:4:3$ .

Hence, the correct option is (a).

14. Formula of ferric hydrogen phosphate is  $\text{Fe}_2(\text{HPO}_4)_3$ .

$$\therefore \text{Ratio} = \frac{2}{2+3+3+12} = \frac{2}{20} = \frac{1}{10} = 1:10$$

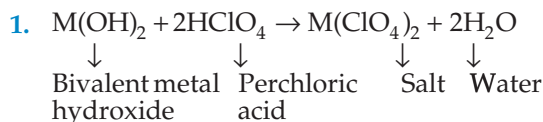
The valency of  $\text{HPO}_4 - 2$  is 2.

Hence, the correct option is (c).

15. More reactive metal displaces less reactive metal from its aqueous solution. The order of reactivity of Zn, Fe, and Ni is  $\text{Zn} > \text{Fe} > \text{Ni}$ .

Hence, the correct option is (c).

### Assessment Test II



Hence, the correct option is (a).

2. Valency of Y in  $\text{H}_2\text{Y}$  with respect to hydrogen is 2. The oxides of Y in which the valencies of Y differ by two units are  $\text{YO}_2$  and  $\text{YO}_3$ .

Hence, the correct option is (b).

3. The monovalent +ve radical with four hydrogen is  $\text{AH}_4^{+1}$  and bivalent -ve radical with four oxygen atoms  $\text{BO}_4^{-2}$ .

$\therefore$  The formula of the salt is  $\text{AH}_4^{+1}, \text{BO}_4^{-2} = (\text{AH}_4)_2\text{BO}_4$ .

Hence, the correct option is (d).

4. The formula of acid is  $\text{H}_3\text{XO}_4$ .  
 $\text{H}_3\text{XO}_4 + \text{M}(\text{OH})_2 \rightarrow \text{M}_3(\text{XO}_4)_2 + \text{H}_2\text{O}$

Hence, the correct option is (c).

5. Copper can form two oxides  $\text{Cu}_2\text{O}$  and  $\text{CuO}$  in which the valency of Cu is 1 and 2, respectively. Similarly Hg can form two oxides  $\text{Hg}_2\text{O}$  and  $\text{HgO}$  in which the valency of Hg is 1 and +2, respectively.

Hence, the correct option is (a).

6. P is  $\text{A}_2\text{O}_3$ , Q is  $\text{AO}$ , R is  $\text{A}_2\text{O}_5$ , and S is  $\text{A}_2\text{O}$ .

Hence, the correct option is (a).

7. Carbonate  $\rightarrow \text{CO}_3^{-2}$ , sulphate  $\text{SO}_4^{-2}$ , chlorite  $\rightarrow \text{ClO}_2^{-1}$ , and Hydroxide  $\rightarrow \text{OH}^{-}$

Hence, the correct option is (c).

8.  $\text{Ca}(\text{OH})_2 + \text{CO}_2 \rightarrow \text{CaCO}_3 + \text{H}_2\text{O}$

Hence, the correct option is (a).

9. Valency of X in  $\text{XH}_2$  is 2 and X can form is  $\text{X}^{+2}$ . Y is P and it can form  $\text{P}^{-3}$  ion. The formula is  $\text{X}^{+2}, \text{P}^{-3} \rightarrow \text{X}_3\text{P}_2$ .

Hence, the correct option is (b).

10. Cations formed by metal M are  $\text{M}^{+1}$  and  $\text{M}^{+2}$ .

Formulae of nitrates are  $\text{MNO}_3$ ,  $\text{M}(\text{NO}_3)_2$ .

Formulae of nitrides are  $\text{M}_3\text{N}$ ,  $\text{M}_3\text{N}_2$ .

Hence, the correct option is (a).

11. Mercuric oxide ( $\text{HgO}$ )  $\rightarrow 2$

Sodium peroxide ( $\text{Na}_2\text{O}_2$ )  $\rightarrow 4$

Ferrous sulphate ( $\text{FeSO}_4$ )  $\rightarrow 6$

Sodium phosphate ( $\text{Na}_3\text{PO}_4$ )  $\rightarrow 8$

Hence, the correct option is (d).

12. The molecular weight of  $\text{CaCO}_3$  is 100.

Hence, the correct option is (c).

13. In  $\text{N}_2\text{O}$ ,  $\text{N}_2\text{O}_5$ , and  $\text{NO}$ , the ratio by weight of oxygen that combine with fixed weight of nitrogen is  $1:5:2$ .

Hence, the correct option is (d).

14. In a compound, the total +ve charge is equal to that of -ve charge, but the total number of atoms in +ve ion may or may not equal to that of -ve ion.

Hence, the correct option is (c).

15. Metals which are more reactive than hydrogen on treatment with dilute acids gives hydrogen gas. The order of reactivity of Zn, Al, and H is  $\text{Al} > \text{Zn} > \text{H}$ .

Hence, the correct option is (c).

### Assessment Test III

1. Burning of a candle involves:

- (i) melting of wax which is a physical change and
- (ii) combustion of hydrocarbons which is a chemical change.

Hence, the correct option is (a).

2. Compound is  $\text{Ca}^{+2}, \text{P}^{-3} \Rightarrow \text{Ca}_3\text{P}_2$ .

In a compound, the total positive charge and the total negative charge are equal.

Hence, the correct option is (d).

3. (a) In  $\text{Zn}_3\text{P}_2$ , valency of positive radical is 2.  
 (b) In  $\text{Fe}_2\text{O}_3$ , valency of positive radical is 3.  
 (c) In  $\text{PbCl}_4$ , valency of positive radical is 4.  
 (d) In  $\text{NaNO}_3$ , valency of positive radical is 1.

Hence, the correct option is (b).

4. Neutralisation reaction  $\Rightarrow$  (C), Thermal decomposition  $\Rightarrow$  (B), Precipitation reaction  $\Rightarrow$  (A), and Photolysis  $\Rightarrow$  (D)

Hence, the correct option is (b).

5. **Compound**                      **Formula**

Sodium chlorate  $\Rightarrow$   $\text{NaClO}_3$

Sodium chlorite  $\Rightarrow$   $\text{NaClO}_2$

Sodium nitrate  $\Rightarrow$   $\text{NaNO}_3$

Sodium nitrite  $\Rightarrow$   $\text{NaNO}_2$ .

Hence, the correct option is (b).

6.  $\text{S} + 2\text{H}_2\text{SO}_4 \rightarrow 3\text{SO}_2 + 2\text{H}_2\text{O}$  is a balanced equation.

Hence, the correct option is (d).

7. Metal sulphate =  $\text{M}^{+3}, \text{SO}_4^{-2} = \text{M}_2(\text{SO}_4)_3$

$$\therefore \text{Molecular mass} = 2(27) + 3(32) + 12(16) = 342$$

Hence, the correct option is (b).

8. The given reaction is a synthesis as well as a combination reaction.

Hence, the correct option is (c).

9.  $\text{N}_2 + \text{O}_2 \rightarrow 2\text{NO}$

32 g of  $\text{O}_2$  gives 2(30) g of NO.

? g  $\leftarrow$  45 g of NO

$$= \frac{32 \times 45}{60} = 24 \text{ g}$$

Hence, the correct option is (b).

10. In  $\text{Na}_2\text{O}$ , valency of Na = 1.

In  $\text{ZnO}$ , valency of Zn = 2.

In  $\text{Fe}_2\text{O}_3$ , valency of Fe = 3.

In  $\text{PbO}_2$ , valency of Pb = 4.

Hence, the correct option is (d).

11. In  $\text{SO}_2$ , 32 g of S reacts with 32 g of oxygen.

In  $\text{SO}_3$ , 32 g of S reacts with 48 g of oxygen.

$\therefore$  Ratio by weight of oxygen = 32:48 = 2:3.

Hence, the correct option is (b).

12. Atomic mass of Al is 27; atomic mass of S is 32; atomic mass of Ca is 40; atomic mass of O is 16.

Hence, the correct option is (c).

13. Symbol of lead is Pb.

Hence, the correct option is (c).

14.  $\text{Na}_2\text{SO}_4$  is a salt of sodium hydroxide and sulphuric acid.

Hence, the correct option is (c).

15. Decomposition of  $\text{C}_2\text{H}_2$  requires sound energy.

Hence, the correct option is (b).

### Assessment Test IV

1.  $\text{NH}_4\text{Cl} \xrightarrow{\text{Physical Change}} \text{NH}_4\text{Cl} \xrightarrow{\text{Chemical Change}} \text{NH}_3 + \text{HCl} \downarrow$

Hence, the correct option is (d).

2. The compound as a whole is neutral. Hence, the charges of +ve and -ve ions are neutralized by criss-cross method.

Hence, the correct option is (a).

3. (A) Charge on fluoride ion is -1.

(B) Charge on oxide is -2.

(C) Charge on nitride ion is -3.

(D) Charge on carbide is -4.

Hence, the correct option is (a).

4. The order of reactivity is  $A > B$ ;  $C > A$ ;  $B > D$

$\Rightarrow C > A > B > D$

Hence, the correct option is (a).

5.

Compound	Total +ve charge
(i) $\text{Zn}_3\text{N}_2$	$3(+2) = +6$
(ii) $\text{PbCl}_4$	$1(+4) = +4$
(iii) $\text{Na}_3\text{PO}_4$	$3(+1) = +3$
(iv) $\text{Ca}(\text{NO}_3)_2$	$1(+2) = +2$

Hence, the correct option is (d).

6. Balanced chemical equation is  $6\text{HNO}_3 + \text{S} \rightarrow \text{H}_2\text{SO}_4 + 6\text{NO}_2 + 2\text{H}_2\text{O}$ .

$\therefore a = 6$  and  $b = 2$

Hence, the correct option is (a).

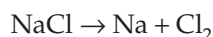
7. Metal phosphate =  $\text{M}^{+2}, \text{PO}_4^{-3} = \text{M}_3(\text{PO}_4)_2$

Molecular mass =  $a(3) + 2(31) + 8(16) = 262$

$\Rightarrow a = 24$

Hence, the correct option is (a).

8. The decomposition of a compound into its respective elements is known as analysis.



Hence, the correct option is (b).

9.  $2\text{S} + 3\text{O}_2 \rightarrow 2\text{SO}_3$

$(2 \times 32)$  g of sulphur gives  $(2 \times 80)$  g of  $\text{SO}_3$ .

40 g of sulphur gives ? g of  $\text{SO}_3$ .

$$= \frac{40 \times 160}{64} = 100 \text{ g}$$

Hence, the correct option is (a).

10. Fe shows variable valency.

Hence, the correct option is (a).

11.  $\text{N}_2\text{O} \Rightarrow 28$  g of N and 16 g of O  $\Rightarrow 140$  g of N and 90 g of O

$\text{NO} \Rightarrow 14$  g of N and 16 g of O  $\Rightarrow 70$  g of N and 80 g of O

$\text{N}_2\text{O}_5 \Rightarrow 28$  g of N and 80 g of O

$\therefore$  Ratio of weight of nitrogen =  $140:70:28$

=  $10:5:2$

Hence, the correct option is (b).

12. Atomic mass of Mg is 24; atomic mass of S is 32; atomic mass of Na is 23; atomic mass of Cr is 52.

Hence, the correct option is (a).

13. Greek name of antimony is stibnum.

Hence, the correct option is (d).

14. Hydrochloric acid is a binary acid.

Hence, the correct option is (b).

15. Photosynthesis takes place in the presence of light; hence, it is a photochemical reaction.

Hence, the correct option is (a).



## CHAPTER 4

### Air and Oxygen

#### Assessment Test I

- In stratosphere, the temperature increases due to the increase in altitude.  
Hence, the correct option is (b).
- 76 cm of Hg  $\rightarrow$  101292 Pascal  
 $\therefore$  19 cm Hg  $\rightarrow$  ?  
 $= \frac{1,01,292 \times 19}{76}$  Pascal = 25,323 Pascal  
Hence, the correct option is (c).
- Since water occupies one-fifth of the volume of the inverted jar, it can be concluded that one-fifth of the volume of air is oxygen.  
Hence, the correct option is (d).
- Photosynthesis does not consume  $O_2$ .  
Hence, the correct option is (a).
- Burning of petrol is an example of rapid combustion.  
Hence, the correct option is (b).
- The innermost zone of a candle flame is the coldest zone.  
Hence, the correct option is (a).
- Fe forms a mixed oxide, i.e.,  $Fe_3O_4$  ( $FeO + Fe_2O_3$ ) on reaction with  $O_2$ .  
Hence, the correct option is (d).
- When a mixture of  $NH_3$  and  $O_2$  in 4:5 ratio is passed over platinum gauze at  $800^\circ C$ , NO and  $H_2O$  are formed.  
Hence, the correct option is (a).
- $H_2S + O_2 \rightarrow H_2O + SO_2$   
Hence, the correct option is (a).
- Surgical instruments are manufactured from stainless steel which is an alloy of iron.  
Hence, the correct option is (d).
- Since combustion is an exothermic reaction, oxygen is used for the combustion of fuel

because it is a good supporter of combustion.  
Hence, the correct option is (b).

- Since air is a mixture of different gases and one of the components of air is oxygen, air supports combustion.

Hence, the correct option is (a).

- The order of pollutants is DCAB.

(D) Usage of electrostatic precipitators in industries.

(C) Developing a suitable substituent for the refrigerant used in A/C, refrigerator, etc.

(A) Usage of scrubber in industries

(B) Controlling deforestation

Hence, the correct option is (d).

- The required order is DCBA.

(D) NO

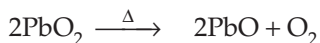
(C)  $CO_2$

(B)  $NO_2$

(A)  $P_2O_5$

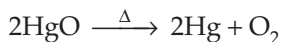
Hence, the correct option is (b).

- (i)  $\rightarrow$  (D); (ii)  $\rightarrow$  (C); (iii)  $\rightarrow$  (A); (iv)  $\rightarrow$  (B)

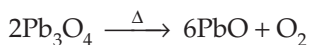


Chocolate  
brown

Yellow  
litharge

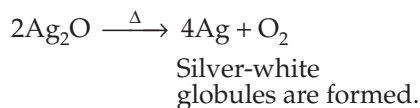


Mirror-like  
surface near  
the cooler parts of  
the test tube



Reddish brown residue  
which turns yellow on  
cooling





Hence, the correct option is (d).

### Assessment Test II

- Thermosphere exists in plasma state.  
Hence, the correct option is (d).
- $1 \text{ atm} \rightarrow 76 \text{ cm}$   
 $0.05 \text{ atm} ?$   
 $= 76 \times 0.05 \text{ cm} = 3.8 \text{ cm}$   
Hence, the correct option is (a).
- The quantity of water vapour in the atmosphere differs from place to place and with change of season.  
Hence, the correct option is (c).
- Combustion consumes but does not produce  $\text{O}_2$ .  
Hence, the correct option is (d).
- Respiration is a slow combustion.  
Hence, the correct option is (c).
- Carbon particle burns with yellow flame in the middle zone of the candle flame.  
Hence, the correct option is (b).
- A protective layer of  $\text{Al}_2\text{O}_3$  is formed on Al upon reaction with  $\text{O}_2$ .  
Hence, the correct option is (b).
- When ammonia is burnt in limited supply of  $\text{O}_2$ ,  $\text{N}_2$  and  $\text{H}_2\text{O}$  are produced.  
Hence, the correct option is (d).
- $\text{FeS}_2 + \text{O}_2 \rightarrow \text{Fe}_2\text{O}_3 + \text{SO}_2$   
Hence, the correct option is (d).
- Tin-coated iron containers are used for storage of edible food stuffs.  
Hence, the correct option is (c).
- Combustion is an exothermic reaction and rapid combustion produces a lot of heat. Hence oxyacetylene flame is used for welding purpose.  
Hence, the correct option is (a).

- When air is passed through lime water, it turns milky because  $\text{CO}_2$  is present in air and it retains its property.  
Hence, the correct option is (a).

- The required order is CDAB.

- (C)  $\text{SO}_2$   
(D) Ozone  
(A) Fly ash  
(B) CFCs

Hence, the correct option is (c).

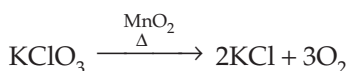
- The required order is BADC.

- (B)  $\text{CuO}$   
(A)  $\text{Al}_2\text{O}_3$   
(D)  $\text{Fe}_3\text{O}_4$   
(C)  $\text{CaO}$

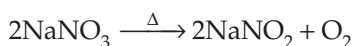
Hence, the correct option is (a).

- (i)  $\rightarrow$  (C); (ii)  $\rightarrow$  (D); (iii)  $\rightarrow$  (A); (iv)  $\rightarrow$  (B)

$\text{H}_2\text{O}_2 \rightarrow$  Heating is not required.



$\text{MnO}_2$  reduces the melting point as well as decomposition temperature of  $\text{KClO}_3$ .



Hence, the correct option is (c).

### Assessment Test III

- With increase in altitude, atmospheric pressure decreases; hence, the height of the mercury column decreases in barometer.  
Hence, the correct option is (a).
- $\text{MnO}_2$  acts as a positive catalyst and decreases the melting point of  $\text{KClO}_3$  during the preparation of  $\text{O}_2$  from  $\text{KClO}_3$ .  
Hence, the correct option is (a).
- The correct order is DABC.  
Hence, the correct option is (b).

4.  $\text{Na} + \text{O}_2 \rightarrow \text{Na}_2\text{O}$ ; Number of oxygen atoms in one molecule is 1.

$\text{Fe} + \text{O}_2 \rightarrow \text{Fe}_3\text{O}_4$ ; Number of oxygen atoms in one molecule is 4.

$\text{Al} + \text{O}_2 + \text{Al}_2\text{O}_3$ ; Number of oxygen atoms in one molecule is 3.

$\text{S} + \text{O}_2 \rightarrow \text{SO}_2$ ; Number of oxygen atoms in one molecule is 2.

Hence, the correct option is (b).

5. (i)  $\rightarrow$  (B); (ii)  $\rightarrow$  (C); (iii)  $\rightarrow$  (A)

Hence, the correct option is (b).

6. Oxygen is collected by downward displacement of water, as it has negligible solubility in water.

Hence, the correct option is (a).

7. Since the ignition temperature of LPG is less, it can be lighted by automatic gas lighter. Kerosene stone cannot be lighted by automatic gas lighter since kerosene has a higher ignition temperature and the spark produced by the lighter cannot rise the temperature of the fuel to that extent.

Hence, the correct option is (c).

8. Tinning is used to prevent corrosion of containers that are used for storing edible materials.

Hence, the correct option is (d).

9. The major source of most of the air pollutants is automobiles.

Hence, the correct option is (b).

10. Oxyhydrogen flame is used for welding.

Hence, the correct option is (d).

11. Thermal decomposition of  $\text{Ag}_2\text{O}$  gives Ag; hence, silvery white globules are formed.

Hence, the correct option is (b).

12. The metal used is Pt.

Hence, the correct option is (b).

13. Oxygen gas turns alkaline pyrogallol to dark brown.

Hence, the correct option is (a).

14. The innermost zone is also known as zone of unburnt wax vapours, due to the presence of unburnt carbon particles.

Hence, the correct option is (c).

15. Safe disposal of industrial waste is a measure to control acid rain but not global warming.

Hence, the correct option is (b).

### Assessment Test IV

1. Mercury is a liquid with high density. Hence, it can rise as a short column when the pressure exactly balances the atmospheric pressure. Due to weak adhesive force between Hg and glass, it does not stick to the wall of the glass tube.

Hence, the correct option is (c).

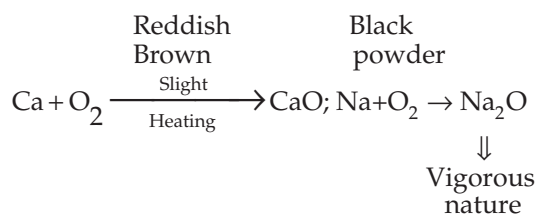
2. In the preparation of  $\text{O}_2$  from  $\text{H}_2\text{O}_2$ , no heating is required.

Hence, the correct option is (b).

3. The correct order is BACD.

Hence, the correct option is (a).

4.  $\text{Fe} + \text{O}_2 \rightarrow \text{Fe}_3\text{O}_4$ ;  $\text{Cu} + \text{O}_2 \rightarrow \text{Cu}_2\text{O}$



Hence, the correct option is (a).

5. (i)  $\rightarrow$  (B); (ii)  $\rightarrow$  (C); (iii)  $\rightarrow$  (A)

Hence, the correct option is (b).

6. Oxygen is slightly soluble in water.

Hence, the correct option is (c).

7. Among the given fuels, CNG has the least ignition temperature.

Hence, the correct option is (c).

8. Surgical instruments, utensils, etc. are prevented from rusting by alloying.

Hence, the correct option is (a).

9. CFC and fly ash are not produced by automobiles.  
Hence, the correct option is (c).
10. In photosynthesis,  $O_2$  is not used.  
Hence, the correct option is (c).
11.  $2PbO_2 \rightarrow 2PbO + O_2$   
Brown      Yellow  
Hence, the correct option is (c).
12.  $SO_2 + O_2 \xrightarrow{V_2O_5 \text{ or } Pt} SO_3$ .  
(X)                      (Y)  
Hence, the correct option is (a).
13.  $NO + O_2 \rightarrow NO_2$   
Colourless      Reddish brown  
(X)                      (Y)  
Hence, the correct option is (c).
14. Luminous zone produces soot due to incomplete combustion.  
Hence, the correct option is (d).
15. Corrosion of monuments takes place due to acid rain.  
Hence, the correct option is (a).

## CHAPTER 5

### Water, Solution, Solubility and Hydrogen

#### Assessment Test I

1. (A) 100 g ice  $\rightarrow$  water at  $0^{\circ}\text{C}$

$$q_1 = 100 \times 80 = 8000 \text{ cal}$$

Water at  $0^{\circ}\text{C} \rightarrow$  water at  $30^{\circ}\text{C}$

$$q_2 = 100 \times 1 \times 30 = 3000 \text{ cal}$$

$$Q = q_1 + q_2 = 8000 + 3000 = 11000 \text{ cal}$$

- (B) 50 g boiling water  $\rightarrow$  water vapour at  $100^{\circ}\text{C}$

$$q_1 = 50 \times 540 = 27,000 \text{ cal}$$

Water vapour at  $100^{\circ}\text{C} \rightarrow$  water vapour at  $120^{\circ}\text{C}$

$$q_2 = 50 \times 0.9 \times 20 = 900 \text{ cal}$$

$$Q = q_1 + q_2 = 27,000 + 900 = 27,900 \text{ cal}$$

- (C) 100 g boiling water  $\rightarrow$  water vapour at  $100^{\circ}\text{C}$

$$q = 100 \times 540 = 54,000 \text{ cal}$$

- (D) 50 g ice  $\rightarrow$  water at  $0^{\circ}\text{C}$

$$q = 50 \times 80 = 4000 \text{ cal}$$

Increasing order of heat required is DABC.

Hence, the correct option is (b).

2. Due to the high value of dielectric constant of water, water can break the forces of attraction between the oppositely charged ions. Therefore, many ionic compounds are highly soluble in water.

Hence, the correct option is (a).

3. The formulae of blue vitriol and washing soda are  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  and  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ , respectively. Both of them possess water of crystallization.

Hence, the correct option is (c).

4. At  $40^{\circ}\text{C}$ , the order of solubility of substances according to the solubility curve is  $B < A < D < C < E$ .

Hence, the correct option is (a).

5. Solubility = 40

Mass of saturated solution = 210 g

140 g of solution  $\rightarrow$  40 g of substance

$$210 \text{ g of solution} \rightarrow \frac{40 \times 210}{140} = 60 \text{ g}$$

Hence, the correct option is (c).

6. Solubility of calcium sulphate first increases and then decreases with temperature. Therefore, it shows the same solubility at two different temperatures.

Hence, the correct option is (b).

7. Moisture catalyses the reaction between hydrogen and chlorine to form hydrogen chloride. Therefore, no reaction takes place between dry hydrogen and chlorine even in the presence of diffuse or intense sunlight

Hence, the correct option is (a).

8. Solubility of a gas in a liquid is proportional to the external pressure and inversely proportional to the external temperature. As atmospheric pressure is the least at hill stations, solubility is also the least. The solubility is greater in winter than in summer. The solubility of oxygen in water is maximum in deep sea in winter. The correct order is deep sea in winter  $>$  sea level in winter  $>$  sea level in summer  $>$  hill station in summer.

Hence, the correct option is (b).

9. 1 g of water requires 4.2 J of heat for rise in the temperature by  $1^{\circ}\text{C}$ . 10 g of water requires 42 J of heat for the same rise in temperature. For reaching the boiling point ( $100^{\circ}\text{C}$ ), 4200 J or 4.2 kJ of heat is required.

Hence, the correct option is (c).

10. The presence of dissolved salts decreases the freezing point of water. Distilled water freezes at a higher temperature than saline water. Increase in pressure decreases the freezing point. As pressure is low at higher altitudes, the water freezes at a higher temperature at hill station than on plains.

Hence, the correct option is (b).

11. (i)  $\rightarrow$  (C),  $K + H_2O \rightarrow KOH + H_2 \Rightarrow$  Catches fire with lilac flame  
 (ii)  $\rightarrow$  (D),  $Na + H_2O \rightarrow NaOH + H_2 \Rightarrow$  Catches fire with yellow flame  
 (iii)  $\rightarrow$  (E);  $Mg + H_2O \rightarrow Mg(OH)_2 + H_2 \Rightarrow$  Brilliant white light and white ash  
 (iv)  $\rightarrow$  (A);  $Zn + H_2O \rightarrow ZnO + H_2 \Rightarrow$  Yellow substance and turns to white on cooling  
 (v)  $\rightarrow$  (B);  $Fe + H_2O \rightarrow Fe_2O_3 + H_2 \Rightarrow$  Brown substance

Hence, the correct option is (c).

12. Lead is not a preferred metal for the laboratory preparation of hydrogen because of the formation of insoluble  $PbCl_2$  or  $PbSO_4$ , which stops the further reaction.

Hence, the correct option is (b).

13. When a glass full of ice is subjected to melting, the water level in the glass will be lower than the ice. This is because ice has lower density than water and occupies greater volume than water. The water formed is denser than ice occupies lesser volume.

Hence, the correct option is (c).

14. X is a saturated solution as the solubility of the substance at  $80^\circ\text{C}$  is 80. Y is an unsaturated solution as the solubility of the substance at  $80^\circ\text{C}$  is 50 and the solution contains only 50 g of substance in it. Since X is a saturated solution and its solubility decreases with temperature, X starts crystallising on cooling just below  $80^\circ\text{C}$  itself. However, Y becomes a saturated solution at  $50^\circ\text{C}$  where the solubility of the substance is 50 and it starts crystallizing just below  $50^\circ\text{C}$ .

Hence, the correct option is (c).

15. At  $0^\circ\text{C}$ , the solubilities of X and Y are 20 and 10, respectively. That means, 20 g of X and 10 g of Y will be left behind in the solution even at  $0^\circ\text{C}$ . Therefore, out of 50 g of the substances in the solution taken at  $80^\circ\text{C}$ , 30 g of X and 40 g of Y can be precipitated.

Hence, the correct option is (a).

### Assessment Test II

1. (A) 100 g water at  $50^\circ\text{C} \rightarrow$  water at  $0^\circ\text{C}$

$$q_1 = 100 \times 1 \times 50 = 5000 \text{ cal}$$

Water at  $0^\circ\text{C} \rightarrow$  ice at  $0^\circ\text{C}$

$$q_2 = 100 \times 80 = 8000 \text{ cal}$$

$$Q = q_1 + q_2 = 5000 + 8000 = 13,000 \text{ cal}$$

- (B) 50 g water at  $0^\circ\text{C} \rightarrow$  ice

$$q = 50 \times 80 = 4000 \text{ cal}$$

- (C) 100 g water vapour  $\rightarrow$  water at  $100^\circ\text{C}$

$$Q = 100 \times 540 = 54,000 \text{ cal}$$

- (D) 50 g water vapour  $\rightarrow$  water at  $100^\circ\text{C}$

$$q_1 = 50 \times 540 = 27000 \text{ cal}$$

Water at  $100^\circ\text{C} \rightarrow$  water at  $50^\circ\text{C}$

$$q_2 = 50 \times 1 \times 50 = 2500 \text{ cal}$$

$$Q = q_1 + q_2 = 27000 + 2500 = 29,500 \text{ cal}$$

Decreasing order of heat evolved is CDAB.

Hence, the correct option is (d).

2. Glucose is not an inorganic compound. Its high solubility in water is not due to high dielectric constant.

Hence, the correct option is (b).

3. Glauber's salt and washing soda are efflorescent substances. On exposure to air, Glauber's salt loses water of crystallization completely and forms an anhydrous salt. However, washing soda loses only 9 water molecules and forms a monohydrate. Only on heating, it forms anhydrous salt.

Hence, the correct option is (c).

4. The decreasing order of solubility of given substances at the given temperatures is ECDBA.

Hence, the correct option is (c).

5. Mass of the solution = 80 g

Mass of solute = 16 g

Mass of solvent = 80 – 16 = 64 g

Amount of substance dissolved in 64 g water = 16 g

Amount of substance dissolved in 100 g =  $\frac{1600}{64} = 25$  g

Solubility of the substance = 25

Hence, the correct option is (d).

6. Glauber's salt is  $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$ . Its solubility increases with increase in temperature. At  $32.6^\circ\text{C}$ , it changes to anhydrous  $\text{Na}_2\text{SO}_4$ . Its solubility decreases with increase in temperature. Change in water of crystallization is not the reason for change in the trend of solubility.

Hence, the correct option is (b).

7. Red phosphorus burns in oxygen in the presence of moisture which catalyses the reaction. Anhydrous  $\text{CaCl}_2$  absorbs moisture from the air in contact with phosphorus. Therefore, no reaction occurs in the test tube.

Hence, the correct option is (d).

8. Collection of hydrogen by downward displacement of water is due to the insoluble nature of hydrogen in water.

Hence, the correct option is (d).

9. 4.2 J of heat is required for 1 g of water for  $1^\circ\text{C}$  rise in temperature. 100 g of water requires 420 J of heat.

420 J of heat  $\rightarrow 1^\circ\text{C}$

$2.1 \rightarrow 10^3$  J of heat  $\rightarrow \frac{2.1 \times 10^3}{420} = 5^\circ\text{C}$

Hence, the correct option is (d).

10. As brine solution is a saturated solution of sodium chloride, it contains maximum amount of dissolved salt and hence, freezes at the lowest temperature.

Hence, the correct option is (a).

11. (i)  $\rightarrow$  (C); Reaction of potassium with water is vigorous and exothermic.

(ii)  $\rightarrow$  (D); The reaction becomes reversible when carried out in a closed container.

(iii)  $\rightarrow$  (B); A milky alkaline solution of  $\text{Ca}(\text{OH})_2$  is formed by the reaction of calcium with water.

(iv)  $\rightarrow$  (A); Magnesium reacts only with boiling water.

Hence, the correct option is (d).

12. When iron is taken in place of zinc for the laboratory preparation of hydrogen, the reaction becomes slow and yields only lesser volume of hydrogen as the reaction of iron with acid becomes reversible.

Hence, the correct option is (d).

13. Floating of dead body in the water in the Dead Sea is due to the greater density of water in dead sea due to the very high salinity of that water. This is not a consequence of anomalous expansion of water.

Hence, the correct option is (a).

14. At  $35^\circ\text{C}$ , X and Y possess same solubility.

Hence, the correct option is (a).

15. The solution of X and Y contain 90 g and 70 g of solutes at  $80^\circ\text{C}$  as they are saturated solutions. When they are cooled up to  $60^\circ\text{C}$ , 20 g of X and 10 g of Y are precipitated since their solubilities are 70 and 50 at  $60^\circ\text{C}$ .

Hence, the correct option is (b).

### Assessment Test III

1. During the formation of snow, water vapour directly gets converted to ice.

Hence, the correct option is (d).

2. Density of water is less than 1 g/cc above (or) below  $4^\circ\text{C}$ . Hence, the density of water at  $2^\circ\text{C}$  could be  $< 0.95$  g/cc

Hence, the correct option is (a).

3. Distilled water is a bad conductor of electricity since it is devoid of any dissolved salts.

Hence, the correct option is (d).

4. 1 g of steam releases 540 calories heat.

80 calories of heat are required to melt 1 g ice at  $0^{\circ}\text{C}$  to 1 g water at  $0^{\circ}\text{C}$ .

$$\therefore x = \frac{540}{80} = 6.75 \text{ g}$$

Hence, the correct option is (a).

5. Heat released =  $m \times s \times \Delta t$

$$= 10 \times 4.2 \times (50 - 30)$$

$$= 10 \times 4.2 \times 20$$

$$= 840 \text{ J}$$

Hence, the correct option is (a).

6. Water can dissolve many inorganic salts in it because it has high dielectric constant.

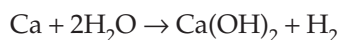
Hence, the correct option is (c).

7.  $\text{SO}_2$  is an acidic oxide since it forms  $\text{H}_2\text{SO}_3$  on reaction with water.

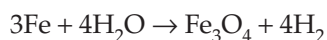
Hence, the correct option is (d).

8.  $2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2$

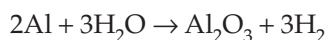
1 molecule Na liberates 0.5 molecules of  $\text{H}_2$ .



1 molecule of Ca liberates 1 molecule of  $\text{H}_2$ .



1 molecule of Fe liberates  $\frac{4}{3} = 1.33$  molecule of  $\text{H}_2$ .



1 molecule of Al gives rise to  $\frac{3}{2} = 1.5$  molecule of  $\text{H}_2$

$\therefore$  The order is ABDC.

Hence, the correct option is (a).

9. The order is DABC.

Hence, the correct option is (c).

10. 25 g of the salt is present in  $225 - 25 = 200$  g of the solvent.

$$\therefore \text{Solubility} = \frac{25}{200} \times 100 = 12.5$$

Hence, the correct option is (b).

11. Since the solubility of B is maximum at  $40^{\circ}\text{C}$ , it is present in the maximum amount in its saturated solution.

Hence, the correct option is (b).

12. Efflorescent salts release water at room temperature.

Hence, the correct option is (b).

13. Solubility of a gas increases with the increase in pressure.

Hence, the correct option is (b).

14. Water gas is  $\text{CO} + \text{H}_2$

Hence, the correct option is (c).

15. The correct matching is

(i)  $\rightarrow$  (D)

(ii)  $\rightarrow$  (E)

(iii)  $\rightarrow$  (B)

(iv)  $\rightarrow$  (A)

(v)  $\rightarrow$  (C)

(vi)  $\rightarrow$  (F)

Hence, the correct option is (d).

### Assessment Test IV

1. Water vapour gets converted to water during the formation of dew.

Hence, the correct option is (a).

2. Ice occupies slightly more volume than water at  $0^{\circ}\text{C}$  since density of ice is lesser than the water.

Hence, the correct option is (b).

3. The electrical conductivity of water is due to the presence of dissolved salts.

Hence, the correct option is (a).

4. Let  $x$  calories is the amount of heat supplied.

$$\frac{\text{Mass of ice}}{\text{Mass of water}} = \frac{\frac{x}{80}}{\frac{x}{540}}$$

$$= \frac{540}{80} = 27:4$$

Hence, the correct option is (b).



5. Heat supplied =  $m \times s \times \Delta t$

$$= 5 \times 4.2 \times (75 - 25)$$

$$= 5 \times 4.2 \times 50$$

$$= 1050 \text{ J}$$

Hence, the correct option is (b).

6. Different inorganic salts dissolve in water to a different extent. Dielectric constant of water does not change with the change of the solute.

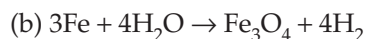
Hence, the correct option is (c).

7. Metallic oxides are basic oxides, and hence, they react with acid. They form bases when they react with water.

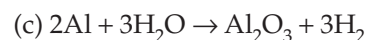
Hence, the correct option is (d).

8. (a)  $2\text{K} + 2\text{H}_2\text{O} \rightarrow 2\text{KOH} + \text{H}_2$

1 molecule of K  $\rightarrow$  1 molecule of  $\text{H}_2\text{O}$



1 molecule of Fe  $\rightarrow \frac{4}{3} = 1.33$  molecule of  $\text{H}_2\text{O}$



1 molecule of Al  $\rightarrow \frac{3}{2} = 1.5$  molecule of Fe

$\therefore$  The expected order is c b a.

Hence, the correct option is (d).

9. The order is BAC.

Hence, the correct option is (b).

10.  $30 = \frac{x}{(390 - x)} \times 100$ ,  $x$  is the amount of solute (B).

$$\therefore 390 \times 30 - 30x = 100x$$

$$\therefore 130x = 390 \times 30$$

$$\therefore x = \frac{390 \times 30}{130} = 90 \text{ g}$$

Hence, the correct option is (a).

11. 100 g water contains  $\frac{150}{750} \times 100$ .

= 20 g of the salt

N is unsaturated.

Hence, the correct option is (c).

12. Hydrated calcium chloride is a deliquescent salt.

Hence, the correct option is (d).

13. Solubility of a gas is inversely proportional to the temperature. Hence, boiling expels the dissolved gases.

Hence, the correct option is (b).

14.  $\text{CO} + \text{H}_2 + \text{H}_2\text{O} \rightarrow \text{CO}_2 + 2\text{H}_2$

CO is oxidized to  $\text{CO}_2$ .

Hence, the correct option is (a).

15. The correct matching is:

(i)  $\rightarrow$  (F); (ii)  $\rightarrow$  (A); (iii)  $\rightarrow$  (B); (iv)  $\rightarrow$  (C); (v)  $\rightarrow$  (D); (vi)  $\rightarrow$  (E)

Hence, the correct option is (a).



## CHAPTER 6

### Carbon and Its Compounds

#### Assessment Test I

1. Diamond is a good thermal conductor because of the compact three-dimensional structure. Mere tetravalency of carbon does not make it a good thermal conductor.

Hence, the correct option is (b).

2. Dry ice undergoes sublimation by taking heat from the surroundings, thereby causing cooling, which results in the condensation of water vapour and ultimately results in rain.

Hence, the correct option is (a).

3. (i)  $\rightarrow$  (C)  
(ii)  $\rightarrow$  (D)  
(iii)  $\rightarrow$  (E)  
(iv)  $\rightarrow$  (A)  
(v)  $\rightarrow$  (B)

Hence, the correct option is (c).

4. (i) Extraction of yellow phosphorus  $\rightarrow$  Bone charcoal  
(ii) Preparation of artificial diamonds  $\rightarrow$  Sugar charcoal  
(iii) Gas masks  $\rightarrow$  Wood charcoal  
(iv) Moderator in nuclear reactors  $\rightarrow$  Graphite  
(v) Abrasive for cutting glass  $\rightarrow$  Diamond

Hence, the correct option is (b).

5. (i) Passing CO gas over finely divided iron  $\rightarrow$   $\text{M}(\text{CO})_5$  or  $\text{Fe}(\text{CO})_5$   
(ii) Passing  $\text{CO}_2$  gas through powdered magnesium  $\rightarrow$   $\text{MO}$  or  $\text{MgO}$   
(iii) Heating  $\text{M}_2\text{O}_3$  with  $\text{CO} \rightarrow \text{M}$  or  $\text{Fe}$   
(iv) Passing  $\text{CO}_2$  through sodium  $\rightarrow$   $\text{M}_2\text{CO}_3$  or  $\text{Na}_2\text{CO}_3$

Hence, the correct option is (c).

6. Except sodium and potassium carbonates, all other carbonates, on heating, decompose to produce  $\text{CO}_2$ .

Hence, the correct option is (a).

7. Baking powder contains sodium bicarbonate as a major component, which, on heating, decomposes to release  $\text{CO}_2$ .

Hence, the correct option is (b).

8. A liquid  $\text{CO}_2$  fire extinguisher works on the principle of evaporation of liquid  $\text{CO}_2$  to gaseous state, thereby reducing the temperature of the combustible substance.

Hence, the correct option is (d).

9. Usage of graphite as a material of refractory crucibles is due to the high melting point and thermal resistance of graphite and not due to its layer lattice structure.

Hence, the correct option is (a).

10. Reaction of carbonic acid with  $\text{NaOH}$  results in the formation of  $\text{Na}_2\text{CO}_3$  which is highly soluble in water. Therefore, it does not involve the formation of white precipitate, whereas all other reactions result in the formation of insoluble carbonates, which are obtained as white precipitates.

Hence, the correct option is (a).

11. Coal, on destructive distillation, gives various products. X should be coke since it can reduce iron oxide to iron, whereas Y should be coal tar since it gives benzene as the final product on fractional distillation.

Hence, the correct option is (c).

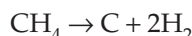
12. The general formula corresponding to saturated hydrocarbons should be  $C_nH_{2n+2}$ . According to this, the formula corresponding to the one with 4 carbon atoms should be  $C_4H_{10}$ .

Hence, the correct option is (c).

13. Marsh gas (methane) is the harmful gas released in coal mines.

Hence, the correct option is (d).

14. Methane on pyrolysis gives carbon black.



Hence, the correct option is (a).

15. High ignition temperature is not the characteristic of an ideal fuel. It should always have low ignition temperature.

Hence, the correct option is (c).

### Assessment Test II

1. Graphite is a good electrical conductor because carbon shows a valency of three, leaving one free electron on each carbon.

Hence, the correct option is (a).

2. A sealed bottle with dry ice explodes after some time as it undergoes sublimation at room temperature and the resultant pressure developed due to the accumulation of gaseous  $CO_2$  in the bottle. Dry ice producing low temperature has no relevance to the above.

Hence, the correct option is (b).

3. (i)  $\rightarrow$  (E)  
(ii)  $\rightarrow$  (D)  
(iii)  $\rightarrow$  (A)  
(iv)  $\rightarrow$  (B)  
(v)  $\rightarrow$  (C)

Hence, the correct option is (d).

4. (i) Sugar, molten iron  $\rightarrow$  Diamond  
(ii) Coke and  $SiO_2 \rightarrow$  Graphite  
(iii) Graphite  $\rightarrow$  Fullerene  
(iv) Coal  $\rightarrow$  Coke

(v) Mustard oil  $\rightarrow$  Lampblack

Hence, the correct option is (a).

5. (i) Neutralisation of  $CO_2$  by caustic soda  $\rightarrow$  Carbonate of sodium  
(ii) Combination of  $CO_2$  and water  $\rightarrow$  Carbohydrate  
(iii)  $CO_2 + Cl_2 \rightarrow COCl_2$  (Phosgene)  
(iv)  $C + CO_2 \rightarrow CO$  (Lower oxide of carbon)  
(v) CO is passed through blood  $\rightarrow$  Carboxy haemoglobin

Hence, the correct option is (b).

6. X does not decompose on heating, whereas Y decomposes to give  $CO_2$ . Among the given options, X and Y should be  $K_2CO_3$  and  $ZnCO_3$ .

Hence, the correct option is (c).

7. Due to the sparingly soluble nature of  $CO_2$  in water, the little amount of  $CO_2$  present dissolved in water is utilised for photosynthesis by aquatic plants.

Hence, the correct option is (d).

8. Both soda-acid fire extinguisher and foam-type fire extinguisher involve a neutralization reaction between sodium bicarbonate and  $H_2SO_4$  or  $Al_2(SO_4)_3$ . However, foam-type fire extinguisher can be used for extinguishing petrol or oil fires due to the presence of saponin which traps the oil vapour in the froth.

Hence, the correct option is (b).

9. Usage of graphite as a lubricant in machines, especially where high temperature is produced, involves both its layer lattice structure and high thermal resistance.

Hence, the correct option is (b).

10. Action of HCl on magnesium bicarbonate results in the formation of insoluble  $MgCO_3$  which is obtained as a precipitate along with the release of  $CO_2$  as gaseous product.

Hence, the correct option is (b).

11. Coal gas is a mixture of CO,  $CH_4$ , and  $H_2$ . Hence, X should be methane. Coal tar, on fractional

distillation, can give various products among which naphthalene could be one of the products.

Hence, the correct option is (d).

12. The general formula corresponding to saturated hydrocarbons should be  $C_nH_{2n+2}$ . According to this, the given hydrocarbon with 14 hydrogen atoms should be  $C_6H_{14}$ .

Hence, the correct option is (a).

13. Phosgene and CO are poisonous gases coal gas contains CO and  $CH_4$  which are harmful. Butane is not a harmful gas.

Hence, the correct option is (c).

14. Pyrolysis is the process of heating of hydrocarbon in the absence of air.

Hence, the correct option is (d).

15. Since X and Y are gaseous fuels, they do not produce any residue on burning. X may have higher calorific value than Y and could be ignited at a lower temperature than y.

Hence, the correct option is (a)

### Assessment Test III

1. Graphite is a crystalline allotrope of carbon.

Hence, the correct option is (a).

2. Sand is the raw material used for the manufacture of graphite in Acheson.

Hence, the correct option is (d).

3. Diamond cannot be used as solid lubricant since it is the hardest substance.

Hence, the correct option is (c).

4. Sugar charcoal is used to extract metals from their oxides because of its high purity and reactivity.

Hence, the correct option is (a).

5.  $CaCO_3 + 2HCl \rightarrow CaCl_2 + CO_2 + H_2O$

$CO_2$  is produced but not CO.

Hence, the correct option is (d).

6. Since CO is a neutral oxide, it does not dissolve in water and can be collected by downward displacement of water.

Hence, the correct option is (a).

7. Since the combustion of CO is highly exothermic, it is used as the constituent of many fuels.

Hence, the correct option is (a).

8. The correct order is DCBA.

Hence, the correct option is (d).

9. The correct order is CBAD.

Hence, the correct option is (d).

10.  $CaC_2 + H_2O \rightarrow C_2H_2 + Ca(OH)_2$   
 Calcium carbide                  Acetylene          Calcium hydroxide

Hydrolysis of  $CaC_2$  liberates  $C_2H_2$ .

Hence, the correct option is (b).

11. The given reaction is involved in foam-type fire extinguisher.

Hence, the correct option is (c).

12. The formation of  $CaCO_3$  makes lime water milky, since it is insoluble.

Hence, the correct option is (b).

13. Anthracite contains the highest percentage of carbon.

Hence, the correct option is (a).

14. Photosynthesis traps atmospheric  $CO_2$ .

Hence, the correct option is (b).

15. The correct matching is

(i)  $\rightarrow$  (C)

(ii)  $\rightarrow$  (A)

(iii)  $\rightarrow$  (E)

(iv)  $\rightarrow$  (B)

(v)  $\rightarrow$  (D)

Hence, the correct option is (a).

**Assessment Test IV**

1. Since sugar charcoal is an amorphous allotrope, carbon atoms are not present in a regular pattern.

Hence, the correct option is (d).

2. CO gas is liberated during the manufacture of graphite in Acheson process.

Hence, the correct option is (b).

3. Graphite is used as solid lubricant because of its layered structure and high resistance to heat.

Hence, the correct option is (d).

4. Gas carbon is used for making electrodes for dry cell.

Hence, the correct option is (d).

5.  $\text{Na}_2\text{CO}_3$  has high thermal stability. Hence, it does not undergo thermal decomposition to produce  $\text{CO}_2$  gas.

Hence, the correct option is (d).

6.  $\text{CO}_2$  is collected in the laboratory by upward displacement of air since it is heavier than air. It does not support combustion.

Hence, the correct option is (b).

7.  $\text{CO}_2$  is not a reducing agent. It is used in fire extinguishers because it is heavier than air and does not support combustion.

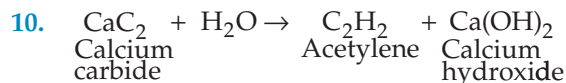
Hence, the correct option is (c).

8. The correct order is ADBC.

Hence, the correct option is (b).

9. The correct order is BDAC.

Hence, the correct option is (c).

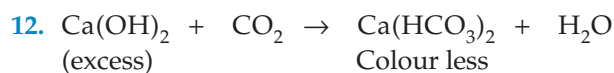


$\text{Ca(OH)}_2$  is basic in nature.

Hence, the correct option is (a).

11. Thermal decomposition of  $\text{NaHCO}_3$  is associated with dry powder fire extinguisher.

Hence, the correct option is (a).



Hence, the correct option is (d).

13. Peat, since its carbon content is the least.

Hence, the correct option is (a).

14. Respiration releases  $\text{CO}_2$  in the atmosphere.

Hence, the correct option is (c).

15. The correct matching is

(i)  $\rightarrow$  (B)

(ii)  $\rightarrow$  (D)

(iii)  $\rightarrow$  (A)

(iv)  $\rightarrow$  (E)

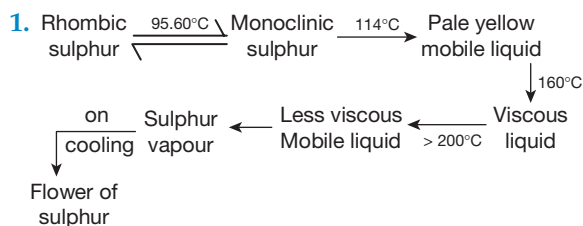
(v)  $\rightarrow$  (C)

Hence, the correct option is (b).

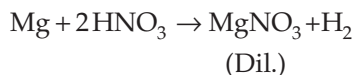
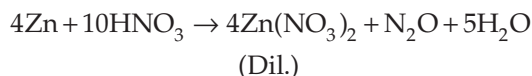
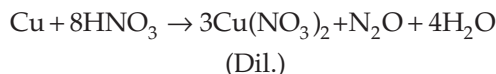
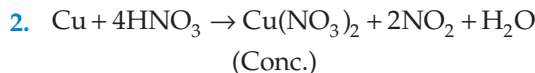
## CHAPTER 7

### Some Important Elements and their Compounds

#### Assessment Test I



Hence, the correct option is (c).



Hence, the correct option is (a).

3.  $\text{SO}_2$ , on treatment with excess water in the presence of oxygen, gives nascent hydrogen. Hence,  $\text{SO}_2$  acts as a reducing agent. The nascent hydrogen produces on being exposed to moisture acts as a bleach mg agent. It reduces the coloured matter to colourless. This process is reversible. The colourless product, on exposure to atmospheric oxygen, can get oxidized and thus regains its colour.

Hence, the correct option is (a)

4. Since  $\text{HNO}_3$  is a good oxidising agent, it oxidises the impurities present on the surface of gold, but does not react with gold.

Hence, the correct option is (c).

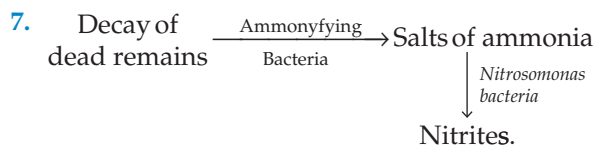
5. Liquid nitrogen is used as refrigerant. Zinc phosphide is used as rat poison. Sulphur is used in the manufacture of gunpowder.

Hydrogen sulphide is a good analytical reagent.  $\text{H}_2\text{SO}_4$  is used in storage batteries.

Hence, the correct option is (a).

6. Aqueous solution of  $\text{NH}_3$  on treatment with  $\text{CuSO}_4$  solution gives a pale blue precipitate of  $\text{Cu}(\text{OH})_2$ .

Hence, the correct option is (a).



Hence, the correct option is (c).

8. X is white phosphorous and Y is red phosphorous. Red phosphorous is used in match industry. Both X and Y are allotropes and possess same chemical properties but different properties.

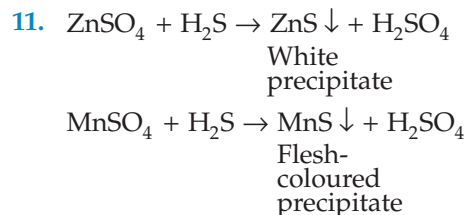
Hence, the correct option is (b).

9. Both rhombic sulphur and monoclinic sulphur are crystalline and soluble in  $\text{CS}_2$ .

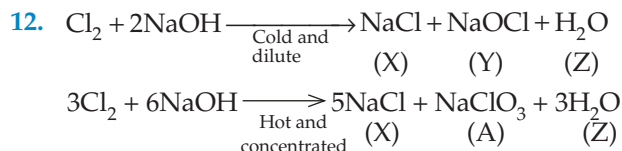
Hence, the correct option is (c).

10. Sugar, on treating with conc.  $\text{H}_2\text{SO}_4$ , turns into a black-coloured mass due to removal of hydrogen and oxygen present in sugar as water.

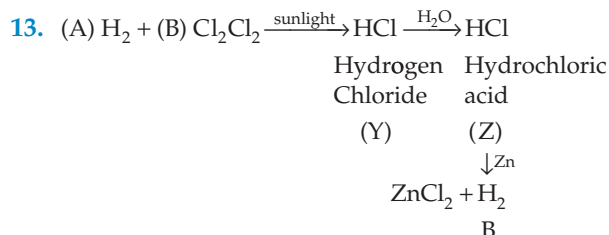
Hence, the correct option is (c).



Hence, the correct option is (a).



Hence, the correct option is (a).



Hence, the correct option is (a).

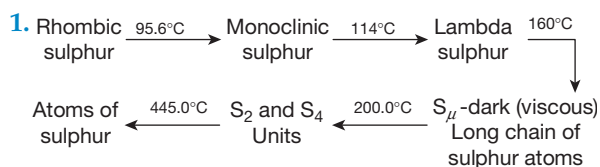
14. Thermosetting plastics are made up of cross-linked polymeric chains and hence are highly heat resistant and poor thermal conductors. Due to these characteristics, they are used for making handles of kitchenware.

Hence, the correct option is (a).

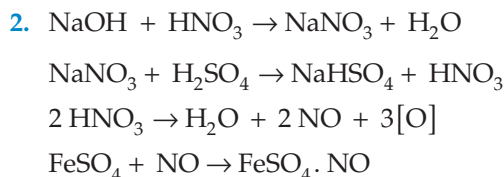
15. Red phosphorous is used in safety matches rather than white phosphorous because white phosphorous has a lower ignition temperature.

Hence, the correct option is (b)

## Assessment Test II



Hence, the correct option is (b).



Nitroso ferrous sulphate gives rise to brown ring.  
Hence, the correct option is (a).

3. Since  $\text{SO}_2$  act as a bleaching agent, it is used in sugar industry to remove colour from sugar-cane juice.

Hence, the correct option is (a).

4.  $\text{HNO}_3$  forms an oxide layer on the surface of iron, cobalt, etc. This layer acts as a passive layer and prevents the reaction between metal and  $\text{HNO}_3$ .

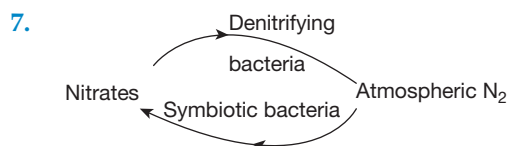
Hence, the correct option is (a).

5. Nitrogen is a less reactive substance among the given options. White phosphorus possesses garlic smell. Sulphur is a yellow coloured substance. Hydrogen sulphide has rotted egg smell. Sulphuric acid is corrosive in nature.

Hence, the correct option is (c).

6. Copper sulphate, on treatment with excess aqueous solution of  $\text{NH}_3$ , gives a dark blue solution of  $[\text{Cu}(\text{NH}_3)_4]\text{SO}_4$ .

Hence, the correct option is (b).



Hence, the correct option is (b).

8. White phosphorus (X) is a soft solid. Red phosphorous (Y) is odourless. Both X and Y are crystalline.

Hence, the correct option is (c).

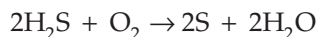
9. X is rhombic sulphur, Y is monoclinic sulphur, and Z is plastic sulphur. X possesses octahedral shape and Y is needle shaped. Since Z is amorphous, it does not have a sharp melting point.

Hence, the correct option is (b).

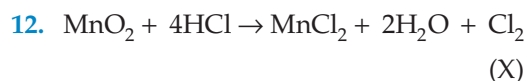
10. Sulphuric acid, on thermal decomposition, gives nascent oxygen and hence  $\text{H}_2\text{SO}_4$  acts as an oxidising agent. It can oxidise carbon to  $\text{CO}_2$

Hence, the correct option is (b).

11. Hydrogen sulphide undergoes combustion during which it reduces oxygen to water.

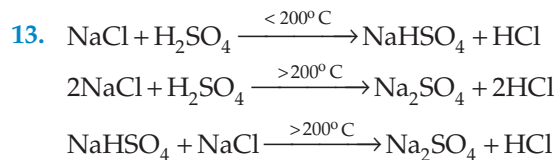


Hence, the correct option is (c).



Since X is soluble in water, it cannot be collected by either upward or by downward displacement of water.

Hence, the correct option is (b).



Hence, the correct option is (c).

14. Bakelite is a thermosetting plastic and is heat resistant due to cross-linked polymeric structure. Therefore, it cannot be remoulded.

Hence, the correct option is (c).

15. As Y is used in the match industry, it is red phosphorus and X is white phosphorus. In Y, each  $\text{P}_4$  units are linked by P-P bonds.

Hence, the correct option is (c)

### Assessment Test III

1. An electrostatic precipitator removes dust particles from air.

Hence, the correct option is (a).

2. Fractional distillation is used to isolate nitrogen from liquid air.

Hence, the correct option is (d).

3. Nitrogen is evolved by heating  $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$ .

Hence, the correct option is (a).

4. Red phosphorus is made up of chains of tetrahedral units of 4 phosphorus atoms, whereas white phosphorus is made up of discrete tetrahedral units. Hence, red phosphorus is less reactive.

Hence, the correct option is (c).

5.  $\text{MnO}_2$  is one of the reactants in the laboratory preparation of chlorine.

Hence, the correct option is (c).

6. The correct order is BCDAE.

Hence, the correct option is (a).

7. The correct order is CDAB.

Hence, the correct option is (c).

8. Hydrogen is not present in bleaching powder. Formula of bleaching powder is  $\text{CaOCl}_2$ . So, it has calcium, oxygen, and chlorine.

Hence, the correct option is (c).

9. Borosilicate glass has low coefficient of thermal expansion.

Hence, the correct option is (a).

10. Superphosphate does not contain nitrogen.

Hence, the correct option is (c).

11. Fibre glass is used for reinforcing purpose.

Hence, the correct option is (b).

12. Melamine, being a thermosetting plastic, contains cross-linked polymeric chains.

Hence, the correct option is (d).

13. Acrylic is a synthetic fibre. Hence, it does not originate from living beings.

Hence, the correct option is (d).

14.  $\text{H}_2\text{S}$  is widely used as an analytical reagent.

Hence, the correct option is (b).

15. The correct matching is:

(i)  $\rightarrow$  (D)

(ii)  $\rightarrow$  (A)

(iii)  $\rightarrow$  (B)

(iv)  $\rightarrow$  (E)

(v)  $\rightarrow$  (C)

Hence, the correct option is (a).

### Assessment Test IV

1. By passing through a strong alkaline solution,  $\text{CO}_2$  can be removed.

Hence, the correct option is (c).

2. Difference in the boiling point of liquid nitrogen and liquid oxygen is used to separate nitrogen from liquid air.

Hence, the correct option is (d).

3. Nitrogen and  $\text{NH}_4\text{Cl}$  are formed, when excess of  $\text{NH}_3$  reacts with chlorine.

Hence, the correct option is (c).

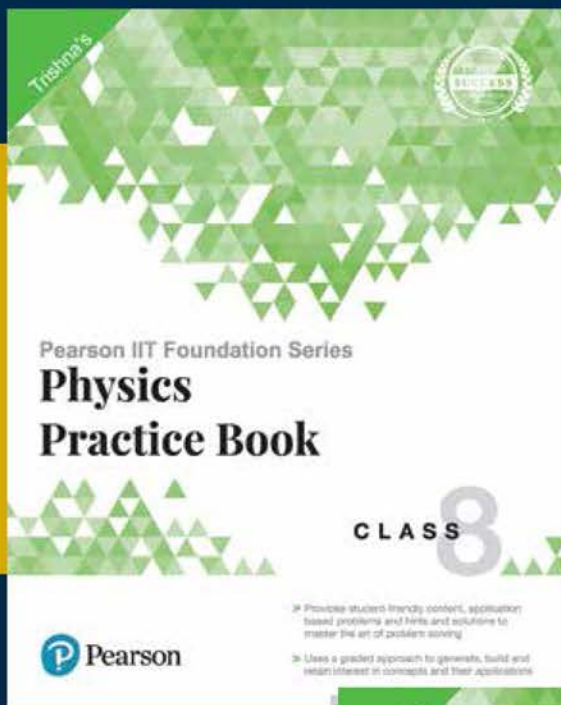


4. Crystal structure of monoclinic sulphur is like a needle, whereas that of rhombic sulphur is octahedral. In monoclinic sulphur, eight-membered puckered rings are stacked one over the other. However, in rhombic sulphur, they are snuggled into each other. Hence, the density of rhombic sulphur is more than that of monoclinic sulphur. Hence, the correct option is (b).
5.  $\text{MnO}_2$  oxidises  $\text{HCl}$  to chlorine in the laboratory preparation of chlorine. Hence, the correct option is (d).
6. The correct order is BDAC. Hence, the correct option is (b).
7. The correct order is DBAC. Hence, the correct option is (b).
8. Chlorine is used in the manufacture of bleaching powder. Hence, the correct option is (a).
9. Alkalisilicate glass gets dissolved in water. Hence, the correct option is (d).
10. Potassium chloride replenishes potassium. Hence, the correct option is (d).
11. Foam glass is light in weight and used for civil construction and insulating purpose. Hence, the correct option is (c).
12. Teflon is heat and chemical resistant and is made up of linearly linked polymeric units. Hence, the correct option is (a).
13. Rayon is like silk, and acrylic is like wool. Hence, the correct option is (d).
14.  $\text{H}_2\text{S}$  gas is a good reducing agent and is used to detect metals present in the salt, as it can give coloured precipitates with metal salts. Hence, the correct option is (b).
15. The correct matching is:  
(i)  $\rightarrow$  (E)  
(ii)  $\rightarrow$  (C)  
(iii)  $\rightarrow$  (B)  
(iv)  $\rightarrow$  (A)  
(v)  $\rightarrow$  (D)  
Hence, the correct option is (a).

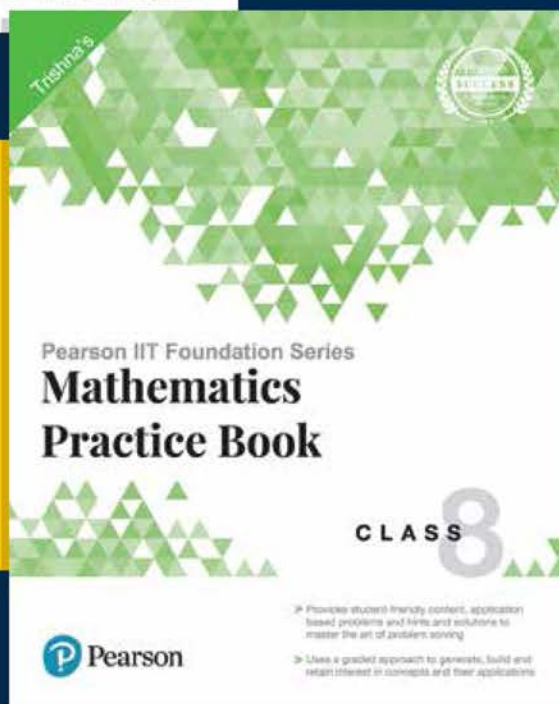


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