



DELHI PUBLIC SCHOOL NEWTOWN
SESSION 2024-25
HALF YEARLY EXAMINATION

CLASS: IX
SUBJECT: CHEMISTRY [SET A]

FULL MARKS: 80
TIME: 2 HOURS

Maximum Marks: 80 Time allowed: Two hours

Answers to this Paper must be written on the paper provided separately. You will not be allowed to write during first 15 minutes.

This time is to be spent in reading the question paper.

The time given at the head of this Paper is the time allowed for writing the answers.

*Section A is compulsory. Attempt any four questions from Section B. The intended marks for questions or parts of questions are given in brackets [].
(This paper consists of seven printed pages)*

SECTION A
(Attempt all questions from this Section)

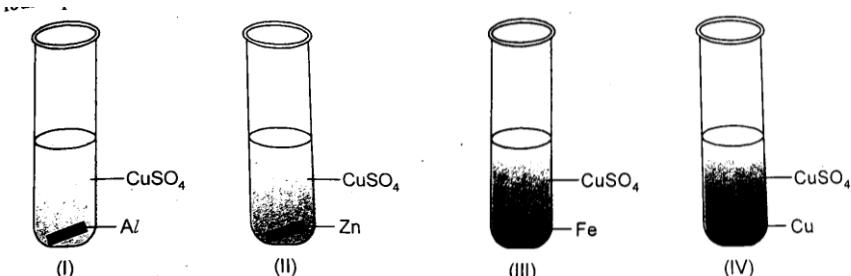
Question1

Choose the correct answers to the questions from the given questions. [15]
(Do not copy the questions, write the correct answers only.)

- (i) Which of the following matches the electronic configuration of the noble gas element?
P. S^{2-}
Q. S^{2+}
R. Mg^{2+}
(a) only P (b) only R (c) only Q (d) both P and R
- (ii) A compound P is treated with lead nitrate solution. A yellow precipitate is formed.
Which of the following could compound P be?
(a) ammonium chloride (b) sodium iodide
(c) zinc nitrate (d) ferrous sulphate
- (iii) The percentage of calcium in calcium carbonate is:
(Atomic masses Ca= 40, C= 12, O=16)
(a) 40 (b) 30 (c) 48 (d) 36
- (iv) A, B and C are three elements which undergo chemical reactions according to the following equations:
 $A_2O_3 + 2B \rightarrow B_2O_3 + 2A$
 $3CSO_4 + 2B \rightarrow B_2(SO_4)_3 + 3C$
 $3CO + 2A \rightarrow A_2O_3 + 3C$
Which of the above element is most and least reactive?
(a) A and B respectively (b) B and C respectively
(c) A and C respectively (d) C and B respectively

- (xiv) In Bosch's process, the removal of unreacted carbon dioxide is done by:
- Dissolving the mixture in water under pressure.
 - Dissolving the mixture in water under high temperature.
 - Dissolving the mixture in ammoniacal cuprous chloride solution.
 - Dissolving the mixture in cuprous chloride solution.

- (xv) A student performed the following four experiments:

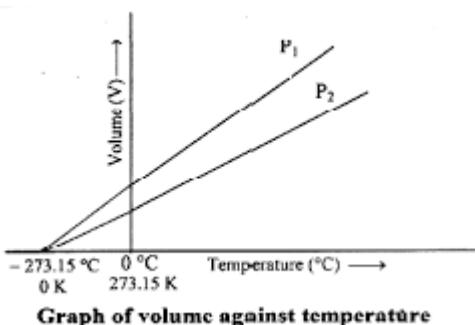


The experiments in which solid get deposited on the metal plate will be observed are:

- (a) I and II (b) I, II and III (c) II and III (d) II, III and IV

Question 2

- (i) Observe the following graph carefully and answer the following questions given below: [5]



- Name the Gas law for which the above graph is made.
- State the law mentioned above (in terms of degree Celsius).
- How is the volume of the gas related to the absolute temperature?
- Give the mathematical expression of the gas law for which the graph is made.
- According to the above gas law mentioned, which is the lowest possible temperature that can ever be reached theoretically?

- (ii) Match the following Column A with Column B.

[5]

| | Column A | | Column B |
|-----|--------------------------------|-------|------------------------|
| (a) | 17°C | (i) | -273°C |
| (b) | Absolute zero | (ii) | 3K |
| (c) | $-270\text{ }^{\circ}\text{C}$ | (iii) | 290 K |
| (d) | 1atm | (iv) | 546K |
| (e) | 273°C | (v) | 760mm |

- (iii) Complete the following by choosing the correct answers from the bracket: [5]
- (a) The formula of manganate radical is _____ [MnO_4^{1-} / MnO_4^{2-}]
 - (b) A metallic carbonate which does not decompose on heating is _____ [ZnCO_3 / K_2CO_3].
 - (c) If 'n' is the serial number of a shell, then maximum number of electrons can be determined by using the formula _____ [$2n^2$ / $2(n+1)$].
 - (d) A gas that can be removed by passing it through lead nitrate solution is _____ [arsine / hydrogen sulphide]
 - (e) The PV vs P graph for a gas is a _____ [straight line parallel to X axis / parabola]
- (iv) Identify the following: [5]
- (a) Laws that describe the behaviour of a gas under known conditions of pressure, volume and temperature.
 - (b) A basic gas that acts as a reducing agent.
 - (c) An element that does not contain any neutron in its nucleus.
 - (d) A gas that is produced due to heating of ammonium dichromate.
 - (e) A trivalent acid radical.
- (v) (a) Draw the orbit structure for the following: [5]
- (i) An ion of an element whose atomic number is 9 and mass number is 18.
 - (ii) An atom of an element whose atomic number is 19 and number of neutrons is 21.
- (b) Give the chemical formula for the following compounds:
- (i) Calcium acetate (ii) Ammonium nitrite
 - (iii) Sodium ferrocyanide

SECTION B(40 marks)
(Attempt any four questions)

Question 3

- (i) Identify the reactant and write the balanced equation for the following: [2]
Zinc reacts with compound Q to give a salt potassium zincate and hydrogen.
- (ii) What do you observe in each of the following cases: [2]
- (a) Sodium hydroxide solution is added to copper sulphate solution.
 - (b) Magnesium carbonate is heated in a test tube.
- (iii) Two elements X and Y have mass numbers 39 and 40 respectively, but their atomic numbers remain the same as 19. [3]
- (a) What is the relationship between X and Y?
 - (b) Are their chemical properties same or different? Explain to support your answer.
 - (c) Which one has more number of electrons: X or X^+ ?
- (iv) You are provided with the list of gases mentioned below in the box: [3]

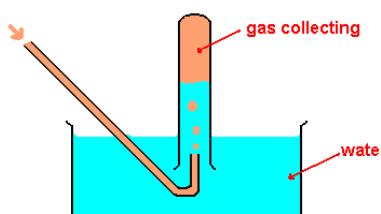
H_2 , Cl_2 , NH_3 , CO_2 , SO_2 , NO_2 , H_2S , Br_2 , NO

Identify the suitable gas that matches with the description given below:

- (a) A pungent smelling gas evolved on thermal dissociation of ammonium chloride.
- (b) A colourless gas evolved when nitrogen and oxygen gases are mixed together.
- (c) A reddish brown gas evolved when chlorine is passed through a solution of potassium bromide.

Question 4

- (i) A green coloured hydrated metallic crystalline salt on heating loses its water of crystallisation molecules and gives a suffocating smell. [2]
 - (a) Identify the salt.
 - (b) Write a balanced chemical equation.
- (ii) Rahul purchased a LPG cylinder having a pressure of 15atm. The pressure of the gauge of the cylinder shows 12atm pressure at 27°C having the same volume. At what temperature (in °C) will the cylinder explode? [2]
- (iii) Give balanced equations for each of the following: [3]
 - (a) Ammonia heated in presence of air.
 - (b) Steam is added to red hot iron.
 - (c) Sodium nitrate is heated in a test tube.
- (iv) A metal is treated with dilute sulphuric acid. The gas evolved is collected by the method shown in the figure. Answer the following questions. [3]



- (a) Write a balanced chemical equation for the above reaction (choosing the most appropriate metal)
- (b) Name the method of collection of the gas.
- (c) Can concentrated sulphuric acid be used in place of dilute sulphuric acid to obtain the same gas? Justify your answer.

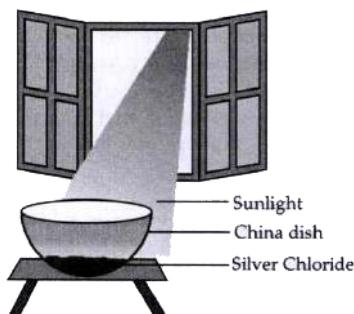
Question 5

- (i) Raktim wants to prove that chlorine is an oxidising agent. To demonstrate this, he passes chlorine through hydrogen sulphide gas. [2]
 - (a) What will he observe?
 - (b) Write a balanced chemical equation for the above reaction.
- (ii) Justify the following as oxidation reactions. [2]
 - (a) $\text{PbO} + \text{SO}_2 \rightarrow \text{PbSO}_4$
 - (b) $\text{Mn}^{2+} \rightarrow \text{Mn}^{7+}$
- (iii) Arun was given a blue hydrated crystalline salt 'P' for analysis. On strong heating it produced a black residue 'Q' along with a colourless gas 'R' with the smell of burning smell. [3]

- (a) Identify 'P'.
 (b) Name the black residue formed.
 (c) Give one chemical test for the gas 'R'.
- (iv) Complete the following reactions and state whether it is oxidation or reduction. [3]
- (a) $2\text{H}^+ \rightarrow \text{H}_2$
 (b) $\text{S} \rightarrow \text{S}^{2-}$
 (c) $\text{Zn} \rightarrow \text{Zn}^{2+}$

Question 6

- (i) An atom of an element 'Z' has one electron in its N-shell. [2]
 (a) Write the formula for its aluminate.
 (b) What type of reaction will take place when it (Z) reacts with cold water?
- (ii) A student kept silver chloride exposed to light as shown in the figure: [2]



- (a) What does she observe?
 (b) Write a balanced chemical equation for the same.
- (iii) What could be the necessary temperature for the volume of a gas to be doubled initially at STP if the pressure is decreased to 25%? [3]
- (iv) X (2, 8, 8, 7) and Y (2, 8, 1) are two elements. Using this information, complete the following: [3]
- (a) ____ is the non metallic element.
 (b) The nearest noble gas to Y is ____.
 (c) ____ is the reducing agent.

Question 7

- (i) The pressure of a gas is reduced from 1200mm Hg to 850 mm Hg as the volume of its container is increased by moving a piston from 85mL to 350mL. What would be the final temperature, if the original temperature was 90°C ? [3]

(ii) Identify A, B and C cations present in each of the following cases:

[3]

| Cation | Reagent added | Observation |
|--------|--------------------|------------------------------|
| A | Ammonium hydroxide | Reddish brown precipitate |
| B | Sodium hydroxide | Chalky white precipitate |
| C | Sodium hydroxide | Gelatinous white precipitate |

(iii) An element 'X' has two electrons in the M shell.

[4]

- (a) State its atomic number.
- (b) What do you observe when it is burnt in presence of oxygen?
- (c) Find out the molecular mass of its phosphide.
(At. Mass: X= 24, P= 31, O=16, H=1, S=32)

Question 8

(i) State giving reasons if:

[2]

- (a) Sodium can be used to prepare hydrogen gas from dilute acids.
- (b) Dilute nitric acid can be used in the laboratory preparation of hydrogen.

(ii) State the law that explains the relationship between pressure of the gas and its volume. Represent it graphically.

[2]

(iii) Give balanced equations for the following reactions: (mention the conditions wherever necessary)

[3]

- (a) Cold water is added to a divalent metal.
- (b) A metallic nitrate on heating liberates a reddish brown gas, a colourless gas leaving behind a metallic residue.
- (c) Excess steam is added to water gas.

(iv) Identify the oxidising agent in the following reactions:

[3]

- (a) $5\text{Ca} + \text{P}_2\text{O}_5 \rightarrow 2\text{P} + 5\text{CaO}$
- (b) $\text{ZnO} + \text{H}_2 \rightarrow \text{Zn} + \text{H}_2\text{O}$
- (c) $\text{Pb}_3\text{O}_4 + 8\text{HCl} \rightarrow 2\text{PbCl}_2 + \text{Cl}_2 + 4\text{H}_2\text{O}$