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SYLLABUS - 2020-2021**CHEMISTRY****CLASS - X****March -April****Chapter1: Chemical reactions and equations**

Types of chemical reactions: Combination, decomposition, displacement, double displacement, oxidation and reduction in terms of gain and loss of oxygen, corrosion, rancidity.

Activities:

To demonstrate different types of reactions in the class.

Practical**Experiment - 1**

To perform and observe the following reactions and classify them into:

- Combination reaction
 - Decomposition reaction
 - Displacement reaction
 - Double displacement reaction
- (1) Action of water on quick lime.
(2) Action of heat on ferrous sulphate crystals.
(3) Iron nails kept in copper sulphate solution.
(4) Reaction between sodium sulphate and barium chloride solutions.

MAY**Chapter2: Acids, bases and Salts**

Understanding the chemical properties of acids and bases: how do acids and bases react with metals, how do metal carbonates and metal hydrogen carbonates react with acids, how do acids and bases react with each other, reaction of metallic oxides with acids, reaction of a non-metallic oxide with base, what happens to an acid or a base in a water solution .

pH, importance of pH in everyday life, chemicals from common salt, sodium hydroxide, bleaching powder, baking soda, washing soda, plaster of Paris.

Activities:

- Reaction of acids and bases with metal.
- Reaction of HCl with NaHCO_3 and Na_2CO_3 .
- Neutralization reaction.

- Effect of acid and base on litmus paper.

Practical

Experiment - 2

To find the pH of the following samples:

- Dilute HCl solution
- Dilute NaOH Solution
- Dilute ethanoic acid solution
- Lemon juice
- Water
- Dilute sodium carbonate solution by using pH paper/ universal indicator.

Experiment - 3

To study the properties of acids (dil HCl) by their reactions with:

- Litmus solution (Red/Blue)
- Zinc metal
- Sodium carbonate.

Experiment - 4

To study the properties of bases (dil NaOH sol) by their reactions with:

- Litmus solution
- Zinc metal
- Solid sodium carbonate
- Phenolphthalein.

July

Chapter3: Metals and non-metals

Physical properties of metals and non-metals, chemical properties of metal, reactivity series, properties of ionic compounds, various metallurgical processes, corrosion, prevention of corrosion.

Various metallurgical processes, corrosion, prevention of corrosion.

Activities:

- Reaction of metals with water.
- Rusting of iron.

Practical**Experiment - 5:**

(a) To observe the action of Zinc, iron, copper and aluminium on the following salt solutions:

- (i) ZnSO_4 (aq)
- (ii) FeSO_4 (aq)
- (iii) CuSO_4 (aq)
- (iv) $\text{Al}_2(\text{SO}_4)_3$ (aq)

(b) Arrange Zn, Fe, Cu and Al in the decreasing order of reactivity based on the above result.

August**Chapter 4: Carbon and its compounds**

Nomenclature of carbon compounds, bonding in carbon- the covalent bond, versatile nature of carbon, saturated and unsaturated carbon compounds.

Chains, branches and rings, homologous series, properties of alcohols and carboxylic acids,

September

Soap-cleansing action of soap.

Practical**Experiment - 6** To study the following properties of acetic acid:

- (i) Colour
- (ii) Solubility in water
- (iii) Effect on litmus
- (iv) Reaction with sodium carbonate

Experiment - 7

Testing the behaviour of soap with hard and soft water and other properties.

October**Chapter 5: Periodic classification of elements**

Early attempts at the classification of elements: Dobereiner's triads, Newland's law of octaves, Mendeleev's periodic table, achievements of Mendeleev's periodic table, limitation of Mendeleev's classification, Modern periodic table, position of elements in the modern periodic table, trends in the modern periodic table: valency, atomic size, metallic and non-metallic properties.

November**Chapter 14: Sources of energy**

Conventional sources of energy: fossil fuels, thermal power plant, hydro power plant, biomass and wind energy.

Revision**PRACTICALS**

1) Observation of following and classifying into kind of reaction

- (i) Action of water on Quick lime
- (ii) Action of heat on FeSO_4 crystals
- (iii) Iron nails kept in CuSO_4 solution.
- (iv) Reaction between Na_2SO_4 and BaCl_2 solutions

2) Finding pH of Dil. HCl solution, Dil. NaOH solution, Dil. Ethanoic acid solution, lemon juice, water, dil. Sodium carbonate solution

3) Study the reaction of dil. HCl with litmus solution (Red/ Blue), Zinc metal, Sodium carbonate

4) Study the properties of bases with litmus solution, zinc metal, sodium carbonate, and phenolphthalein.

5) Observing the action of Zn, Fe, Cu and Al on ZnSO_4 , FeSO_4 , CuSO_4 and $\text{Al}_2(\text{SO}_4)_3$ solutions. Based on these, arrange the metals in the reactivity series.

6) To study the following properties of acetic acid:

- Colour
- Solubility in water
- Effect on litmus
- Reaction with sodium carbonate

7) Testing of soap on following parameters

Lather formation with hard and soft water and its comparison.

Rubric:

| | | |
|-------|-----------------------------------|---|
| (i) | Aim | 1 |
| (ii) | Apparatus | 1 |
| (iii) | Theory and diagram | 2 |
| (iv) | Observation and performing skills | 4 |
| (v) | Inference drawn | 1 |
| (vi) | Precautions | 1 |

Chapter No. 1

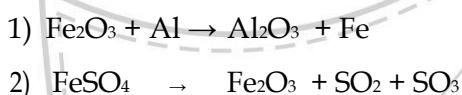
Chemical Reactions and equations (I)

Assignment

Q1. Write the balanced chemical equations for the following chemical reactions.

- Aqueous solution of sulphuric acid reacts with sodium hydroxide to form aqueous sodium sulphate and water.
- Sodium hydroxide solution reacts with hydrochloric acid solution to produce sodium chloride solution and water .

Q2. Balance the following equations :-



Q3. What happens

- When quicklime is added to water?
- Zinc metal is dipped in copper sulphate solution.

Q4. Translate the following into balanced chemical equations :

- Steam is passed over heated iron to form magnetic oxide of iron (Fe_3O_4) and hydrogen.
- Carbon disulphide burns in air to give carbon dioxide and sulphur dioxide.
- Magnesium burns in presence of Nitrogen to form Magnesium nitride.

Q5. With the help of an activity show the displacement reaction of zinc granules and dilute hydrochloric acid.

Q6. A metal is treated with dilute sulphuric acid .The gas evolved is collected by the method shown in the figure. Answer the following

- Name the gas.
- Name the method of collection of the gas.
- Is the gas soluble or insoluble in the water?
- Is the gas lighter or heavier than air?

Q7. When hydrogen burns in oxygen, water is formed and when water is electrolysed, then hydrogen and oxygen are produced. What type of reaction takes place

- In the first case.

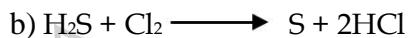
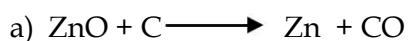
b) In the second case.

Give equations.

Q8. Give one example of a redox reaction which is also

- 1) a combination reaction
- 2) A displacement reaction.

Q9. Identify the component oxidised in the following reactions



Q10 What is Rancidity? Suggest methods which can be used to prevent food from getting rancid.

Q11. Decomposition reactions require energy in the form of heat , light or electricity for breaking down of reactants . Write one equation each for decomposition reactions where energy is supplied in the form of heat , light and electricity .

Q12. Write chemical equations for the following reactions :

- i) When zinc carbonate is calcined ?
- ii) When manganese dioxide is heated with aluminium powder .
- iii) When magnesium is treated with very dilute nitric acid

Q13. A substance 'X' which is an oxide of a group 2 element , is used intensively in the cement industry . This element is present in bones also .On treatment with water it forms a solution which turns red litmus blue . Identify 'X' and also write the chemical reactions involved .

Q14. A magnesium ribbon is burnt in oxygen to give a white compound X accompanied by emission of light . If the burning ribbon is now placed in an atmosphere of nitrogen , it continues to burn and form a compound Y

- a) Write the chemical formulae of X and Y .
- b) Write a balanced chemical equation , when X is dissolved in water .

Q15. Why do we store silver chloride in dark coloured bottles ?

Multiple Choice Questions

1. Before burning in air, the magnesium ribbon is cleaned by rubbing with a sand paper to:

- a. Make the ribbon surface shinier
- b. Remove the layer of magnesium oxide from the ribbon surface
- c. Remove the layer of magnesium carbonate from the ribbon surface
- d. Remove the moisture from the ribbon surface

2. The respiration process during which glucose undergoes slow combustion by combining with oxygen in the cells of our body to produce energy, is a kind of:

- a. Exothermic process
- b. Endothermic process
- c. Reversible process
- d. Physical process

3. A chemical reaction does not involve:

- a. Formation of new substances having entirely different properties than that of the reactants
- b. Breaking of old chemical bonds and formation of new chemical bonds
- c. Rearrangement of the atoms of reactants to form new products
- d. Changing of the atoms of an element into those of another element to form new products

4. One of the following processes does not involve a chemical reaction. That is:

- a. Melting of candle wax when heated
- b. Burning of candle wax when heated
- c. Digestion of food in our stomach
- d. Ripening of banana

5. All the methods mentioned below can be used to prevent the food from getting rancid except:

- i. Storing the food in the air-tight containers
- ii. Storing the food in refrigerator
- iii. Keeping the food in clean and covered containers
- iv. Always touching the food with clean hands

6. You are given the following chemical reaction:



This reaction represents:

- a. Combination reaction as well as double displacement reaction
- b. Redox reaction as well as displacement reaction

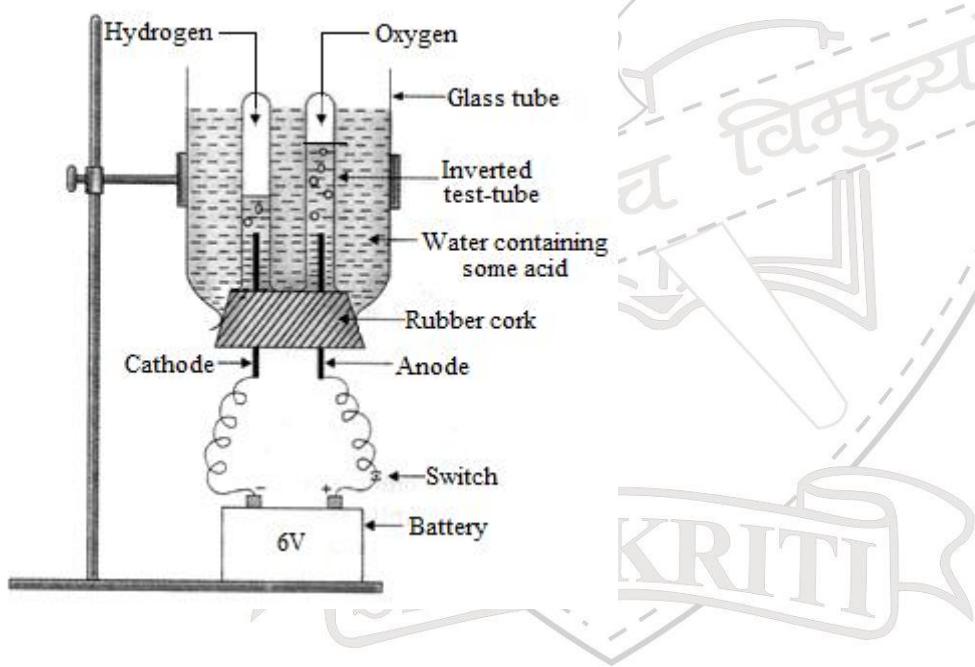
- c. Double displacement reaction as well as redox reaction
d. Decomposition reaction as well as displacement reaction
7. Which of the following gases is used in the storage of fat and oil containing foods for a long time?

- a. Carbondioxide gas
- b. Nitrogen gas
- c. Oxygen gas
- d. Neon gas

8. The neutralization reaction between an acid and a base is a type of:

- a. Double displacement reaction
- b. Displacement reaction
- c. Addition reaction
- d. Decomposition reaction

9. Following is given a diagram showing an experimental set-up:



The given set-up is used to carry out:

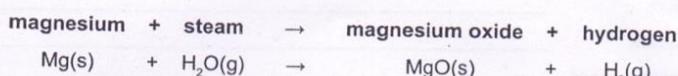
- a. Distillation of water
 - b. Purification of water
 - c. Electrolysis of water
 - d. Hydrolysis
10. White silver chloride in sunlight turns to
- a)Grey
 - b)Yellow

- c) Remain white
d) Red
11. What happens chemically when quick lime is added to water?
12. What is an oxidation reaction? Is it exothermic or endothermic?
13. Give an example of photochemical reaction.
14. A substance 'X' is used in white-washing and is obtained by heating limestone in the absence of air. Identify 'X' .
15. Fill in the blanks -
1. The addition of O₂ to a substance is called _____ whereas removal of oxygen is called _____.
 2. The colour of magnesium oxide is _____.
 3. Precipitation reaction produces insoluble _____.
 4. A reaction in which an element displaces another element from its compound is called _____.
16. Identify whether the statement is true or false ;
1. Antioxidants are used to prevent oxidation of food containing fats and oils.
 2. A chemical change occurs by chemical reaction .
 3. In a chemical equation, Reactants are written on the right hand side .

Types of chemical reaction

Scientists classify chemical reactions into different types, such as neutralisation, combination, redox, double displacement (precipitation), decomposition and displacement. This exercise provides the equations for a number of chemical reactions.

For each reaction, you are given a word equation and a balanced chemical equation:



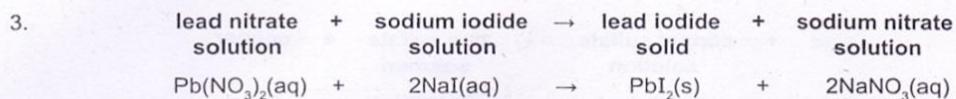
You should try to classify each of the examples given.

- Type of reaction:
- Displacement
- Neutralisation
- Redox
- Combination
- Decomposition
- Double displacement (precipitation)
- None of the above

For each reaction tick (✓) the box, or boxes, that describe the type of reaction. Some of the reactions may be examples of more than one type of reaction and some of the reactions may only occur when energy is provided (by heating or electrolysing), but this is not shown in the questions.

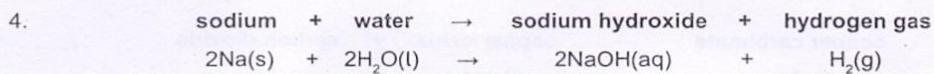
Tick (✓) "None of the above" if the reaction does not seem to fit any of the suggestions.

Explain why you have classified the reaction the way you have.



Type of reaction I made this classification because...

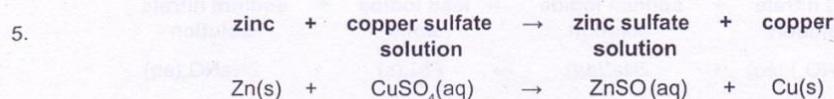
- Displacement _____
- Neutralisation _____
- Redox _____
- Combination _____
- Decomposition _____
- Double displacement (precipitation) _____
- None of the above _____



Type of reaction I made this classification because...

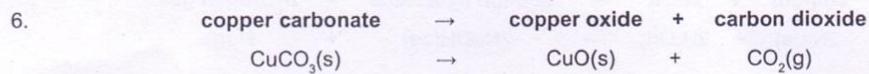
- Displacement _____
- Neutralisation _____
- Redox _____
- Combination _____
- Decomposition _____
- Double displacement (precipitation) _____
- None of the above _____

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Type of reaction I made this classification because...

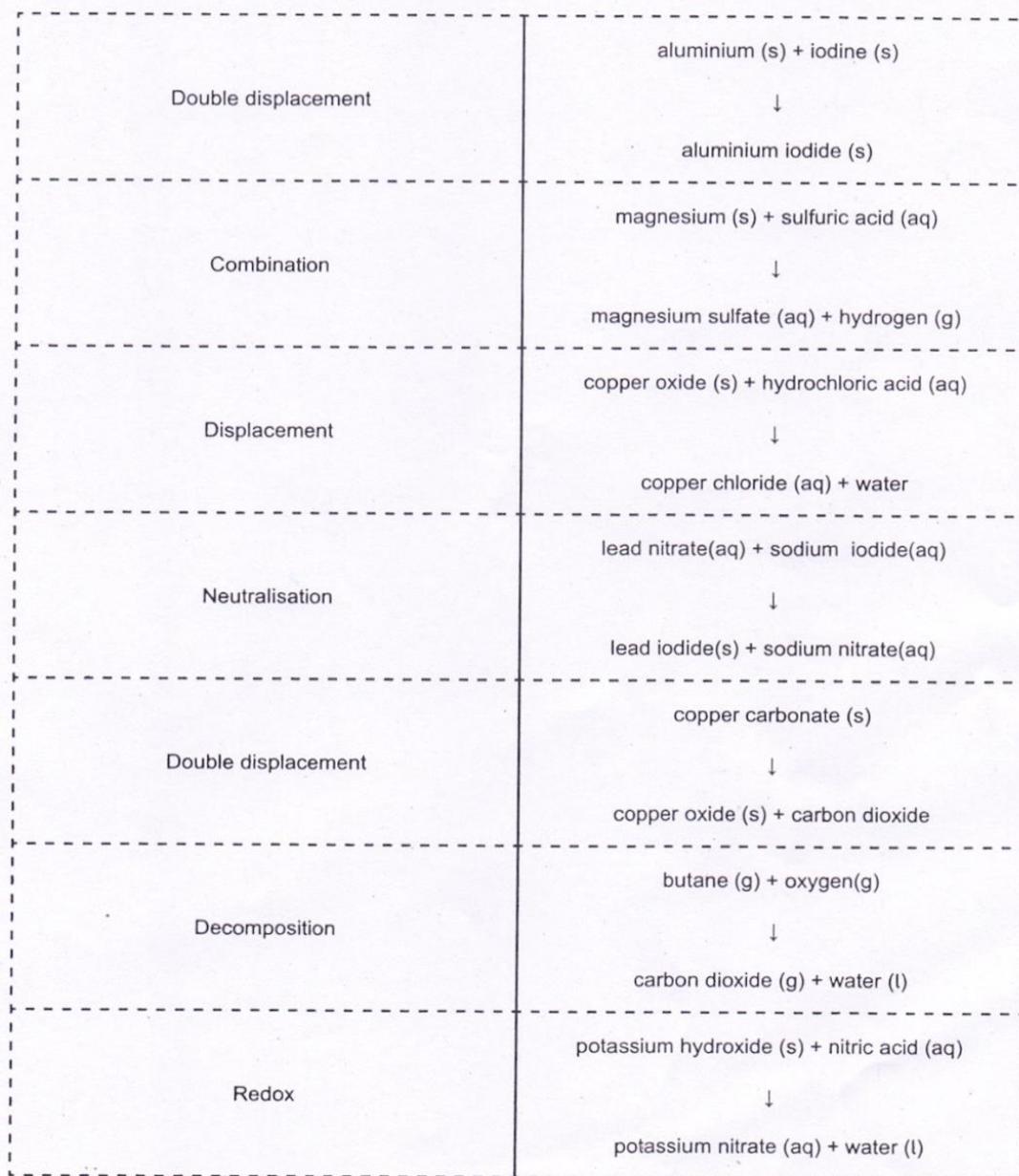
- Displacement
- Neutralisation
- Redox
- Combination
- Decomposition
- Double displacement (precipitation)
- None of the above

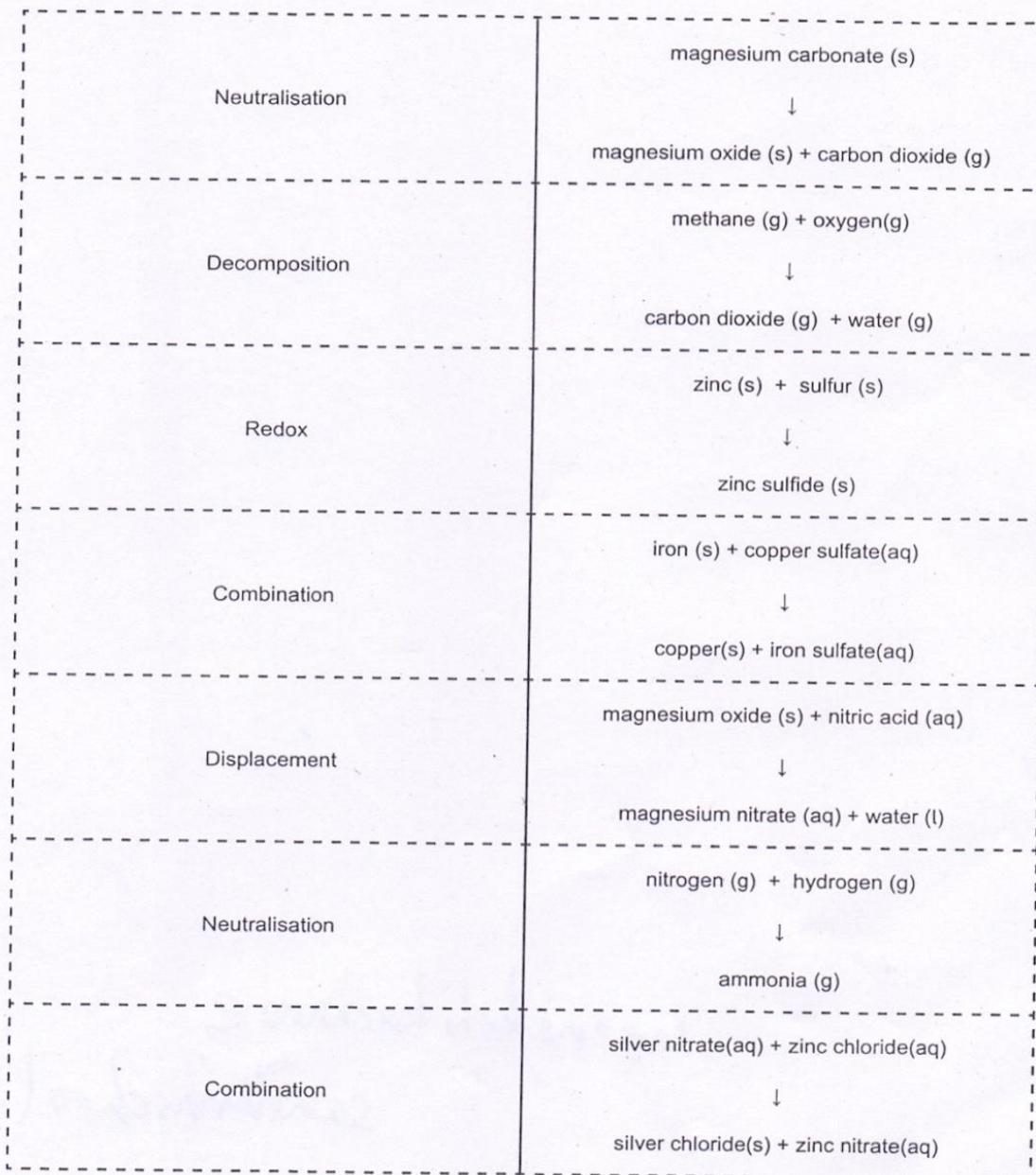


Type of reaction I made this classification because...

- Displacement
- Neutralisation
- Redox
- Combination
- Decomposition
- Double displacement (precipitation)
- None of the above

Dominoes: Chemical changes and equations





Chapter No. 2

Acids, bases and salts

Assignment

- Q1. A gas produced in the lab is highly soluble in water. Its colourless solution turns pink on adding few drops of indicator. Name the indicator and the nature of this gas?
- Q2. Crystals of a substance changed their colour on heating in a closed vessel but regained it after some time when they were allowed to cool down .Name one such substance that shows this property.
- Q3. Identify the compound of calcium which is yellowish white powder and is used for disinfecting drinking water. How it is manufactured? Write chemical equations for the reactions involved. What happens when it is left exposed to air?
- Q4. With the help of an activity show that hydrochloric acid solution conducts electric current.
- Q5. A student dropped a few pieces of marble in dilute hydrochloric acid contained in a test tube . The evolved gas was passed through lime water . What change would be observed in lime water ? Write the balanced chemical equations for both the changes observed .
- Q6. Give reasons;
- Acid must be added to water and not vice versa during dilution.
 - Solution of sulphuric acid conducts electricity whereas alcohol does not.
 - Cake rises on adding baking powder.
 - Dry ammonia gas has no action on litmus paper, but a solution of ammonia in water turns red litmus blue.
 - Tartaric acid is an important ingredient of baking powder.
- Q7. Identify the compound of calcium which is used for plastering of fractured bones. With the help of chemical equation show how it is prepared. What special precautions should be taken during the preparation of this compound?
- Q8. Write balanced equations for the following reactions ;
- Dilute sulphuric acid reacts with aluminium powder.
 - Dilute hydrochloric acid reacts with iron filings.
 - Dilute sulphuric acid is added to solid sodium carbonate.

Q9. Baking soda is used in small amount in making bread and cake. It helps to make these soft and spongy. An aqueous solution of baking soda turns red litmus blue. It is also used in soda - acid fire extinguisher.

- 1) How does baking soda help to make cakes and bread soft and spongy?
- 2) How does it help in extinguishing fire?
- 3) Is the pH of baking soda solution less than or greater than 7.

Q10. Write balanced equations for the preparation of the following salts -



Q11. Write the action on litmus of :

- a) Dry ammonia gas (b) Solution of ammonia gas in water

Q12. Which three chemical substances are obtained when electricity is passed through an aqueous solution of brine ? Write an industrial use of each .

Q13. State the number of water molecules present in the crystals of washing soda and Plaster of paris . What are these molecules called as ?

Q14. Write the terms defined by the following sentences :

- (a) A soluble base
- (b) The insoluble solid formed when two solutions are mixed together .
- (c) An acidic solution in which there is only partial ionization of the solute molecules .

Q15. Name the acid present in ant sting and give its chemical formula . Also give the common method to get relief from the discomfort caused by the ant sting .

MCQ

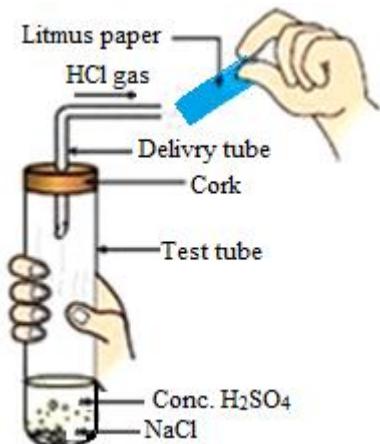
Q1. Some fruits like mango, lemon, raw grapes, orange, etc., have a sour taste due to the presence of:

- a. Acetic acid
- b. Citric acid
- c. Lactic acid
- d. Oxalic acid

Q2. Zinc granules on treating with an acid X, form the zinc sulphate (ZnSO_4) salt along with the evolution of a gas Y which burns with a pop sound when brought near to a burning candle. Identify the acid X and gas evolved Y.

- a. X- Sulphuric acid and Y- Oxygen gas
- b. X- Hydrochloric acid and Y- Oxygen gas
- c. X- Sulphuric acid and Y- Hydrogen gas
- d. X- Hydrochloric acid and Y- Hydrogen gas

3. The figure given below represents the experiment carried out between conc. sulphuric acid and sodium chloride, which react with each other to form HCl gas.



Blue litmus paper is brought near the mouth of the delivery tube to check the presence of HCl acid but no change is observed in the color of litmus paper because:

- a. The litmus paper used is dry
- b. The litmus paper used is moist
- c. Blue litmus paper does not change its color with an acid
- d. The litmus paper is kept very close to the mouth of the delivery tube

4. Which of the following phenomena occur, when a small amount of acid is added to water?

- i. Ionisation
 - ii. Neutralisation
 - iii. Dilution
 - iv. Salt formation
- a. (i) and (ii)
 - b. (i) and (iii)
 - c. (ii) and (iii)
 - d. (ii) and (iv)

5. Which of the following indicators turn red in an acidic solution?

- i. Phenolphthalein
- ii. Litmus
- iii. Turmeric
- iv. Methyl orange

Choose the correct option:

THE CIVIL SERVICES SCHOOL

- a. (i) and (ii)
- b. (ii) and (iii)
- c. Only (ii)
- d. (ii) and (iv)

6. Dilute acid does not produce carbon dioxide on being treated with:

- a. Marble
- b. Lime
- c. Baking soda
- d. Limestone

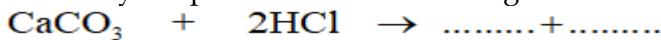
7. The sample of soil from a particular place was tested for its pH value. It came out to be 5. Which one of the following should be added to the soil to make it suitable for the plant growth?

- i. Calcium chloride
- ii. Calcium Hydroxide
- iii. Calcium oxide

Choose the correct option:

- a. Both (i) and (ii)
- b. Both (ii) and (iii)
- c. Only (i)
- d. Only (iii)

8. Identify the products of the following reaction:



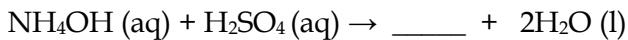
- a. Calcium hydrogencarbonate and chlorine gas
- b. Calcium chloride and water
- c. Calcium oxide, carbon dioxide and water
- d. Calcium chloride, carbon dioxide and water

9. An ant's sting can be treated with which will neutralise the effect of the chemical injected by the ant's sting into our skin.

Choose the correct option from the following to be filled in the blank space:

- a. Methanoic acid
- b. formic acid
- c. Baking soda
- d. Caustic soda

10. In the following reaction, identify the salt formed

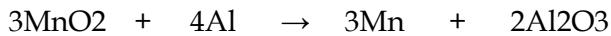


- a. NH_4NO_3
- b. $(\text{NH}_4)_2\text{SO}_4$
- c. $(\text{NH}_4)_3\text{PO}_4$
- d. $(\text{NH}_4)_2\text{S}$

Chapter No. 3**Metals and Non Metals****Assignment**

Q1. An element on burning in air forms an oxide XO_2 which when dissolved in water turns blue litmus red. Identify if 'X' is a metal or a non-metal. Justify your answer.

Q2. Name the reducing agent in the reaction



For the reduction of metal oxide to metal, suggest a reducing agent cheaper than aluminium

Q3. Give reason:

- (i) Metals are regarded as electropositive metals.
- (ii) Aluminium which is more reactive than iron does not corrode like iron.
- (iii) When a piece of copper metal is added to a solution of zinc sulphate , no change takes place, but the blue colour of copper sulphate fades away when a piece of zinc is placed in its solution.
- (iv) Aluminium cannot be extracted by using carbon as a reducing agent.
- (v) Ionic compounds in solid state do not conduct electricity but they do so in molten state.
- (vi) When calcium is added to water, the gas evolved does not catch fire but the same gas evolved on adding sodium metal to wire catches fire.

Q4. Name a metal which does not react with cold water as well as hot water but reacts with steam. Give the reaction involved.

Q5. Describe with the help of a labelled diagram the method of refining of copper by electrolytic method

Q6. How are the less reactive metals extracted? Explain with the help of an example.

Q7. An ore on heating in the absence of air gives carbon dioxide. Which method will you use to convert the ore into oxide form? Explain.

Q8. What are amphoteric oxides? Show by giving equations that Aluminium oxide is an amphoteric oxide.

Q9. What are alloys? What properties of alloys make it useful over pure metals? Explain with examples.

Q10. Show the formation of Al_2O_3 by the transfer of electrons between the combining atoms

Q11. A white powder having an odour of chlorine is used to remove yellowness of white clothes in laundries .Name this powder. How is it prepared ? Write the chemical equation for the reaction involved in the preparation .

Q12. An alkali metal A gives a compound B on reacting with water . The compound B gives a soluble compound C on treatment with aluminium oxide . Identify A , B and C and give the reaction involved .

Q13. A metal M does not liberate hydrogen from acids but reacts with oxygen to give a black colour product and also explain the reaction of M with oxygen .

Q14. Explain why zinc metal can displace copper from copper sulphate solution but copper cannot displace zinc from zinc sulphate solution .

Q15. Why metals are called electropositive elements whereas non- metals are called electronegative elements?

MCQ

Q1.The metal which is liquid at room temperature is

- a) Bromine
- b) Mercury
- c) Iodine
- d) Potassium

Q2. The sulphide ores are converted into oxides by heating strongly in the presence of excess air. This process is known as

- a) Roasting
- b) Smelting
- c) Calcination
- d) Refining

Q3.In electrolytic refining, the cathode is made up of

- a) Pure metal
- b) Impure metal
- c) Alloy
- d) Metallic salt

Q4.In the given reaction, $\text{Al}_2\text{O}_3 + \text{NaOH} \rightarrow \dots\dots\text{X}\dots\dots + \text{H}_2\text{O}$
What is element X?

- a) NaAlO_2
- b) Na_3Al
- c) Na_2O_3
- d) NaAl_2O_3

Q5. Which of the following represent the correct order of decreasing reactivity?

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

Q6. An element reacts with oxygen to give a compound with a high melting point. This compound is also soluble in water. The element is likely to be

- (a) Ca
- (b) C
- (c) Si
- (d) Fe

Q7. Which of the following pairs will give displacement reactions?

- (a) NaCl solution and copper metal
- (b) MgCl₂ solution and aluminium metal
- (c) FeSO₄ solution and silver metal
- (d) AgNO₃ solution and copper metal

Q8. Which among the following is the most abundant metal found in the earth's crust?

- (a) Magnesium
- (b) Aluminium
- (c) Oxygen
- (d) Iron

Q9. Which of the following pairs of reactants will go undergo a displacement reaction?

- (a) CuSO₄ + Fe
- (b) ZnSO₄ + Fe
- (c) MgSO₄ + Fe
- (d) Ca(SO₄)₂ + Fe

Q10. Galvanisation is a method of protecting steel and iron from rusting by coating them with a thin layer of

- (a) Copper
- (b) Aluminum
- (c) Zinc
- (d) Bauxite

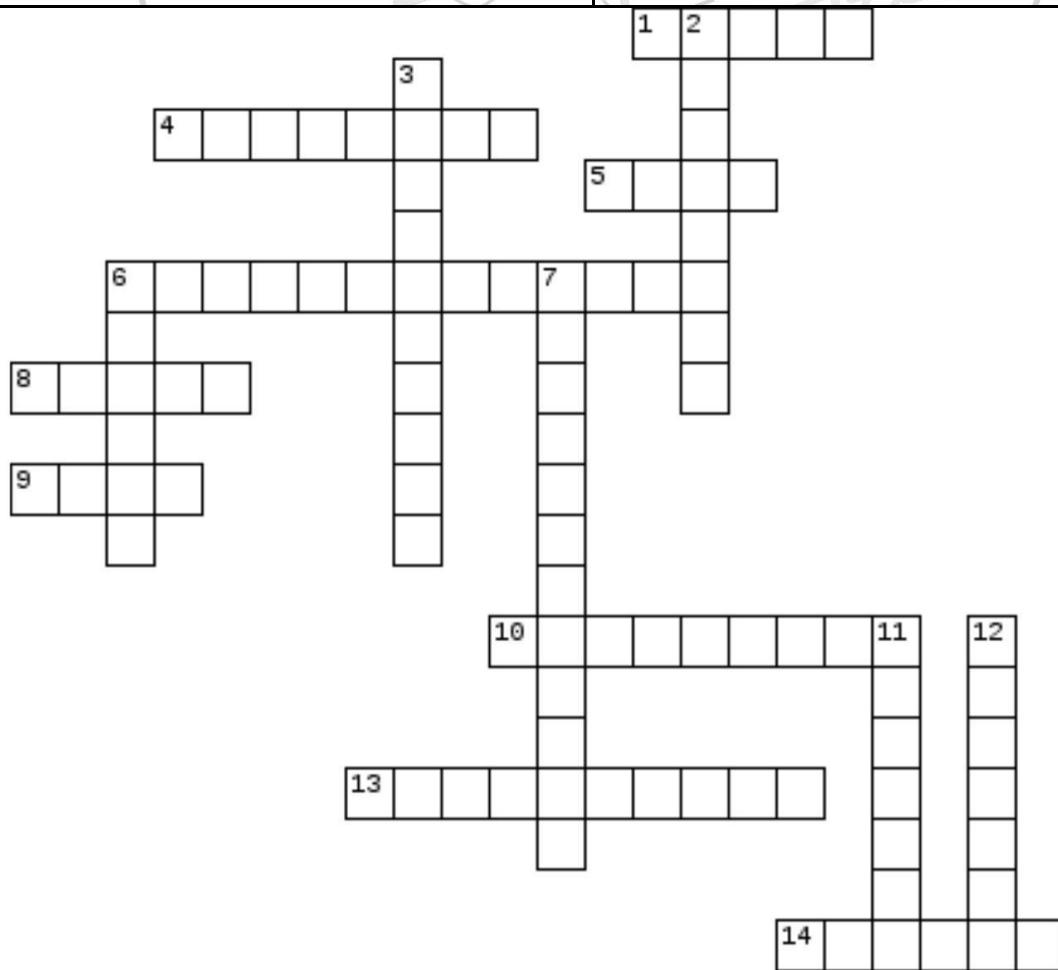
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Across Clues

- One characteristic of metals is that they
 1. have?
 The type of element that is poor
 4. conductors of
 heat and electricity
 5. I have 26 protons
 6. I am a list of all known elements
 The number of valence electrons that
 8. boron has?
 9. I am the element in period 2, group 18
 10. I am a metalloid
 The type of elements that have
 characteristics of both metals and non-
 13. metals
 14. I am a gas with 8 protons

Down Clues

2. Salt forming elements are also known as?
 3. The periodic table is not based on:
 6. I am a horizontal row
 7. What are group one elements known as?
 11. I am a metal and a liquid at room
 temperature.
 12. The vocabulary term used that states:
 Can be
 stretched into wire



Chapter No. 4

Carbon and Its Compounds

C.W. ASSIGNMENT

Answer the following

Give the molecular formula and IUPAC names of the following organic compounds:

- a) An alkyne containing 4 carbon atoms

- b) An alcohol containing 3 carbon atoms

- c) An aldehyde containing 2 carbon atoms

- d) Simplest ketone

- e) An alcohol used in cough syrups.

- f) A carboxylic acid used as a preservative.

- g) A saturated hydrocarbon containing 4 carbon atoms.

- h) A cyclo alkane with 5 carbon atoms.

- i) A compound used as fuel for vehicles.



Carbon and Its Compounds

Assignment

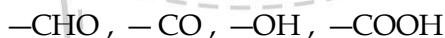
Q1. a) Write the number of covalent bonds in the molecule of ethane.

b) List two reasons why carbon forms large number of compounds and are poor conductors of electricity?

Q2. Explain with the help of chemical equation, what happens when sodium hydrogen carbonate reacts with ethanoic acid.

Q3. What is meant by denatured alcohol? What is the need to denature alcohol?

Q4. Name the groups of compounds with the following functional groups



Q5. Give one example each for the following reactions:

- a. Dehydration of Ethanol
- b. Oxidation of alcohols
- c. Combustion
- d. Saponification
- e. Esterification

Q6. Complete and balance the following reactions:



Hot conc. H_2SO_4



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Q7. Show the bond formation in;

- (i) Nitrogen gas
- (ii) Methane
- (iii) Ethanol

Q8. Under what conditions can saturated hydrocarbons produce a sooty flame? Explain.

Q9. Draw the possible structural isomers for hexane. Also write their IUPAC names.

Q10. Write the name and formula of the 2nd member of homologous series having general formula C_nH_{2n}

Q11. With the help of an example, explain the process of hydrogenation. Mention the essential conditions for the reaction and state the change in physical property with the formation of product.

Q12. Both soap and detergent are some type of salts . What is the difference between them ? Describe in brief the cleansing action of soap .Why do soaps not form lather in hard water ? List two problems that arise due to the use of detergents instead of soaps .

Q13. Explain why carbon forms compounds mainly by covalent bond. Why does carbon form strong bonds with other elements?

Q14. An organic compound 'X' is an essential constituent of wine and beer. 'X' is responsible for intoxication caused by these drinks. Oxidation of 'X' yields an organic acid 'Y' which is present in vinegar. Name the compounds 'X' and 'Y' and write their formulae.

15. a) Why are most carbon compounds poor conductors of electricity ?

b) Write the name and structure of a saturated compound in which carbon atoms are arranged in a ring . Give the number of single bonds present in this compound

MCQ

Q1. While cooking, if the bottom of the vessel is getting blackened on the outside, it means that:

- a) The food is not cooked completely
- b) The fuel is not burning completely
- c) The fuel is wet
- d) The fuel is burning completely

Q2. Cation is formed when:

- a) Atom gains electrons

- b) Atom loses electrons
- c) Proton is lost by the atom
- d) Atom shares electrons

Q3. The I.U.P.A.C name of $\text{CH}_3\text{CH}_2\text{CH}=\text{CH}_2$ is?

- a) 3-Butene
- b) Prop-1-ene
- c) But-1-ene
- d) Butyne

Q4. Which of the following compounds of carbon does not consist of ions?

- a) CHCl_3
- b) CaCO_3
- c) NaHCO_3
- d) Ca_2C

Q5. The property of self-linkage among identical atoms to form long chain compounds is known as:

- a) Catenation
- b) Isomerisation
- c) Superposition
- d) Halogenation

Q6. Which of the following is the molecular formula of cyclobutane?

- a) C_4H_{10}
- b) C_4H_6
- c) C_4H_8
- d) C_4H_4

Q7. Which of the following statements about graphite and diamond is true?

- a) They have the same crystal structure
- b) They have the same degree of hardness
- c) They have the same electrical conductivity
- d) They can undergo the same chemical reactions

Q8. How many number of carbon atoms are joined in a spherical molecule of buckminsterfullerene?

- a) 30
- b) 60
- c) 90
- d) 120

Q9. Which of the followings is the major constituent of the liquefied petroleum gas?

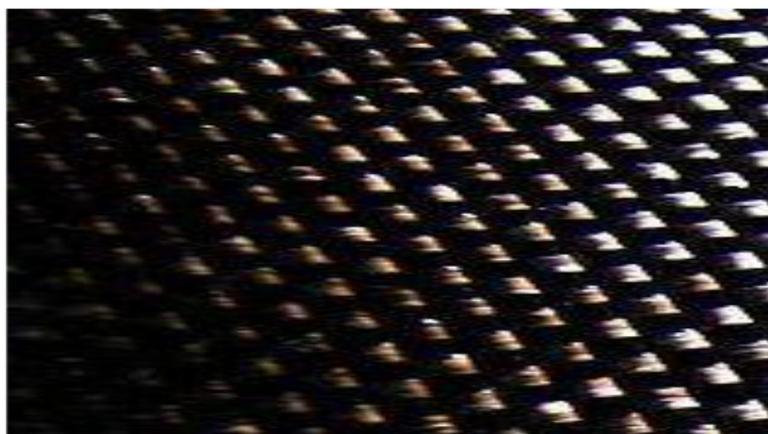
- a) Methane
- b) Ethane
- c) Propane
- d) Butane

Q10. The organic compounds having functional group are known as:

- a) Aldehyde
- b) Ketone
- c) Carboxylic acids
- d) Alcohol



A few facts about carbon fibre



Carbon fibre is a lightweight yet strong substance. Many things from sports equipment like golf clubs and tennis racquets to sports cars use carbon fibre. Carbon fibre is easily identifiable by its unique chequered appearance.

What is carbon fibre?

Carbon fibre is a material that is made from very thin fibres having carbon atoms. These are bonded together in microscopic crystals, aligned parallel to the long axis of the fibre. It is this crystal alignment that makes carbon fibre so strong. Carbon fibre is used to make composite materials with plastics resins. Carbon fibre has the strength of steel, yet is lightweight. It also does not expand when heated due to its high heat resistance. When stretched or bent, carbon fibre is very strong, but if you subject it to high shock or compression, such as hitting it with a hammer it will break. Carbon fibre has the best weight to strength ratio.

The first carbon fibres

You might be surprised to know that carbon fibre is by no means a recent discovery.

1. Thomas Edison used carbon fibre filaments in his early light bulb experiments back in 1879. He created these fibres by heating bamboo in a controlled environment. The carbon fibre Edison carbon made was from cellulose-based materials, today it is made from petroleum bases. The carbon fibres that Edison made out of the bamboo fires were fire resistant, making it ideal for his filament for incandescence.

The carbon fibres that Edison made out of the bamboo fires were fire resistant, making it ideal for his filament for incandescence.

2. Later in 1958 Roger Bacon would try to make carbon fibres from strands of rayon but these fibres were not very strong. It was only later in 1963 that the Royal Aircraft Establishment at Farnborough, Hampshire UK developed strong carbon fibre. Rolls Royce used this in their aeroplane engines.

3. Today carbon fibre is made from the polymer PAN. Once this polymer is produced it is stretched in a manner that it becomes parallel to the axis of the fibre. This polymer is then oxidised at a temperature of 200°C to 300°C to remove hydrogen and add oxygen to the molecule. The polymer is further purified by carbonisation, done by heating it to a temperature of 2500°C in a nitrogen rich environment. The result depends on the quality of the fibre and is a polymer having more than 90% carbon in it. The final step in the manufacture of carbon fibre is called sizing. Here the fibres are weaved into sheets and embedding in an epoxy resin. What you get in the end is the characteristic black carbon fibre sheet which you can use to make a variety of things.

Types of carbon fibre compounds and their uses

Carbon fibre compounds are very expensive compounds. Different types of carbon fibre compounds can be used for a variety of purposes.

For high temperature applications, carbon fibre reinforced graphite is ideal.

Carbon fibre can be used to filter high temperature gases as a corrosion resisting electrode with an anti-static component.

Carbon fibre compounds with metals are avoided as the combination forms metal carbides. The metals in these compounds eventually corrode. Today carbon fibre is even having applications in the field of medicine. Carbon fibres are used for skin grafts.

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Periodic classification of elements

(Notes)

At present 114 elements are known to us all these have different properties. To make the study of elements easy and systematic they have been classified based on their properties. Scientists made several attempts to classify elements to obtain an orderly arrangement out of chaos.

Early attempts at the classification of elements.

1 Döbereiner's Triads

In the year 1817, Johann Wolfgang Döbereiner, a German chemist, tried to arrange the elements with similar properties into groups. He identified some groups having three elements each. So he called these groups 'triads'.

Döbereiner showed that when the three elements in a triad were written in the order of increasing atomic masses; the atomic mass of the middle element was roughly the average of the atomic masses of the other two elements.

For example, take the triad consisting of lithium (Li), sodium (Na) and potassium (K) with the respective atomic masses 6.9, 23.0 and 39.0. What is the average of the atomic masses of Li and K? How does this compare with the atomic mass of Na? Given below (Table 5.1) are some groups of three elements. These elements are arranged downwards in order of increasing atomic masses. Can you find out which of these groups form Döbereiner triads?

| Group A | Atomic element | Group B | Atomic Element | Group C | Atomic elements |
|---------|-------------------|---------|-------------------|---------|--------------------|
| | mass | | mass | | mass |
| N | 14.0 | Ca | 40.1 | Cl | 35.5 |
| P | 31.0 | Sr | 87.6 | Br | 79.9 |
| As | 74.9 | Ba | 137.3 | I | 126.9 |

You will find that groups B and C form Döbereiner triads. Döbereiner could identify only three triads from the elements known at that time hence, this system of classification into triads was not found to be useful. As it could not be applied to all the elements known at that time.

Newlands' Law of Octaves

In 1866, John Newlands, an English scientist, arranged the then known elements in the order of increasing atomic masses. He started with the element having the lowest atomic mass (hydrogen) and ended at thorium which was the 56th element. He found that every eighth element had properties similar to that of the first. He compared this to the octaves found in music. Therefore, he

called it the 'Law of Octaves'. It is known as 'Newlands' Law of Octaves'. In Newlands' Octaves, the properties of lithium and sodium were found to be the same. Sodium is the eighth element after lithium. Similarly, beryllium and magnesium resemble each other.

| Sa (do) | re (re) | ga (mi) | Ma (fa) | pa (so) | da (la) | ni (ti) |
|------------|------------|------------|------------|------------|------------|------------|
| H | Li | Be | B | C | N | O |
| F | Na | Mg | Al | Si | P | S |
| Cl | K | Ca | Cr | Ti | Mn | Fe |
| Co and Ni | Cu | Zn | Y | In | As | Se |
| Br | Rb | Sr | Ce and La | Zr | — | — |

Limitations:

1. It was found that the Law of Octaves was applicable only up to calcium, as after calcium every eighth element did not possess properties similar to that of the first.
2. When more elements were discovered their properties did not fit into the law of octaves.
3. He placed some unlike elements like Co and Ni with F and Cl and Fe is placed separately.

MENDELÉEV'S PERIODIC TABLE

The main credit for classifying elements goes to Dmitri Ivanovich Mendeléev, a Russian chemist. He was the most important contributor to the early development of a Periodic Table of elements wherein the elements were arranged on the basis of their fundamental property, the atomic mass, and also on the similarity of chemical properties. Among chemical properties, Mendeléev concentrated on the compounds formed by elements with oxygen and hydrogen. He selected hydrogen and oxygen as they are very reactive and formed compounds with most elements. The formulae of the hydrides and oxides formed by an element were treated as one of the basic properties of an element for its classification.

On this basis, Mendeléev formulated a *Periodic Law, which states that 'the properties of elements are the periodic function of their atomic masses'*.

Mendeleev's Periodic Table contains vertical columns called 'groups' and horizontal rows called 'periods'.

| Group | I | II | III | IV | V | VI | VII | VIII | | | | | |
|------------------|------------------------|-----------------------|--|------------------------------------|--|------------------------------------|-------------------------------------|-----------------|--------------|--------------|---|---|-------------------|
| Oxide Hydride | R ₂ O RH | RO RH ₂ | R ₂ O ₃ RH ₃ | RO ₂ RH ₄ | R ₂ O ₅ RH ₃ | RO ₃ RH ₂ | R ₂ O ₇ RH | RO ₄ | | | | | |
| Periods | A ↓ | B | A | B | A | B | A | B | A | B | A | B | Transition series |
| 1 | H 1.008 | | | | | | | | | | | | |
| 2 | Li 6.939 | Be 9.012 | B 10.81 | C 12.011 | N 14.007 | O 15.999 | F 18.998 | | | | | | |
| 3 | Na 22.99 | Mg 24.31 | Al 29.98 | Si 28.09 | P 30.974 | S 32.06 | Cl 35.453 | | | | | | |
| 4 First series: | K 39.102 | Ca 40.08 | Sc 44.96 | Ti 47.90 | V 50.94 | Cr 50.20 | Mn 54.94 | Fe 55.85 | Co 58.93 | Ni 58.71 | | | |
| Second series: | Cu 63.54 | Zn 65.37 | Ga 69.72 | Ge 72.59 | As 74.92 | Se 78.96 | Br 79.909 | | | | | | |
| 5 First series: | Rb 85.47 | Sr 87.62 | Y 88.91 | Zr 91.22 | Nb 92.91 | Mo 95.94 | Tc 99 | Ru 101.07 | Rh 102.91 | Pd 106.4 | | | |
| Second series: | Ag 107.87 | Cd 112.40 | In 114.82 | Sn 118.69 | Sb 121.75 | Te 127.60 | I 126.90 | | | | | | |
| 6 First series: | Cs 132.90 | Ba 137.34 | La 138.91 | Hf 178.49 | Ta 180.95 | W 183.85 | | | | | | | |
| Second series: | Au 196.97 | Hg 200.59 | Tl 204.37 | Pb 207.19 | Bi 208.98 | | | Os 190.2 | Ir 192.2 | Pt 195.09 | | | |



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Achievements

1. Mendeléev left some gaps in his Periodic Table. Instead of looking upon these gaps as defects, Mendeléev boldly predicted the existence of some elements that had not been discovered at that time. Mendeléev named them by prefixing a Sanskrit numeral, *Eka* (one) to the name of preceding element in the same group. For instance, scandium, gallium and germanium, discovered later, have properties similar to *Eka*-boron, *Eka*-aluminium and *Eka*-silicon, respectively.
2. When Noble gases were discovered, they could be placed in a new group without disturbing the existing order.

Limitations:

1. He could not assign a correct position to hydrogen in his Table.
2. Isotopes of all elements posed a challenge to Mendeleev's Periodic Law
3. Another problem was that the atomic masses do not increase in a regular manner in going from one element to the next. So it was not possible to predict how many elements could be discovered between two elements – especially when we consider the heavier elements.

THE MODERN PERIODIC TABLE

In 1913, Henry Moseley showed that the atomic number of an element is a more fundamental property than its atomic mass . Accordingly, Mendeléev's Periodic Law was modified and atomic number was adopted as the basis of Modern Periodic Table and the Modern Periodic Law can be stated as 'Properties of elements are a periodic function of their atomic number.'

Let us recall that the atomic number gives us the number of protons in the nucleus of an atom and this number increases by one in going from one element to the next.

Elements, when arranged in order of increasing atomic number Z, lead us to the classification known as the Modern Periodic Table .Prediction of properties of elements could be made with more precision when elements were arranged on the basis of increasing atomic number.

1. There are 18 vertical columns called Groups.

- First group is called Alkali metals.
- Second group is called Alkaline earth metals.
- 17 group is of Halogens.
- 18 group is of Noble metals.

2. There are 7 horizontal rows of elements called periods.

GROUP NUMBER

| | | |
|--------------------------------|--------------------------------|----------|
| 1 | H Hydrogen 1.0 | 2 |
| 3 | 4 | |
| Li Lithium 6.9 | Be Beryllium 9.0 | |
| 11 | 12 | |
| Na Sodium 23.0 | Mg Magnesium 24.3 | |
| 19 | 20 | |
| K Potassium 39.1 | Ca Calcium 40.1 | |
| 37 | 38 | |
| Rb Rubidium 85.5 | Sr Strontium 87.6 | |
| 55 | 56 | |
| Cs Cesium 132.9 | Ba Barium 137.3 | |
| 87 | 88 | |
| Fr Francium (223) | Ac* Radium (226) | |

GROUP NUMBER

| | | | | | | | | | |
|----------------------------------|--------------------------------|----------------------------------|---------------------------------|---------------------------------|---------------------------------|-------------------------------|---------------------------------|------------------------------|-------------------------------|
| 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Sc Scandium 45.0 | Ti Titanium 47.8 | V Vanadium 50.9 | Cr Chromium 52.0 | Mn Manganese 54.9 | Fe Iron 55.9 | Co Cobalt 58.9 | Ni Nickel 58.7 | Cu Copper 63.5 | Zn Zinc 65.4 |
| 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 |
| Y Yttrium 88.9 | Zr Zirconium 91.2 | Nb Niobium 92.9 | Mo Molybdenum 95.9 | Tc Technetium (99) | Ru Ruthenium 101.1 | Rh Rhodium 102.3 | Pd Palladium 106.4 | Ag Silver 107.9 | Cd Cadmium 112.4 |
| 57 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 |
| La* Lanthanum 138.9 | Hf Hafnium 178.5 | Ta Tantalum 181.0 | W Tungsten 183.9 | Re Rhenium 186.2 | Os Osmium 190.2 | Ir Iridium 192.2 | Pt Platinum 195.1 | Au Gold 197.0 | Hg Mercury 200.6 |
| 89 | 104 | 105 | 106 | 107 | 108 | 109 | 110 | 111 | 112 |
| Fr Francium (223) | Ra Radium (226) | Ac** Actinium (227) | Rf | Db | Sg | Bh | Hs | Mt | Ds |

GROUP NUMBER

| | | | | | |
|--------------------------------|--------------------------------|--------------------------------|---------------------------------|--------------------------------|-----------------------------|
| 13 | 14 | 15 | 16 | 17 | 18 |
| B Boron 10.8 | C Carbon 12.0 | N Nitrogen 14.0 | O Oxygen 16.0 | F Fluorine 19.0 | Ne Neon 20.2 |
| Al Aluminum 27.0 | Si Silicon 28.1 | P Phosphorus 31.0 | S Sulfur 32.1 | Cl Chlorine 35.5 | Ar Argon 39.9 |
| Ge Germanium 74.9 | As Arsenic 75.0 | Se Selenium 79.0 | Br Bromine 79.9 | Kr Krypton 83.8 | Xe Xenon 131.3 |
| In Indium 114.8 | Tl Thallium 118.7 | Sn Antimony 121.8 | Te Tellurium 122.6 | I Iodine 126.9 | Rn Radon (222) |
| Pb Lead 207.2 | Bi Bismuth 209.0 | Po Polonium (210) | At Astatine (210) | At Assaying (210) | |
| Uuh | Uuq | Uub | Uuh | Uuh | |

| | | | | | | | | | | | | | |
|-------------------------------|------------------------------------|---------------------------------|----------------------------------|---------------------------------|---------------------------------|----------------------------------|---------------------------------|-----------------------------------|-----------------------------------|-------------------------------|-----------------------------------|---------------------------------|----------------------------------|
| 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 |
| Ce Cerium 140.1 | Pr Praseodymium 140.9 | Nd Neodymium 144.2 | Pm Promethium (145) | Sm Samarium 150.4 | Eu Europium 152.0 | Gd Gadolinium 157.3 | Tb Terbium 158.9 | Dy Dysprosium 162.5 | Ho Holmium 164.9 | Er Erbium 167.3 | Tm Thulium 168.9 | Yb Ytterbium 173.0 | Lu Lutetium 175.5 |
| 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 | 101 | 102 | 103 |
| Th Thorium 232.0 | Pa Protactinium (231) | U Uranium (238.1) | Np Neptunium (237) | Pu Plutonium (242) | Am Americium (243) | Cm Curium (247) | Bk Berkelium (245) | Cf Californium (251) | Es Einsteinium (254) | Fm Fermium (253) | Md Mendelevium (256) | No Nobelium (254) | Lr Lawrencium (257) |

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Trends in the modern periodic table

Valency : The valency of an element is determined by the number of valence electrons present in the outermost shell of its atom.

As we move in a period the valency first increases from 1 to 4 and then decreases from 4 to 1.

As we go down the group valency remains the same as no. of valence electrons remain same.

Atomic size: The term atomic size refers to the radius of an atom. The atomic size may be visualised as the distance between the centre of the nucleus and the outermost shell of an isolated atom.

The atomic radius decreases in moving from left to right along a period. This is due to an increase in nuclear charge which tends to pull the electrons closer to the nucleus and reduces the size of the atom.

The atomic size increases down the group. This is because new shells are being added as we go down the group. This increases the distance between the outermost electrons and the nucleus so that the atomic size increases in spite of the increase in nuclear charge.

Metallic and Non-metallic Properties

Metals tend to lose electrons while forming bonds, that is, they are in electropositive in nature.

The effective nuclear charge acting on the valence shell electrons increases across a period, the tendency to lose electrons will decrease. Down the group, the effective nuclear charge experienced by valence electrons is decreasing because the outermost electrons are farther away from the nucleus. Therefore, these can be lost easily. Hence metallic character decreases across a period and increases down a group.

Non-metals, on the other hand, are electronegative. They tend to form bonds by gaining electrons.

These trends also help us to predict the nature of oxides formed by the elements because it is known to you that the oxides of metals are basic and that of non-metals are acidic in general.

Periodic classification of elements

(C.W. ASSIGNMENT)

Q1. The reactivity of non-metals _____ down the group.

Q2. Non-metallic character _____ from left to right in a period.

Q3. Size of Na^+ is _____ than Na atom.

Q4. Atomic size _____ from left to right in a period.

Q5. Group 2 elements are known as _____.

Q6. Which one of the metals has highest metallic character?

Q7. Group 17 elements are called _____.

Q8. Group 18 elements are _____ valent.

Q9. Name two elements whose valences are equal to their group number.

Q10. An element belongs to 2nd period and group 14. Is it a metal or a non-metal? Why?

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(C.WAssignment)

Q1. What are periods and groups?

Q2. State modern periodic law.

Q3. Name the first and last member of the third period

Q4. Name the following

- The sum of the number protons and neutrons in the atoms.
- Most electro negative element.
- Most electro positive element.

Q5. Given below is a list of elements that form the periodic table:

S, Al, C, Ar, Mg, F, O and B

Choose from the above list,

- the most metallic element
- the most electronegative element
- elements of period 3 of the periodic table
- elements of group 16 of the periodic table

An element has atomic no 17. Predict its

- Valency
- Group number
- Whether it is a metal or non-metal
- Nature of the oxide found

e) Name of the element

Two elements with symbol X (atomic no. 11) and Y (atomic no. 13) are placed in the III period of the modern periodic table -

(i) Which amongst the two has more metallic character?

(ii) Calculate the valency of each element.

(iii) Element Y' is smaller than X' in terms of atomic size. Is the Statement true, justify?

a) What happens to the size of the atom down the group.

b) Classify the following elements as metal, non-metal and metalloid :

(i) Calcium

(ii) Sulphur

c) Explain how the tendency to form electropositive ions change on moving down a group ?

Q9. In the table given below some of the elements are placed in their correct positions and others are represented by hypothetical letters.

| 1 | 2 | 13 | 14 | 15 | 16 | 17 | 18 |
|----|---|----|----|----|---------|----|-------|
| Li | A | B | | C | D | E | F |
| I | | | G | | Sulphur | L | argon |
| J | | | H | | | M | |
| K | | | | | | N | |

a) Which of these has smallest radius?

b) Which of these has electronic configuration (2, 8, 4)?

c) What is the electronic arrangement of J?

d) Name the family of the elements represented by E, L, M, and N.

e) Which of these is an alkaline earth metal?

Q10. Two elements 'P' and 'Q' belong to the same period of the modern periodic table and are in Group-1 and Group - 2, respectively . Compare their following characteristics in tabular form

(a) The number of electrons in their atoms.

(b) The sizes of their atoms.

(c) Their metallic characters.

(d) The formula of their oxides.

(e) The formula of their chlorides.

Q11. The elements Be , Mg and Ca each having two electrons in their outermost shells are in period 2,3 and 4 respectively of the modern periodic table . Answer the following questions , giving justification in each case :

(1) Write the groups to which these elements belong .

(2) Name the least reactive element .

(3) Name the element having largest atomic radius .

Q12 . Taking the example of an element of atomic number 16 , explain how the electronic configuration of the atom of an element relates to its position in the periodic table and how valency of an element is calculated on the basis of atomic number .

Q13. a) The modern periodic table has been evolved through the early attempts of Dobereiner , Newland and Mendeleev's . List one advantage and one limitation of all the three attempts .

a) Name the scientist who first of all showed that atomic number of an element is a more fundamental property than its atomic mass .

Q14. What is periodicity in properties of elements with reference to the Modern Periodic Table ?

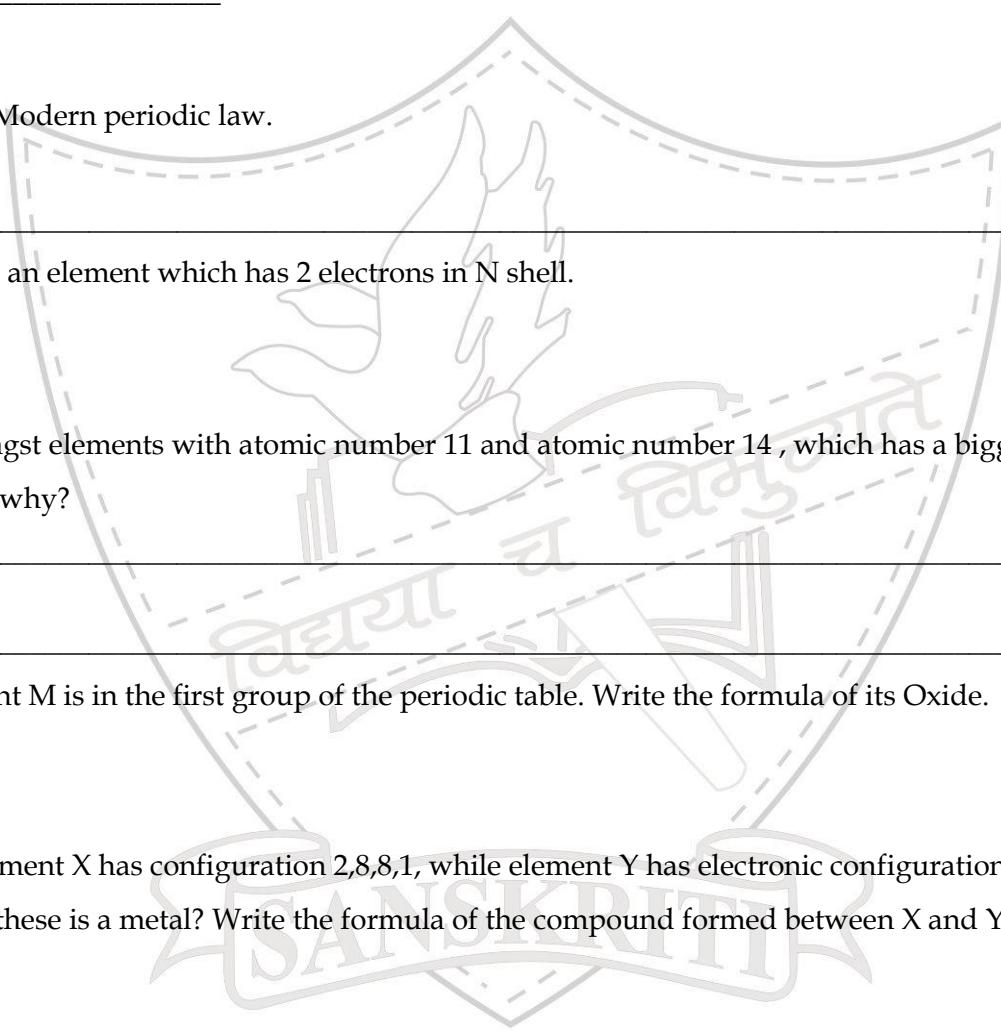
Why do elements of the same group have similar properties ? How does the tendency of elements to gain electrons change as we move from left to right in a period ? State the reason of this change ?

ASSIGNMENT

Q1. While classifying the elements Mendeleev was guided by two factors. What were these two factors?

Q2. Name three elements for which Mendeleev left gap in his periodic table.

Q3. State Modern periodic law.

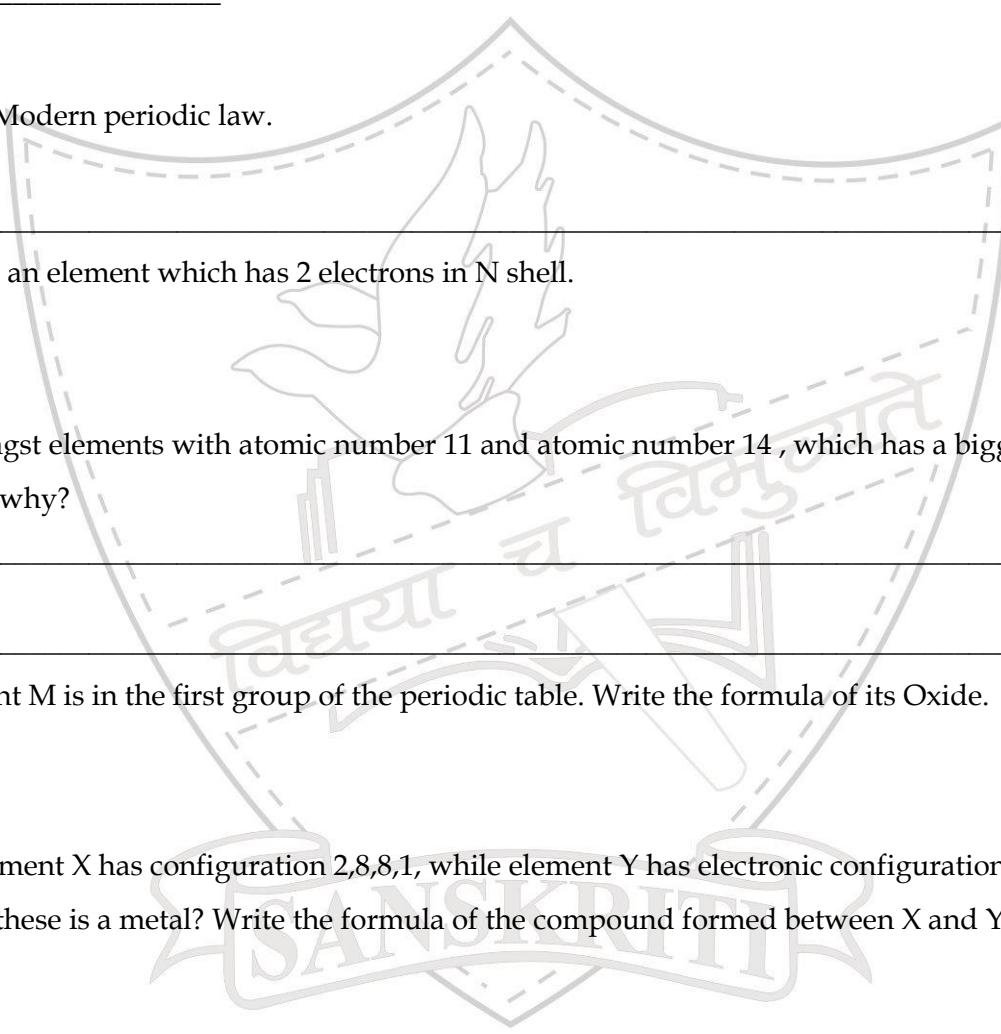


Q4. Name an element which has 2 electrons in N shell.

Q5. Amongst elements with atomic number 11 and atomic number 14 , which has a bigger size atom and why?

Q6. Element M is in the first group of the periodic table. Write the formula of its Oxide.

Q7. An element X has configuration 2,8,8,1, while element Y has electronic configuration 2,8,7. Which of these is a metal? Write the formula of the compound formed between X and Y.



Q8. Why does Lithium, Sodium and Potassium show resemblance on the basis of Dobereiner's law of triads?

Q9. What are the names of group 2 elements?

Q10. The formula of a compound is M_2O_3 . Predict the valency of element M.

Q11. What does the word period signify in the periodic table?

Q12. An element X readily accepts an electron from another element Y. Predict the nature of the element X.

Q13. What do you understand by periodicity in properties?

Q14.

What is the reason of placing Ar before K in the Mendeleev's periodic table?

MCQ

1. How many periods and groups are present in the periodic table?

- a) 7 periods and 18 groups
- b) 8 periods and 7 groups
- c) 7 periods and 7 groups
- d) 8 periods and 8 groups

2. Which of the following forms the basis of the modern periodic table?

- a) Atomic mass
- b) Atomic number
- c) Number of nucleons
- d) All of these

3. What happens to the electropositive character of elements on moving from left to right in a periodic table?

- a) Increase
- b) Decreases
- c) First increases than decreases
- d) First decreases than increases

4. The electronic configuration of an element M is 2, 8, 4. In modern periodic table, the element M is placed in

- a) 4th group
- b) 2nd group
- c) 14th group
- d) 18th group

5. Which of the following is the correct order of the atomic radii of the elements oxygen, fluorine and nitrogen?

- a) O < F < N
- b) N < F < O
- c) O < N < F
- d) F < O < N

6. What is the other name for group 18th elements?

- a) Noble gases
- b) Alkali metals
- c) Alkali earth metals
- d) Halogens

7. Which of the following is the most reactive element of the group 17?

- a) Oxygen
- b) Sodium

- c) Fluorine
- d) Magnesium

8. Element X forms a chloride with the formula XCl_2 , which is a solid with a high melting point. X would most likely be in the same group of the Periodic Table as

- a) Na
- b) Mg
- c) Al
- d) Si

9. Which group elements are called transition metals?

- a) Group number 1 to 2
- b) Group number 13 to 18
- c) Group number 3 to 12
- d) Group number 1 to 8

10. Which of the following elements has 2 shells and both are completely filled?

- a) Helium
- b) Neon
- c) Calcium
- d) Boron

Chapter 14

Sources of energy (conventional sources)

Q1. Firewood is our conventional fuel. List any four reasons for replacing it by the alternate sources of energy.

Q2. Name the process for obtaining charcoal from wood. What are the advantages and disadvantages of burning charcoal over wood?

Q3. Why fossil fuels are called non-renewable sources of energy

Q4. Distinguish between renewable and non-renewable sources of energy.

Q5. What steps would you suggest to minimise environmental pollution caused by burning of fossil fuels?

Q6. Explain how a thermal power plant produces electricity.

Q7. Mention advantages and disadvantages of producing hydroelectricity by building dams on river.

Q8. What is biomass? Explain the principle and working of a biogas plant using a labelled schematic diagram.

Q9. Give the limitations of wind energy.

Q10. Name the different constituents of bio gas. Why is biogas a better fuel than animal dung cakes?

QUESTION BANK

- Q1.** Explain Thermal Decomposition and Photolytic decomposition reactions with example.
- Q2.** Identify the substance oxidized and substance reduced in the following reactions-
- 1) $\text{ZnO} + \text{C} \rightarrow \text{Zn} + \text{CO}$
 - 2) $\text{MnO}_2(\text{s}) + 4\text{HCl}(\text{aq}) \rightarrow \text{MnCl}_2(\text{s}) + 2\text{H}_2\text{O}(\text{l}) + \text{Cl}_2(\text{g})$
 - 3) $\text{Cu}(\text{s}) + 2\text{AgNO}_3(\text{aq}) \rightarrow \text{Cu}(\text{NO}_3)_2(\text{aq}) + 2\text{Ag}(\text{s})$
- Q3.** Balance the following equations :-
- i) $\text{Al} + \text{HCl} \rightarrow \text{AlCl}_3 + \text{H}_2$
 - ii) $\text{KMnO}_4 \rightarrow \text{K}_2\text{MnO}_4 + \text{MnO}_2 + \text{O}_2$
- Q4.**
 - a) Define a combination reaction.
 - b) Give one example of a combination reaction which is also an endothermic reaction.
 - c) Give one example of a combination reaction which is also an exothermic reaction.
- Q5.** What types of reactions are represented by the following equations :-
- 1) $\text{A} + \text{B}_2 \rightarrow \text{A}_2 + \text{B}$
 - 2) $\text{A} + \text{BC} \rightarrow \text{AC} + \text{B}$
 - 3) $\text{A} \rightarrow \text{B} + \text{C}$
 - 4) $\text{A} + \text{B} \rightarrow \text{AB}$
 - 5) $\text{AB} + \text{CD} \rightarrow \text{AD} + \text{CB}$
- Q6.** When the solutions of lead (II) nitrate and potassium iodide are mixed, what type of reaction occurs? Write balanced equation for this reaction.
- Q7.** Give an example of decomposition reaction carried out with the help of electricity.
- Q8.** Name the products obtained on strong heating of lead nitrate. Write chemical equation for the reaction. What type of chemical reaction occurs in the change?
- Q9.** Which of the following reactions are possible and why?
- i) $\text{Cu}(\text{s}) + 2\text{AgNO}_3(\text{aq}) \rightarrow \text{Cu}(\text{NO}_3)_2(\text{aq}) + 2\text{Ag}(\text{s})$
 - ii) $\text{Cu}(\text{s}) + \text{ZnSO}_4(\text{aq}) \rightarrow \text{Zn}(\text{s}) + \text{CuSO}_4(\text{aq})$
- Q10.** What is corrosion? List two methods which can prevent the corrosion of metals.
- Q11.** What is an acid base indicator? Give two examples of synthetic acid base indicators.
- Q12.** What is an indicator? Name three common indicators and their effect on acids and bases.

Q13. How is plaster of Paris obtained from gypsum? Give chemical reaction.

Plaster of Paris should be stored in moisture proof container. Explain why.

Q14. What happens when electricity is passed through brine? Give reaction.

Q15. Sweet tooth may lead to tooth decay. Explain why? What is the role of tooth paste in preventing cavities?

Q16. A compound 'X' of sodium is used to in kitchen for making crispy pakoras. It is also used for curing acidity in the stomach. Identify 'X'. What is its chemical formula? State the reactions that take place when it is heated on cooking.

Q17. There are some substances which give different odour in different medium.

a) What is the name given to such substances?

b) Give an example of such substance.

Q18. Why is plaster of Paris written as $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$? How is it possible to have half a molecule of water attached to CaSO_4 .

Q19. Black colour of copper oxide changes to bluish green if reacted with dilute hydrochloric acid .why?

Q20. A white powder is used for decolorizing wood pulp in paper industry.

a) Give its chemical name and formula.

b) Give the chemical equation to show its preparation

Q21 .Write the chemical equation for the reaction of hot aluminium with steam.

Q22. Holes are observed in zinc plate immersed in copper sulphate solution. Explain why?

Q23. State two properties of carbon which are not expected from its classification as Non-metal.

Q24. What happens when basic oxides like Na_2O or K_2O is dissolved in water? Write the balanced chemical reactions.

Q25. What do you understand by thermite reaction?

Q26. Which is more metallic Sodium or Aluminium? Why?

Q27. Give reasons for the following:

- 1) Hydrogen is not metal but it has been assigned a place in the activity series of Metals.
- 2) Aluminium is found in combined state whereas gold is found free in nature.
- 3) An alloy solder is used for soldering wires.
- 4) Electric wires are coated with polyvinyl chloride.

Q28. A metal is found in nature as its carbonate ore. It is used in galvanization of iron articles.

Identify the metal M and name its ore, MCO_3 . How will you convert this carbonate ore into free metal? Explain with equations.

Q29. Out of copper and iron, which one is more reactive? How can you justify it?

Q30. Silver metal does not combine with oxygen easily but silver jewellery tarnishes after some time. Why?

Q31. What happens when limestone reacts with dil. HCl.

Q32. Name two synthetic indicators which are used to test acids and bases.

Q33. What are strong acids? Give two examples.

Q34. What happens when HCl reacts with ammonium hydroxide? Give chemical equation for the reaction.

Q35. Do alkalis also react with metals? Give any two examples.

Q36. Which acid and base can be used to prepare sodium bicarbonate and sodium hydrogen sulphate?

Q37. On eating spicy food we feel burning sensation in our stomach, why? Which medicine will you take as a remedy?

Q38. When concentrated acid is diluted does the pH get higher or lower? Give reason.

Q39. How are acids and bases similar?

Q40. Name one chemical used to remove permanent hardness of water.

Q41. What is the role of tartaric acid in baking powder?

Q42. How is plaster of Paris obtained? Give a chemical equation.

Q43. What happens when electricity is passed through an aqueous solution of sodium chloride?

Q44. Why blue vitriol lose its colour on heating? Write the reaction.

Q45. The molecular formula C_3H_6O can represent an aldehyde as well as ketone. Write their structures and name them.

Q46. List two tests for experimentally distinguishing between an alcohol and a carboxylic acid .

Q47. What is a functional group in a carbon compound? Write the formulation for the functional groups of alcohols and carboxylic acids.

Q48. Saturated hydrocarbons take part in substitution reactions while unsaturated hydrocarbons in addition reactions. Explain.

Q49. Give reasons for the following observations:

- Air holes of a gas burner have to be adjusted when the heated vessels get blackened by the flame.
- Use of synthetic detergents causes pollution of water.
- Soaps are ineffective in hard water.

Q50. An organic compound 'A' which is sometimes used as an antifreeze and has the molecular formula C_2H_6O . Upon reaction with alkaline $KMnO_4$, the compound 'A' is oxidized to another compound 'B' with formula $C_2H_4O_2$. Identify the compounds 'A' and 'B'. Write the chemical equation for the reaction which leads to the formation of 'B'.

Q51. Two carbon compounds A and B have the molecular formula C_3H_8 and C_3H_6 respectively. Which one of the two is more likely to show addition reaction? Justify your answer. Explain with the help of chemical reaction. How an addition reaction is useful in vegetable ghee industry?

Q52. An organic compound 'A' is widely used as a preservative in pickles and has molecular formula $C_2H_4O_2$. This compound reacts with ethanol to form a sweet smelling compound 'B'.

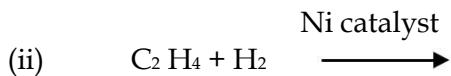
- Identify the compound 'A'.
- Write the chemical equation for its reaction with ethanol to form compound 'B'.
- How can we get compound 'A' back from 'B'.
- Name the process and write the corresponding chemical equation.
- Which gas is produced when compound 'A' reacts with washing soda? Write the chemical equation.

Q53. Define soap. With the help of well-labeled diagram of micelle, explain the cleansing action of soap

Q54. State how would you distinguish between Acetic acid and Ethanol in your laboratory. Give chemical equation of the reactions shown by them. Write the chemical equations involved.

Q55. Complete the reaction(s) given below and classify them as Combustion / Oxidation / Addition / Substitution reaction.





Q.56 Draw the electron dot structure of the gas molecule which is liberated when zinc metal is treated with aqueous NaOH solution.

Q57. What do you understand by periodicity? Are the properties of elements placed in a group the same? Illustrate.

Q58. Why atomic number is more important than atomic weight in determining chemical properties?

Q59. How does electronic configuration of an atom relate to its position in the modern periodic table?

Q60. Explain the variation in atomic size in a group and a period in the periodic table, Giving examples.

Q61. What will happen to electron releasing tendency of the elements in a group?

Q62. Why could no fixed position be given to hydrogen in Mendeleev's periodic table.

Q63. Explain why sodium is an active metal while neon is inert?

Q64. What physical and chemical properties were used by Mendeleev in creating his periodic table? List two observations which posed a challenge to Mendeleev's periodic law.

Q65. What is meant by group in a periodic table? Within a group where would you find a element with (a) most metallic character (b) the largest atomic size? Q66. How does the tendency to gain electron change on moving left to right in a period of the periodic table.

Q67. How does the tendency to lose electron change on moving left to right in a period of the periodic table.

Q68. How does the nature of oxide change on moving left to right in a period of the periodic table.

Assertion- Reasoning Questions

Assertion (A) : Iron articles get coated with reddish brown powder when left for sometime in the open.

Reason(R) : Iron is attacked by substances around it such as moisture , acids, etc.

- A. Both A and R are true and R is correct explanation of A.
- B. Both A and R are true and R is not the correct explanation of A .
- C. A is true but R is false
- D. A is false but R is true

Assertion (A) : Fat/ Oil containing food substances become rancid and their smell and taste changes

Reason(R) : We keep such food in airtight containers .

- A. Both A and R are true and R is correct explanation of A.
- B. Both A and R are true and R is not the correct explanation of A .
- C. A is true but R is false
- D. A is false but R is true

Assertion (A) : White silver chloride turns grey in sunlight .

Reason(R) : Copper reacts with zinc sulphate to form copper sulphate and zinc is deposited

- A. Both A and R are true and R is correct explanation of A.
- B. Both A and R are true and R is not the correct explanation of A .
- C. A is true but R is false
- D. A is false but R is true

Assertion (A) : A complete chemical equation represents the reactants and products and their physical states symbolically .

Reason(R) : In a combination reaction, two or more substances combine to form a new single substance .

- A. Both A and R are true and R is correct explanation of A.
- B. Both A and R are true and R is not the correct explanation of A .
- C. A is true but R is false
- D. A is false but R is true

Assertion (A) : Antacids are used to get rid of pain caused by indigestion .

Reason(R) : Antacids neutralise the excess acid produced in the stomach.

- A. Both A and R are true and R is correct explanation of A.
- B. Both A and R are true and R is not the correct explanation of A .
- C. A is true but R is false
- D. A is false but R is true

Assertion (A) : Tooth decay starts when the pH of the mouth is lower than 5.5

Reason(R) : Bee- sting leaves an acid which causes pain and irritation

- A. Both A and R are true and R is correct explanation of A.
- B. Both A and R are true and R is not the correct explanation of A .
- C. A is true but R is false
- D. A is false but R is true

Q7.Assertion (A) : Soap gives a red colour with blue litmus solution

Reason(R) : Hydrogen gas is not formed when sodium metal reacts with ethyl alcohol

- A. Both A and R are true and R is correct explanation of A.
- B. Both A and R are true and R is not the correct explanation of A .
- C. A is true but R is false
- D. A is false but R is true

Q8.Assertion (A) : Atomic radius decreases in moving from left to right in the periodic table

Reason(R) : As we move from L.H.S to R.H.S, the nuclear charge increases which tends to pull the electrons closer to the nucleus.

- A. Both A and R are true and R is correct explanation of A.
- B. Both A and R are true and R is not the correct explanation of A .
- C. A is true but R is false
- D. A is false but R is true

Q9.Assertion (A) : Acetic acid is also called glacial acetic acid.

Reason(R) : Acetic acid often freezes during winters as its freezing point is 290 K

- A. Both A and R are true and R is correct explanation of A.
- B. Both A and R are true and R is not the correct explanation of A .
- C. A is true but R is false
- D. A is false but R is true

Q10.Assertion (A) : The electrical conductivity and melting point of an alloy is less than that of pure metals.

Reason(R) : Galvanisation is a method of protecting steel and iron from rusting

- A. Both A and R are true and R is correct explanation of A.
- B. Both A and R are true and R is not the correct explanation of A .
- C. A is true but R is false
- D. A is false but R is true

MUTIPLE CHOICE QUESTIONS FOR COMPETITIVE EXAMS

Q1. A solution of a substance in water is denoted by-

- 1) (l) 2) (s) 3) (aq) 4) (w)

Q2. $x \text{ Cl}_2 (\text{g}) + y \text{KI} (\text{aq}) \rightarrow z \text{KCl} (\text{aq}) + \text{I}_2 (\text{s})$ What are x, y and z respectively?

- 1) 1, 2, 3 2) 1,2,1 3) 1,2,2 4) 1,1,2

Q3. $2 \text{ HCl} + \text{Zn} \rightarrow \text{ZnCl}_2 + \text{H}_2$ is an example of ----- reaction.

- 1) Oxidation 2) Reduction 3) Combination 4) Displacement

Q4. Which of the following metals do not corrode in moist air?

- 1) Copper 2) Iron 3) Gold 4) Silver

Q5. The removal of oxygen from a substance is called

- 1) oxidation
2) Corrosion
3) reduction
4) rancidity

Q6. What happens when dilute hydrochloric acid is added to iron fillings?

- 1) Hydrogen gas and iron chloride is produced.
2) Chlorine gas and iron hydroxide are produced.
3) No reaction takes place.
4) Iron salt and water are produced.

Q7. Oxidation of fatty substances in food is prevented by

- 1) Galvanisation
2) Electroplating
3) Antioxidants
4) Oxidation

Q8. An iron nail is kept immersed in a solution of copper sulphate for three hours. When it was taken out of the copper sulphate solution, it was found to acquire a brown colour. This brown colour is

1. due to the rusting of the iron nail.

2. oxidation of iron due to iron oxide.
3. due to deposition of copper metal on iron nail.
4. due to conversion of iron to iron sulphate.

Q9 $\text{Fe}_2\text{O}_3(\text{s}) + 2\text{Al}(\text{s}) \rightarrow 2\text{Fe}(\text{s}) + \text{Al}_2\text{O}_3(\text{s})$. This reaction is an example of

- 1) combination reaction
- 2) double decomposition reaction
- 3) decomposition reaction
- 4) displacement reaction

Q10 $\text{Mg}(\text{s}) + \text{CuO}(\text{s}) \rightarrow \text{MgO}(\text{s}) + \text{Cu}(\text{s})$

The equation represents

- 1) Decomposition reaction as well as displacement reaction.
- 2) Redox reaction as well as displacement reaction.
- 3) double displacement reaction as well as redox reaction
- 4) Combination reaction as well as double displacement reaction.

Q11. Which amongst the following can be used as an antacid?

- 1) Vinegar
- 2) Milk of magnesia
- 3) Calcium hydroxide
- 4) Sodium hydroxide

Q12. Tooth decay starts when the pH of the mouth is lower than

- 1) 10
- 2) 8
- 3) 7
- 4) 5.5

Q13. When a base is dissolved in water

- 1) Concentration of OH- ions per unit volume increases.
- 2) Concentration of OH- ions per unit volume decreases.
- 3) Concentration of OH- ions per unit volume may increase or decrease depending upon the nature of the base.
- 4) No change in concentration of OH- ions per unit volume occurs.

Q14. Wasp stings can be treated with

- 1) vinegar
- 2) clove oil
- 3) baking soda solution
- 4) Washing soda

Q15. The sting of ants and bees contains

- 1) formic acid
- 2) acetic acid
- 3) slaked lime
- 4) sodium hydroxide

Q16. The oxides of metals are

- 1) Neutral
- 2) basic
- 3) acidic
- 4) none of these.

Q17. Large deposits of sodium chloride in the form of brown crystals is called

- 1)salt petre
- 2)alum
- 3) soda
- 4) rock salt

Q18. The salt whose aqueous solution will turn blue litmus red

- a) Ammonium sulphate
- b) sodium acetate
- c) sodium chloride
- d) Potassium carbonate

Q19. Solutions A, B, C and D have pH 3, 4, 6 and 8. The solution with highest acidic strength is

- 1) A
- 2) B
- 3) C
- 4) D

Q20. Methyl orange is

- 1) Yellow in acidic medium and red in basic medium
- 2) Red in acidic medium and yellow in basic medium
- 3) Colourless in acidic medium and red in basic medium
- 4) Red in acidic medium and Colourless in basic medium

Q21. Which of the following metal forms amphoteric oxides?

- 1) Copper
- 2) Silver
- 3) Aluminium
- 4) Iron

Q22. Aqua regia is a mixture of

- 1) HNO_3 and HCl in the ratio of 1:3 by volume
- 2) HNO_3 and HCl in the ratio of 3:1 by volume
- 3) HNO_3 and HCl in the ratio of 1:1 by volume
- 4) H_2SO_4 and HCl in the ratio of 1:3 by volume

Q23. A basic oxide will be formed by the element

- 1) Aluminium
- 2) Sulphur
- 3) Krypton
- 4) Nitrogen

Q24. Which of the following metals is protected from oxygen and moisture by immersing in kerosene oil?

- 1) Potassium
- 2) Aluminium
- 3) Magnesium
- 4) silver

Q25. Which of the following metal will not displace H_2 gas from dilute H_2SO_4 ?

- 1) zinc
- 2) iron
- 3) copper
- 4) aluminium

Q26. Among the metals poorest conductor of heat is

- 1) Lead
- 2) Tin
- 3) Bismuth
- 4) Mercury

Q27. The common method for the extraction of metals from the oxide ore is

- 1) Reduction with carbon
- 2) Electrolytic method
- 3) Reduction with aluminium
- 4) All of these

Q28. The best conductor of electricity is

- 1) Copper

- 2) Aluminium
- 3) Silver
- 4) All are equal

Q29. Stainless steel in addition to iron contains

- 2) nickel and chromium
- 3) copper and tin
- 4) aluminium and magnesium
- 5) carbon and manganese

Q30. Which of the following oxide cannot be reduced with carbon to obtain metal?

- 1) MnO_2
- 2) Cr_2O_3
- 3) Al_2O_3
- 4) All of these

Q31. Detergents are sodium or potassium salts of long chain

- 1) Aldehydes
- 2) Ketones
- 3) Carboxylic acids
- 4) Sulphonic acids

Q32. Which of the following compounds have a triple bond?

- 1) C_2H_6
- 2) C_3H_8
- 3) C_3H_4
- 4) C_3H_6

Q33. The difference in the formula and molecular masses of CH_3OH and $\text{C}_2\text{H}_5\text{OH}$ is

- 1) CH_3 and 16u
- 2) CH_2 and 14u
- 3) CH_4 and 18u
- 4) CH_3 and 16u

Q34. The number of covalent bonds in C_4H_{10} is

- 1) 10
- 2) 8

- 3) 13
4) 12

Q35. Which of the following is added to denature ethanol?

- 1) Methanol
2) Pyridine
3) Copper sulphate
4) All of these

Q36. Ethene is produced when

- 1) Ethanol reacts with ethanoic acid in the presence of a few drops of conc. H_2SO_4
2) Ethanol is oxidized with acidified potassium dichromate
3) Ethanol is heated with excess of conc. H_2SO_4 at 443K
4) Ethanol reacts with Na metal

Q37. The difference between molecular mass of any two adjacent homologues is-----

- 1) 14 u 3) 16 u
2) 12 u 4) 3u

Q38. The general formula of alcohols is

- 1) $\text{C}_n\text{H}_{2n+2}$
2) $\text{C}_n\text{H}_{2n+1}\text{OH}$
3) C_nH_{2n}
4) $\text{C}_n\text{H}_{2n+2}\text{COOH}$

Q39. The allotrope of carbon containing 60 carbon atoms is

- 1) fullerene
2) graphite
3) diamond
4) coal

Q41. Which of the following decreases across the period?

- | | |
|------------------------------|-------------------|
| (1) Electronegativity | (2) Atomic radius |
| (3) Non – metallic character | (4) None of these |

Q42. The atomic radius decreases as we move across a period because

- 1) atomic mass increases

- 2) atomic number increases
- 3) effective nuclear charge increases
- 4) additive electrons are accommodated in the new electron level

Q43. Which of the following remain unchanged on moving down the group in a periodic table

- 1) Valance electrons
- 2) Atomic size
- 3) Density
- 4) Metallic nature

Q44. The two elements for which Mendeleev left blank places in his original periodic table were:

- (1) Si, Ti
- (2) Ga, Ge
- (3) Al, Ga
- (4) As, Sb

Q45. Which of the following is a metalloid?

- (1) Sulphur
- (2) Silicon
- (3) Sodium
- (4) Aluminium

Q46. _____ element has electronic configuration of 2, 8, 2.

- (1) Calcium
- (2) Beryllium
- (3) Strontium
- (4) Magnesium

Q47. Elements A, B and C form a Dobereiner's triad. If the atomic mass of A is 7 and that of C is 39. What is the atomic mass of the element B?

- 1) 23
- 2) 46
- 3) 32
- 4) 22

Q48. The noble gas having duplet electrons is

- (1) Helium
- (2) Neon
- (3) Argon
- (4) Xenon

Q49. Atomic number is a more fundamental property than atomic mass. This was emphasized by

- 1) Doberenier
- 2) Bohr
- 3) Moseley
- 4) Mendeleev

Academic Session : 2019 - 20
Preboard Examination
Subject - Science
Class - X
Set - 1

Time : 3Hrs.**MM-80****General Instructions:**

1. The question paper comprises three sections – A, B and C. Attempt all the sections.
2. All questions are compulsory.
3. Internal choice is given in each section.
4. All questions in Section A are one-mark questions comprising MCQ, VSA type and assertion-reason type questions. They are to be answered in one word or in one sentence.
5. All questions in Section B are three-mark, short-answer type questions. These are to be answered in about 50 - 60 words each.
6. All questions in Section C are five-mark, long-answer type questions. These are to be answered in about 80 – 90 words each.
7. This question paper consists of a total of 30 questions.

SECTION A

- | | | |
|----|--|---------|
| Q1 | Draw the structure of 2,2-dimethyl-butane. | 1 |
| Q2 | Arrange the following elements in decreasing atomic size- Carbon, oxygen, nitrogen | 1 |
| Q3 | Two students A and B have recorded following observations to verify Ohm's law. Based on the table below, answer the following questions. | 1+1+1+1 |

| Student | S. No. | Voltmeter reading (mV) | Ammeter reading (mA) |
|-----------|--------|------------------------|----------------------|
| Student A | 1. | 2 | 1 |
| | 2. | 4 | 2 |
| | 3. | 6 | 3 |
| Student B | 1. | 1 | 1 |
| | 2. | 2 | 1 |
| | 3. | 3 | 1.5 |

- I) Which student's measurement is wrong?
- II) What is the mathematical relation between voltage and current?
- III) The value of resistance from the measurement of student A is
- (a) 1 ohm
 - (b) 2 Ohm
 - (c) 3 Ohm
 - (d) 4 Ohm
- IV) Plot a graph between V and I for student A on your answer sheet.
(without using graph paper)

Q4 The Fig given below shows extent to which carbohydrates (—), proteins (.....) and fats (----) are digested as food passes through alimentary canal of human beings.

1+1+1+
1

The letters (**A to F**) represent successive parts of alimentary canal.

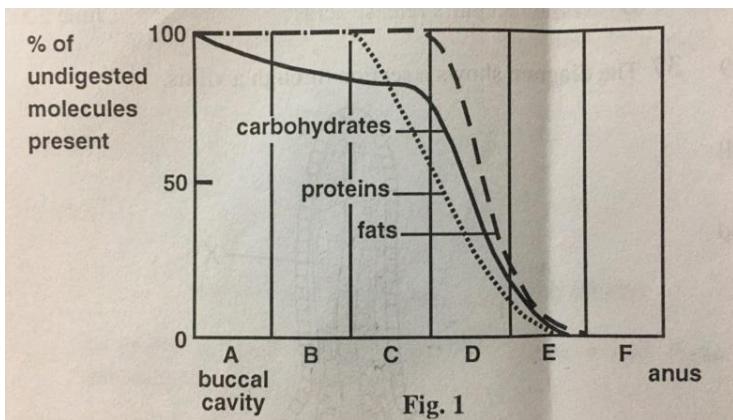


Fig. 1

Examine the Fig and answer the following questions :

4 (a) Name the parts C and D.

4 (b) What brings the start of digestion of carbohydrate molecule in part A of the alimentary canal?

4 (c) In which part of the alimentary canal (**A to F**) would lipase be present and on which part of food would it act?

4 (d) What is the function of part E of alimentary canal

Q5 When we enter a dark room coming from outside during a sunny afternoon, immediately the things inside the room do not appear clear to our eyes, this is because

1

- a) Pupils do not open at all in the dark
- b) Pupils take time to adjust
- c) Light travels slower in a dark room
- d) Pupils open very quickly in the dark

OR

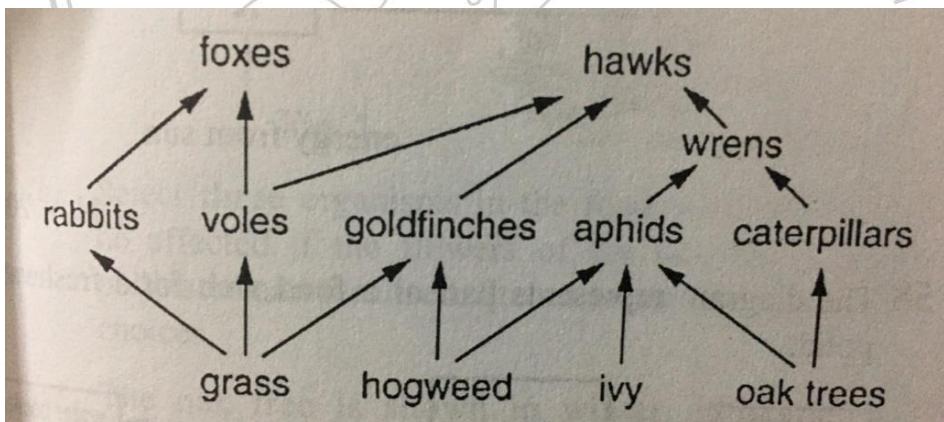
The Change in the focal length of the eye lens is caused by the action of

- a) Pupil

- b) Retina
 c) Ciliary muscles
 d) Iris
- Q6 Unit of power may also be expressed as 1
- a) Volt-ampere
 b) Kilowatt-hour
 c) Watt-second
 d) Joule-second

- Q7 The length of a wire is doubled by stretching, by what factor does the resistance change 1
- a) Becomes half of the original value
 b) Becomes twice of the original value
 c) Becomes four times of the original value
 d) unchanged

- Q8 A food web is shown 1



An insecticide is sprayed to kill caterpillars.

In which organism will the highest level of insecticide accumulate after a period of time?

- a) Foxes
 b) Hawks
 c) Voles
 d) Wrens

OR

Select the **INCORRECT** statement

- a) Sustainable development links economic development to environmental conservation
 b) Sustainable development is a long planned and persistent development

- c) Sustainable development does not consider readiness of stakeholders to alter their present use of resources
- d) Sustainable development encourages usage of resources by current generation and conservation for future generation

Q9 Which of the following compounds will not show addition reaction? 1

- a. Ethene
- b. Ethane
- c. Ethyne
- d. Acetylene

Q10 Which of the following displacement reaction will not occur- 1

- a. Copper and zinc sulphate
- b. Magnesium and iron sulphate
- c. Copper and silver chloride
- d. Iron and copper sulphate

Q11 Which combination will neutralise to form a neutral salt? 1

- a. Sodium hydroxide and carbonic acid
- b. Potassium hydroxide and carbonic acid
- c. Sodium hydroxide and hydrochloric acid
- d. Calcium hydroxide and hydrochloric acid

Q12 An element belongs to the third period and seventeenth group of the Modern periodic table. The element is- 1

- a. Fluorine
- b. Chlorine
- c. Sulphur
- d. Aluminium

Or

Elements belong to the same period if -

- a. They have the same number of valence electrons
- b. Their size decreases from left to right across the period
- c. The valency first increases and then decreases from left to right
- d. They have the same valency

Q13 For the 13 and 14, given below: 1

1. Both A and R are true and R is correct explanation of the assertion.
2. Both A and R are true but R is not the correct explanation of the assertion.
3. A is true but R is false
4. A is false but R is true.

Assertion- The following compounds belong to the same homologous series.

Ethanone, propanone, butanone

Reason: Compounds of the same homologous series have the same functional group and differ from each other by a -CH₂ unit.

2 statements are given- one labeled Assertion (A) and the other labeled Reason ®. Select the correct answer to the question from the codes

Q14 Assertion: Fuses are made up of materials having low melting point. 1
Reason: Fuses should be resistant to electric current.

Q15 a. Write two observations when barium chloride solution is added to sodium sulphate solution 3

b. Name the type of the reaction.

Write a balanced chemical equation to represent the above reaction.

SECTION B

Q16 Salt A commonly used to set fractured bones is obtained by heating compound B at 373K. If heated at a higher temperature, it forms compound C. 3

a. Identify A, B and C.

b. Write a balanced chemical equation for the formation of salt A.

c. What precaution must be taken to store compound A and why?

Or

Give reasons for the following statements-

a. While diluting an acid, acid must be added to water and not vice versa.

b. Tartaric acid is added to baking soda.

Both acetic acid and hydrochloric acid react with zinc to release hydrogen gas. Both acids react with sodium hydroxide also to form salt and water. However, they are still different to each other.

Q17 Two elements X and Y have atomic numbers 12 and 16 respectively. 3

a. To which period of the modern periodic table do these two elements belong?

b. What type of bond will be formed between them and why?

c. Also give the chemical formula of the compound formed.

Q18 How will you create an artificial aquatic ecosystem which is self-sustaining? 3

OR

a) What is water harvesting? List two main advantages associated with water harvesting at community level.

b) Mention two advantages of water which is stored in the underground reservoirs.

Q19

- a) Define excretion
- b) Name the following:
 - i) The cup shaped structure of the nephron that collects the initial filtrate.
 - ii) The tube that connects the kidneys to the urinary bladder
- c) State two factors on which the amount of water re-absorbed by the nephron depends.

Q20

- a) Planaria, insects, octopus and vertebrates all have eyes. Can we group eyes of these animals together to establish a common evolutionary origin? Justify your answer
- b) In an experiment, tall pea plants with round seeds were crossed with short pea plants with wrinkled seeds and in F₁ generation all plants were tall with round seeds.
On selfing F₁ progeny some tall plants with wrinkled seeds and some short plants with round seeds were obtained.

What does this tell us about inheritance of characters?

Q21

- a) Define tropic movements.
- b) How does auxin promote the growth of a tendril around a support?
Explain

Q22

A spherical mirror forms a real image four times magnified at a distance of 60 cm from the mirror. Calculate the distance of the object from the mirror and the focal length of the mirror.

Q23

- a) State Fleming's left hand rule.
- b) Give the function of brushes and split ring in an electric motor.
- c) Name the type of current
 - i) Given by a cell
 - ii) Used in household supply

Q24

- a) Why does the sun appear reddish early in the morning? Justify your answer with a reason.
- b) Why do stars twinkle but planets do not? Give reason.

OR

- a) What is dispersion of light?

- b) Why are traffic signals red in colour for stopping?
 - c) Why do different colours of white light bend at different angles through a prism?

SECTION C

- Q25 a. Show the bonding in MgCl_2 .
b. Why does this compound have a high melting point?
c. Write two differences between roasting and calcination.
d. With the help of a labeled diagram, explain electrolytic refining of copper.

Or

- Q26**

 - a. State the steps used in extracting a metal of middle order reactivity from its sulphide ore.
 - b. What is thermite reaction? Why is it useful?
 - c. Why does calcium stick to the surface when treated with dilute hydrochloric acid? Write a balanced chemical equation to show the above reaction.

a. Write the IUPAC names of the following chemical compounds-

 1. $\text{CH}_3\text{-CH}_2\text{-CO-CH}_3$
 2. $\text{C}_2\text{H}_6\text{O}$
 3. $\text{CH}_2=\text{CH-CH}_3$

b. Complete the following chemical reactions-

 1. $\text{C}_2\text{H}_5\text{OH} + \text{CH}_3\text{COOH} \rightarrow$
 2. $\text{CH}_4 + \text{Cl}_2 \xrightarrow{\text{Sunlight}}$

Q27

 - a) Why is blood circulation in human heart called double circulation?
Explain the advantage of double circulation.
 - b) Why do arteries have thick and elastic walls?
 - c) State the function of capillaries.

Q28

 - a) Draw a neat diagram of human female reproductive system and label the following parts:
 - i) Site of fertilization
 - ii) Site of implantation
 - iii) Site of formation of egg
 - b) What happens when the egg is not fertilized? Explain
 - c) Name one intra-uterine contraceptive device used by females.

OR

- a) How does the embryo get nourishment from the mother's blood?
Explain
- b) What are the two functions of the secretion poured by seminal vesicle and prostate gland into the vas deferens?
- c) In a bisexual flower in spite of the young stamens being removed artificially, the flower produces fruit. Give reason.
- d) Name two organisms that reproduce by regeneration.

Q29

- a) List any two factors on which resistance of a conductor depends. 5
- b) I) A wire of resistance R is cut into four equal parts. These parts are then connected in parallel. If the equivalent resistance of this combination is R_p , then find the ratio R/R_p .
II) What will be the new resistivity of each of these parts? Why?
- c) Why are the alloys commonly used in electric heating devices? (Give two points)

Q30

- a) A convex lens has a focal length 12 cm. At what distance from the lens should an object be placed so that this lens may act as a magnifying glass? 5
- b) A lens produces a magnification of -0.5. Is this a converging or a diverging lens? If the focal length of the lens is 4 cm, draw a ray diagram showing image formation in this case.
- c) A convex lens of power 4D is placed at a distance of 40 cm from a wall. At what distance from the lens should a candle be placed so that its image is formed on the wall.

OR

- a) What is meant by absolute refractive index?
- b) On entering a medium from air, the speed of light becomes half of its value in air. Find the refractive index of that medium with respect to air.
- c) A glass slab made of a material of refractive index n_2 is kept in a medium of refractive index n_1

A light ray is incident on the slab. Draw the path of the rays of light emerging from the glass slab if i) $n_1 > n_2$ ii) $n_1 = n_2$ iii) $n_1 < n_2$