

CHEMICAL REACTION AND EQUATIONS

Single Option Correct

1. $a \text{Mg}_3\text{N}_2 + b \text{H}_2\text{O} \rightarrow c \text{Mg}(\text{OH})_2 + d \text{NH}_3$. When the equation is balanced, the coefficients a, b, c, d respectively are

- (a) 1, 3, 3, 2 (b) 1,6,3,2 (c) 1, 2, 3, 2 (d) 2, 3, 6, 2

2. Heat is evolved during

- (a) endothermic reaction (b) displacement reaction
(c) combustion reaction (d) both (b) and (c)

3. Which of the following reactions evolves heat?

- (a) $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$ (b) $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O}$
(c) $\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca}(\text{OH})_2$ (d) All of these

4. Which of the following is not a chemical reaction?

- (a) Souring of milk (b) Dissolution of sugar in water
(c) Rusting of iron (d) Digestion of food in our body

5. Which of the following occurs as a solution in the following reaction

Zinc + Sulphuric acid \rightarrow Zinc sulphate + Hydrogen

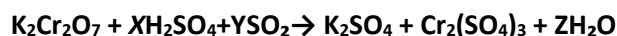
- (a) Zinc (b) Hydrogen (c) Sulphuric acid (d) Sulphuric acid and zinc sulphate

6. $\text{C}_2\text{H}_6(\text{g}) + n\text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$

In this equation, ratio of the coefficients of CO_2 and H_2O is

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

7. In the chemical reaction



X, Y and Z are

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

8. Which of the products is incorrectly matched when the reactant is burnt in air?

Reactant	Product
(a) Magnesium ribbon	Magnesium oxide
(b) Carbon	Carbon dioxide
(c) Sulphur	Hydrogen sulphide
(d) Hydrogen	Water

9. In the following equation:



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

10. Which of the following is not a physical change?

- (a) Boiling of water to give water vapour (b) Melting of ice to give water
(c) Dissolution of salt in water (d) Combustion of Liquefied Petroleum Gas (LPG)

11. Which of the following are exothermic processes?

- (i) Reaction of water with quick lime (ii) Dilution of an acid
(iii) Evaporation of water (iv) Sublimation of camphor (crystals)
- (a) (i) and (ii) (b) (ii) and (iii) (c) (i) and (iv) (d) (iii) and (iv)

12. Three beakers labelled as A, B and C each containing 25 mL of water were taken. A small amount of NaOH, anhydrous CuSO_4 and NaCl were added to the beakers A, B and C respectively. It was observed that there was an increase in the temperature of the solutions contained in beakers A and B, whereas in case of beaker C, the temperature of the solution falls. Which one of the following statement(s) is (are) correct?

- (i) In beakers A and B, exothermic process has occurred.
(ii) In beakers A and B, endothermic process has occurred.
(iii) In beaker C, exothermic process has occurred.
(iv) In beaker C, endothermic process has occurred.
- (a) (i) only (b) (ii) only (c) (i) and (iv) (d) (ii) and (iii)

13. Solid calcium oxide reacts vigorously with water to form calcium hydroxide accompanied by liberation of heat. This process is called slaking of lime. Calcium hydroxide dissolves in water to form its solution called lime water. Which among the following are true about slaking of lime and the solution formed?

- (i) It is an endothermic reaction.
(ii) It is an exothermic reaction.
(iii) The pH of the resulting solution will be more than seven.
(iv) The pH of the resulting solution will be less than seven.
- (a) (i) and (ii) (b) (ii) and (iii) (c) (i) and (iv) (d) (iii) and (iv)

14. Which of the following is(are) endothermic process(es)?

- (i) Dilution of sulphuric acid
(ii) Sublimation of dry ice
(iii) Condensation of water vapours
(iv) Evaporation of water
- (a) (i) and (iii) (b) (ii) only (c) (iii) only (d) (ii) and (iv)

15. Which one of the following processes involves chemical reaction?

- (a) Storing of oxygen gas under pressure in a gas cylinder
(b) Liquefaction of air
(c) Keeping petrol in a china dish in the open
(d) Heating copper wire in presence of air at high temperature

16. In which of the following chemical equations, the abbreviations represent the correct states of the reactants and products involved at reaction temperature?

- (a) $2\text{H}_2(\text{l}) + \text{O}_2(\text{l}) \rightarrow 2\text{H}_2\text{O}(\text{g})$ (b) $2\text{H}_2(\text{g}) + \text{O}_2(\text{l}) \rightarrow 2\text{H}_2\text{O}(\text{l})$
(c) $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{l})$ (d) $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{g})$

17. In the reaction $3\text{MnO}_2 + 4\text{Al} \rightarrow 3\text{Mn} + 2\text{Al}_2\text{O}_3$ the oxidising agent is

- (a) MnO_2 (b) Al (c) Al_2O_3 (d) Mn

18. Which of the following does not corrode when exposed to the atmosphere?

- (a) Iron (b) Copper (c) Gold (d) Silver

19. The correct formula of rust is

- (a) Fe_2O_3 (b) Fe_3O_4
(c) $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$ (d) $\text{Fe}_3\text{O}_4 \cdot x\text{H}_2\text{O}$

20. Copper displaces which of the following metals from its salt solution?

- (a) ZnSO_4 (b) FeSO_4 (c) AgNO_3 (d) MgSO_4

21. Aluminium oxide reacts with sulphuric acid to form

- (a) aluminium sulphate and hydrogen
(b) aluminium sulphate and oxygen
(c) aluminium sulphate and water
(d) aluminium sulphate and sulphur dioxide

22. $\text{Fe}_2\text{O}_3 + 2\text{Al} \rightarrow \text{Al}_2\text{O}_3 + 2\text{Fe}$

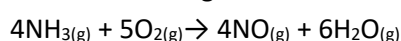
The above reaction is an example of a

- (a) combination reaction
(b) double displacement reaction
(c) decomposition reaction
(d) displacement reaction.

23. What happens when dilute hydrochloric acid is added to iron filings? Tick the correct answer.

- (a) Hydrogen gas and iron chloride are produced.
(b) Chlorine gas and iron hydroxide are produced.
(c) No reaction takes place.
(d) Iron, salt and water are produced.

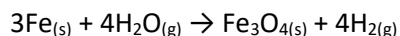
24. The following reaction is an example of a



- (i) displacement reaction (ii) combination reaction
(iii) redox reaction (iv) neutralisation reaction

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

25. Which of the following statements about the given reaction are correct?



- (i) Iron metal is getting oxidised.
- (ii) Water is getting reduced.
- (iii) Water is acting as reducing agent.
- (iv) Water is acting as oxidising agent.

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

More than One Options Correct

1. Which of the following are examples of physical change?

- (a) Breaking of a glass
- (b) Burning of Mg ribbon in air
- (c) Dissolution of sugar in water
- (d) Rusting of iron

2. Chemical equations are made more informative by adding which of the following in the equation?

- (a) Physical states of substances
- (b) Conditions of reaction
- (c) Heat changes in the reaction
- (d) Colour of the substances

3. Which of the following are the correct observations of the reaction between CaO and H₂O?

- (a) Decrease in temperature
- (b) Increase in temperature
- (c) Two reactants react to give a single product
- (d) Blue coloured solution is formed.

4. Which of the following equations are balanced?

- (a) $\text{Cl}_2 + 2\text{KI} \rightarrow 2\text{KCl} + \text{I}_2$
- (b) $2\text{Zn} + \text{H}_2\text{SO}_4 \rightarrow 2\text{ZnSO}_4 + \text{H}_2$
- (c) $\text{N}_2 + 3\text{H}_2 \rightarrow 2\text{NH}_3$
- (d) $2\text{Na}_2\text{CO}_3 + 2\text{HCl} \rightarrow 4\text{NaCl} + 2\text{H}_2\text{O} + \text{CO}_2$

5. Which of the following are the characteristics of a reversible reaction?

- (a) Reactants react completely to give products.
- (b) It is carried out in closed container.
- (c) It is denoted by single headed arrow (\rightarrow).
- (d) Change in concentration of reactants change the direction of reaction.

6. Copper nitrate on decomposition gives

- (a) copper oxide
- (b) nitrogen dioxide
- (c) oxygen
- (d) nitrogen.

7. Which of the following are examples of displacement reaction?

- (a) $\text{CaO} + \text{CO}_2 \rightarrow \text{CaCO}_3$
- (b) $2\text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{O}_2$
- (c) $\text{Cu} + 2\text{AgNO}_3 \rightarrow \text{Cu}(\text{NO}_3)_2 + 2\text{Ag}$
- (d) $\text{CuSO}_4 + \text{H}_2\text{S} \rightarrow \text{CuS} + \text{H}_2\text{SO}_4$

8. Rancidity can be prevented by

- (a) adding antioxidants
(b) packaging oily food in nitrogen gas
(c) packaging oily food in oxygen gas
(d) vacuum packaging.

9. Double displacement reactions are

- (a) $\text{Zn} + \text{CuSO}_4 \rightarrow \text{ZnSO}_4 + \text{Cu}$
(b) $\text{NaOH} + \text{HNO}_3 \rightarrow \text{H}_2\text{O} + \text{NaNO}_3$
(c) $\text{Na}_2\text{S} + 2\text{HCl} \rightarrow 2\text{NaCl} + \text{H}_2\text{S}$
(d) $\text{BaCl}_2 + \text{H}_2\text{SO}_4 \rightarrow \text{BaSO}_4 + 2\text{HCl}$

Fill in the Blanks

1. A balanced equation has an equal number of _____ of different _____ in the reactants and products.
2. Reactions in which heat is given out are called _____ and the reactions in which heat is absorbed are called _____ reactions.
3. The solution of a substance in water is called _____ solution and is represented by the symbol _____.
4. A _____ ion does not take part in chemical reaction.
5. \downarrow sign after a substance in a chemical reaction denotes _____ formation.

True or False

1. $3\text{Cu} + 7\text{HNO}_3 \rightarrow 3\text{Cu}(\text{NO}_3)_2 + 7\text{NO} + 4\text{H}_2\text{O}$ represents a balanced chemical reaction.
2. Irreversible reactions can proceed only in the forward direction.
3. Respiration is an endothermic reaction.
4. Photosynthesis is a physical change.
5. Temperature increases in case of an exothermic reaction.

Match the Following

1. Match the column-I with column-II and mark the appropriate choice.

Column-I(Reaction)		Column-II(Gas evolved)	
(A)	$\text{Al} + \text{HCl}$	(P)	H_2S
(B)	$\text{MnO}_2 + \text{HCl}$	(Q)	CO_2
(C)	$\text{FeS} + \text{H}_2\text{SO}_4$	(R)	H_2
(D)	$\text{Fe}_2\text{O}_3 + \text{CO}$	(S)	Cl_2
		(T)	SO_2

- (a) (A)-(R), (B)-(S), (C)-(P), (D)-(Q) (b) (A)-(R), (B)-(S), (C)-(T), (D)-(Q)
(c) (A)-(S), (B)-(R), (C)-(P), (D)-(Q) (d) (A)-(S), (B)-(R), (C)-(T), (D)-(Q)

Assertion & Reason Type

Direction: In the following questions, a statement of assertion is followed by a statement of reason.

Mark the correct choice as:

- (a) If both assertion and reason are true and reason is the correct explanation of assertion.
(b) If both assertion and reason are true but reason is not the correct explanation of assertion.

- (c) If assertion is true but reason is false.
(d) If both assertion and reason are false.

1. Assertion: A chemical equation gives an indication about the rate of reaction.

Reason: It indicates about the concentration of reactants.

2. Assertion: Balancing of chemical equations is based on law of conservation of mass.

Reason: Total mass of reactants is equal to total mass of products.

3. Assertion: Nitrogen and hydrogen combine together to form ammonia.

Reason: It is an exothermic reaction.

4. Assertion: Calcium nitride reacts with water to give N_2 gas.

Reason: Any substance reacts with water to produce a gas.

5. Assertion: $H_2 + I_2 \rightleftharpoons 2HI$ denotes a reversible reaction.

Reason: Reversible reactions should be carried out in open system.

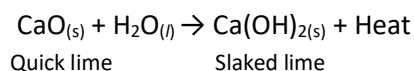
Comprehension Type

PASSAGE

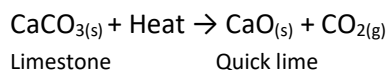
Read the given passage and answer the following questions.

Some chemical reactions involve a change in temperature, *i.e.*, rise or fall of temperature.

Reactions which are accompanied by evolution of heat are known as exothermic reactions e.g., when small amount of water is added to quick lime, a large amount of heat is evolved and reaction mixture becomes hot.



Reactions which are accompanied by absorption of heat are known as endothermic reactions e.g., burning of limestone requires lots of heat which causes fall of temperature.



1. An exothermic reaction is one in which the reacting substances

- (a) have more energy than the products (b) have less energy than the products
(c) have the same energy as the products (d) are at a higher temperature than the products.

2. Evaporation of water is

- (a) an exothermic change (b) an endothermic change
(c) a process where no heat changes occur (d) a process accompanied by chemical reaction.

3. Which of the following is an endothermic reaction?

- (a) $3H_2 + N_2 \rightarrow 2NH_3$ (b) $C + O_2 \rightarrow CO_2$
(c) $PCl_3 + Cl_2 \rightarrow PCl_5$ (d) $N + 1/2 O_2 \rightarrow NO$

Integer/Numerical Value Type

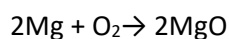
- The value of x in the given reaction is _____.
 $\text{MnO}_2 + x\text{HCl} \rightarrow \text{MnCl}_2 + 2\text{H}_2\text{O} + \text{Cl}_2$
- The number of gaseous product(s) obtained by the reaction between Zn and H_2SO_4 is_____.
- Number of spectator ion in the given reaction is _____.
 $\text{Zn} + \text{CuSO}_4 \rightarrow \text{ZnSO}_4 + \text{Cu}$
- In the reaction, $\text{Mg}_3\text{N}_2 + x\text{H}_2\text{O} \rightarrow y\text{Mg}(\text{OH})_2 + z\text{NH}_3$, the value of $(x + y + z)$ is _____.
- How much CO_2 in grams will be produced when 1g CaCO_3 reacts with excess of dilute HCl?

Case Based Questions

CASE

Read the given paragraph and answer the following questions.

In a balanced chemical equation, equal number of atoms are present on both sides of equation. A balanced chemical equation of burning of magnesium in oxygen to form magnesium oxide is written as:



The mass of reactants ($2 \times 24 + 32 = 80$) is equal to the mass of products [$2 \times (24 + 16) = 80$]

- Which of the following laws is satisfied by a balanced chemical equation?
(a) Law of multiple proportions
(b) Law of conservation of mass
(c) Law of conservation of motion
(d) Law of conservation of magnetism
- What is the molar ratio of magnesium to magnesium oxide in the given reaction?
(a) 2:3 (b) 1:1 (c) 1:2 (d) 3:2
- Which of the following statements is true regarding the balanced chemical equation for this process?
(a) 1 mole of magnesium produces two moles of magnesium oxide.
(b) 2 moles of magnesium oxide produce one mole of magnesium and one mole of oxygen gas.
(c) 1 mole of magnesium oxide produces half mole of magnesium and half mole of oxygen gas.
(d) 2 moles of magnesium oxide is produced by 2 moles of magnesium and one mole of oxygen gas.
- In the given chemical reaction,
 $2\text{C}_6\text{H}_6(l) + 15\text{O}_2(g) \rightarrow m\text{CO}_2(g) + n\text{H}_2\text{O}(l)$
The values of m and n are respectively,
(a) 14 and 8 (b) 12 and 6 (c) 8 and 10 (d) 12 and 10

ACIDS, BASES AND SALTS

Single Option Correct

1. Which one of the following solutions will turn blue litmus red?

- (a) Vinegar (b) Lime water
(c) Baking soda solution (d) Washing soda solution

2. Which of these choices is considered to be a Brønsted- Lowry base?

- (a) Proton donor (b) Proton acceptor
(c) Electron acceptor (d) Proton acceptor

3. In the reaction, $\text{CO}_3^{2-} + \text{H}_2\text{O} \rightarrow \text{HCO}_3^- + \text{OH}^-$ water is a

- (a) Brønsted acid (b) Brønsted base (c) conjugate acid (d) conjugate base.

4. What will be the pH of salt of weak base and strong acid?

- (a) Equal to 7 (b) More than 7 and 8
(c) Less than 7 (d) Unpredictable

5. Which of the following is incorrectly matched?

- (a) Tomato - tartaric acid (b) Ant sting - methanoic acid
(c) Citrus fruit - citric acid (d) Curd - lactic acid

6. Sour milk contains

- (a) lactic acid (b) acetic acid (c) tartaric acid (d) citric acid.

7. If pH of solution is 13, it means that it is

- (a) weakly acidic (b) weakly basic (c) strongly acidic (d) strongly basic.

8. In a solution of pH = 5, more acid is added in order to reduce the pH = 2. The increase in hydrogen ion concentration is

- (a) 100 times (b) 1000 times (c) 3 times (d) 5 times.

9. For dilution of concentrated acid we should add

- (a) water into concentrated acid
(b) concentrated acid into water
(c) first water into acid and then more acid
(d) both (a) and (b) are correct.

10. Calcium phosphate is present in tooth enamel. Its nature is

- (a) basic (b) acidic (c) neutral (d) amphoteric.

11. Phenolphthalein is

- (a) yellow in acidic medium, pink in basic medium
- (b) pink in acidic medium, colourless in basic medium
- (c) colourless in acidic medium, pink in basic medium
- (d) pink in acidic medium, yellow in basic medium.

12. What happens when a solution of an acid is mixed with a solution of a base in a test tube?

- (i) The temperature of the solution increases.
- (ii) The temperature of the solution decreases.
- (iii) The temperature of the solution remains the same.
- (iv) Salt formation takes place.

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

13. An aqueous solution turns red litmus solution blue. Excess addition of which of the following solution would reverse the change?

- (a) Baking powder (b) Lime
(c) Ammonium hydroxide solution (d) Hydrochloric acid

14. During the preparation of hydrogen chloride gas on a humid day, the gas is usually passed through the guard tube containing calcium chloride. The role of calcium chloride taken in the guard tube is to

- (a) absorb the evolved gas (b) moisten the gas
(c) absorb moisture from the gas (d) absorb Cl^- ions from the evolved gas.

15. Which of the following gives the correct increasing order of acidic strength?

- (a) Water < Acetic acid < Hydrochloric acid
(b) Water < Hydrochloric acid < Acetic acid
(c) Acetic acid < Water < Hydrochloric acid
(d) Hydrochloric acid < Water < Acetic acid

16. Which of the following statements is correct about an aqueous solution of an acid and of a base?

- (i) Higher the pH, stronger the acid
- (ii) Higher the pH, weaker the acid
- (iii) Lower the pH, stronger the base
- (iv) Lower the pH, weaker the base

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

17. The pH of the gastric juices released during digestion is

- (a) less than 7 (b) more than 7 (c) equal to 7 (d) equal to 0.

18. 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)

19. Which one of the following can be used as an acid- base indicator by a visually impaired student?

- (a) Litmus (b) Turmeric (c) Vanilla essence (d) Petunia leaves

20. Which of the following is acidic in nature?

- (a) Lime juice (b) Human blood (c) Lime water (d) Antacid

More than One Options Correct

1. Which of the following is/are wrong statements?

- (a) All Arrhenius acids are Brønsted acids but all Arrhenius bases are not Brønsted bases.
(b) All Brønsted bases are Lewis bases.
(c) All Brønsted acids are Lewis acids.
(d) Conjugate acid of a strong base is a strong acid.

2. Which of the following form conjugate acid-base pairs in the right order ?

- (a) $\text{NH}_3, \text{NH}_2^-$ (b) $\text{S}^{2-}, \text{HS}^-$
(c) $\text{HCO}_3^-, \text{CO}_3^{2-}$ (d) $\text{HNO}_3, \text{NO}_3^-$

3. Which of the following acts as a Brønsted acid?

- (a) NH_4^+ (b) HCO_3^- (c) HSO_3^- (d) CH_3COO^-

4. Which of the following aqueous solutions will have a pH less than 7.0?

- (a) HNO_3 (b) NaOH (c) H_2SO_4 (d) NaCl

5. One molar solution of any acid has a pH of 5. Which of the following facts explains this?

- (a) It is a weak acid. (b) The acid is too dilute.
(c) It is a poor electrolyte.
(d) It hydrolyses to produce a high concentration of hydronium ions.

6. Which among the following are complex salts?

- (a) Sodium potassium carbonate (b) Potassium ferrocyanide
(c) Potash alum (d) Sodium argentocyanide

7. Which among the following solutions will turn red litmus blue?

- (a) Ammonium chloride (b) Baking soda
(c) Caustic soda (d) Sodium chloride

8. Which among the following react with NaOH to form hydrogen gas?

- (a) Al_2O_3 (b) ZnO (c) SnO (d) SnO_2

9. NaOH will react with which of the following acids to form neutral salt?

- (a) CH_3COOH (b) HCl (c) H_2SO_4 (d) HNO_3

10. Which among the following are the uses of baking soda?

- (a) As an antacid (b) As bleaching agent
(c) In fire extinguisher (d) In production of CO₂.

Fill in the Blanks

1. An acidic solution contains _____ ions while a basic solution contains _____ ions.
2. The weaker the acid, the greater is the basic strength of its _____.
3. When an acid reacts with a metal, _____ gas is evolved and a corresponding _____ is formed.
4. Strong acids are almost _____ ionised in aqueous solution whereas weak acids are _____ ionized.
5. Brönsted-Lowry theory is based on _____ transfer.

True or False

1. The hydronium ion is the strongest acid that can exist in aqueous solution.
2. Acidic and basic solutions in water conduct electricity because they produce hydrogen and hydroxide ions respectively.
3. Living beings carry out their metabolic activities at a very high pH.
4. When copper oxide is treated with dilute hydrochloric acid, the colour of the solution becomes red.
5. Dilution of an acid decreases H⁺ ion concentration.

Match the Following

1. Match the column-I with column-II and mark the appropriate choice.

Column- I (Salts)		Column-II (Acids and bases of corresponding salts)	
(A)	KNO ₃	(P)	Nitric acid, silver hydroxide
(B)	AgNO ₃	(Q)	Hydrochloric acid, magnesium hydroxide
(C)	MgCl ₂	(R)	Carbonic acid, ammonium hydroxide
(D)	(NH ₄) ₂ CO ₃	(S)	Nitric acid, potassium hydroxide

- (a) (A)-(S), (B)-(Q), (C)-(P), (D)-(R) (b) (A)-(S), (B)-(P), (C)-(Q), (D)-(R)
(c) (A) - (P), (B) - (Q), (C) - (R), (D) - (S) (d) (A) - (Q), (B) - (R), (C)-(P), (D)-(S)

Assertion & Reason Type

Direction: In the following questions, a statement of assertion is followed by a statement of reason. Mark the correct choice as:

- (a) If both assertion and reason are true and reason is the correct explanation of assertion.

- (b) If both assertion and reason are true but reason is not the correct explanation of assertion.
(c) If assertion is true but reason is false.
(d) If both assertion and reason are false.

1. Assertion: Acetic acid is a weak acid.

Reason: Its conjugate base is weak.

2. Assertion: $\text{CaO} + \text{SO}_3 \rightarrow \text{CaSO}_4$ is an acid-base reaction.

Reason: This is based on Brønsted-Lowry concept.

3. Assertion: If H^+ ion concentration of a solution is increased by 10 times, its pH increases by 10.

Reason: Both pH and pH^+ ion concentration are directly proportional to each other.

4. Assertion: Ag^+ , H^+ i.e., simple cations behave as Lewis acids.

Reason: Lewis acids are those which are capable of furnishing H^+ ions in aqueous solution.

5. Assertion: Aqua regia is mixture of concentrated HCl and HNO_3 .

Reason: It is used in dissolving Cu, Pt metals.

Comprehension Type

PASSAGE

Read the given passage and answer the following questions.

A strong acid or strong base means 100% ionisation. That means, the H^+ concentration of a strong acid is equal to concentration of the acid. After all the acid dissociates, there will be no acid molecules. Similarly, for a strong base, OH^- concentration is equal to the concentration of base. It is possible to reach a pH value of zero for an acid. For calculating pH of a base, pOH value can be calculated first and then the pH value. The point to be kept in mind for such calculations is the relation $\text{pH} + \text{pOH} = 14$.

1. The $[\text{OH}^-]$ in a solution is measured to be 0.001 M.

What is pOH of the solution?

- (a) 3 (b) 1 (c) 2 (d) 0.01

2. What is the pH of a 0.050 M solution of KOH?

- (a) 12.70 (b) 1.30 (c) 5 (d) 9

3. What is the pH of a 0.100 M solution of HCl?

- (a) 1 (b) 0.01 (c) 0.1 (d) 0.001

Integer/Numerical Value Type

1. Equal volumes of solutions with $\text{pH} = 4$ and $\text{pH} = 10$ are mixed. What is the pH of the resulting solution?

2. Following solutions are given with their pH value.

A = 2, B = 0, C = 4, D = 8, E = 9, F = 7, I = 1, J = 9, K = 10, L = 5

How many of them are acidic in nature?

3. Aqueous solutions of how many of the given compounds do not conduct electricity?

NaOH, NaCl, C₂H₅OH, H₂SO₄, C₆H₁₂O₆, BCl₃

4. Total number of mineral acids from the following is _____ .

Citric acid, Hydrochloric acid, Tartaric acid, Sulphuric acids, Nitric acid

5. From the following total number of acid with basicity 1 is _____ .

HF, HCl, H₂SO₄, H₃PO₄, HOCl

Case Based Questions

CASE

Read the given paragraph and answer the following questions.

Solution 'A' turns red litmus blue, evolves hydrogen gas on reaction with zinc and does not react with sodium carbonate. Whereas, solution 'B' turns blue litmus red, liberates hydrogen gas on reaction with zinc and evolves carbon dioxide gas with sodium carbonate.

1. Identify 'A' and 'B'.

- (a) 'A' is an acid, 'B' is a base.
- (b) 'A' is a base, 'B' is an acid.
- (c) Both 'A' and 'B' are bases.
- (d) Both 'A' and 'B' are acids.

2. pH of the solution 'A' may have value of

- (a) 0
- (b) 5
- (c) 8
- (d) 7

3. Strength of 'A' and 'B' _____ with dilution.

- (a) increases
- (b) decreases
- (c) does not get affected
- (d) first increases and then decreases

9. A piece of burning calcium was dropped into a gas jar containing carbon dioxide,
Which of the following product(s) is/are obtained?

- (a) Calcium carbonate
(b) Calcium carbonate and carbon
(c) Calcium oxide and carbon
(d) Calcium oxide and carbon monoxide

10. Sodium dissolves in liquid NH_3 to give a deep blue solution. This is due to the presence of

- (a) ammoniated Na^+
(b) ammoniated Na^-
(c) formation of Na^+/Na^- pair
(d) ammoniated electrons.

11. What colour is imparted into the flame when lithium is burnt?

- (a) Golden yellow (b) Brick red (c) Crimson red (d) Grass green

12. Select the correct statement from the following.

- (a) Metals do not react with dilute acids.
(b) Sodium and potassium react vigorously with cold water.
(c) Copper reacts slowly with water at room temperature to form copper oxide.
(d) Magnesium is less reactive than zinc.

13. Lithium shows diagonal relationship with

- (a) sodium (b) magnesium (c) calcium (d) aluminium.

14. Match the flame colours of the alkaline earth metal salts in the Bunsen burner.

- (p) Calcium (1) Brick red
(q) Strontium (2) Apple green
(r) Barium (3) Crimson
- (a) p-1, q-3, r-2 (b) p - 3, q - 1, r - 2 (c) p-2, q-3, r-1 (d) p-1, q-2, r-3

15. Brass is an alloy of

- (a) Cu and Zn (b) Sn and Mn (c) Cu and Ni (d) Ni and Zn

16. Among CaH_2 , BeH_2 , BaH_2 , the order of ionic character is

- (a) $\text{BeH}_2 < \text{CaH}_2 < \text{BaH}_2$ (b) $\text{CaH}_2 < \text{BeH}_2 < \text{BaH}_2$
(c) $\text{BeH}_2 < \text{BaH}_2 < \text{CaH}_2$ (d) $\text{BaH}_2 < \text{BeH}_2 < \text{CaH}_2$

17. Which of the following is not a characteristic of metals?

- (a) Malleable (b) Non-sonorous
(c) Conductor of heat (d) Ductile

18. The alkaline earth metal sulphate which is most soluble in water among the following is

- (a) BaSO_4 (b) CaSO_4 (c) SrSO_4 (d) BeSO_4

19. Which of the following statements is false?

- (a) Ca^{2+} ions are not important in maintaining the regular beating of the heart.
- (b) Mg^{2+} ions are important in the green parts of the plants.
- (c) Mg^{2+} ions form a complex with ATP.
- (d) Ca^{2+} ions are important in blood clotting.

20. Mg is an important component of

- (a) haemoglobin
- (b) chlorophyll
- (c) ATP
- (d) none of these.

21. In the preparation of KMnO_4 , pyrolusite (MnO_2) is first converted to potassium manganate (K_2MnO_4). In this conversion, the oxidation state of manganese changes from

- (a) +1 to +3
- (b) +2 to +4
- (c) +3 to +5
- (d) +4 to +6

More than One Options Correct

1. Identify s-block metals.

- (a) Na
- (b) Au
- (c) Fe
- (d) K

2. Products of reaction of metal with acids are

- (a) Salt
- (b) water
- (c) hydrogen
- (d) metal oxide

3. Which of the following represent the correct sets of diagonal pairs?

- (a) Li and Na
- (b) Li and Be
- (c) Li and Mg
- (d) Be and Al

4. Which of the following groups of elements have properties that are most similar?

- (a) Na, K, Cs
- (b) Mg, Sr, Ba
- (c) Be, Al, Ca
- (d) Be, Ra, Cs

5. Which of the following statements are false?

- (a) BeCl_2 exists as dimer in the vapour state and polymeric in the solid state.
- (b) Calcium hydride is called hydrolith.
- (c) The oxides of Be and Ca are amphoteric.
- (d) Bicarbonates of Na and Sr are insoluble in water.

Fill in the Blanks

1. Alkaline earth metals are _____ reducing agents than alkali metals.
2. Second ionisation energies of alkaline earth metals are _____ than that of corresponding alkali metals.
3. Atomic size of calcium is _____ than that of potassium.
4. Hydrolith is the common name of _____.
5. Sodium metal imparts _____ colour to the flame.

True or False

1. Beryllium resembles aluminium closely in the properties, though it belongs to a different group.
2. Alkaline earth metals have lower melting points than the corresponding alkali metals.
3. The chemical formula of plaster of Paris is $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$.
4. Lithium nitrate decomposes on heating to evolve N_2 gas.
5. Generally, metals have a dull appearance.

Match the Following

1. Match the column-I with column-II and select the appropriate choice.

Column-I		Column-II	
(A)	A metal unreactive towards dilute acids and oxygen	(P)	Zinc
(B)	A metal stored in kerosene	(Q)	Aluminium
(C)	A metal used for galvanisation	(R)	Gold
(D)	A metal used for making foils for wrapping food	(S)	Sodium

(a) (A)-(R), (B)-(P), (C)-(Q), (D)-(S)

(b) (A)-(P), (B)-(R), (C)-(S), (D)-(Q)

(c) (A)-(R), (B) - (Q), (C) - (S) , (D)-(P)

(d) (A)-(R), (B)-(S), (C)-(P), (D)-(Q)

Assertion & Reason Type

Direction: In the following questions, a statement of assertion is followed by a statement of reason. Mark the correct choice as:

- a) If both assertion and reason are true and reason is the correct explanation of assertion.
- b) If both assertion and reason are true but reason is not the correct explanation of assertion.
- c) If assertion is true but reason is false.
- d) If both assertion and reason are false

1. Assertion: Lithium resembles magnesium diagonally placed in next group.

Reason: The size of Li^+ and Mg^{2+} are different and their electropositive character is same.

2. Assertion: Aluminium is used is making foils for wrapping food.

Reason: Metals are malleable and can be beaten into thin sheets.

3. Assertion: Lithium salts are mostly hydrated.

Reason: The hydration enthalpies of alkali metal ions decrease with increase in ionic sizes.

4. Assertion: The melting and boiling points of the alkali metals are low.

Reason: Alkali metals have strong metallic bonding.

5. Assertion: Zn, Cd and Hg are not regarded as transition elements.

Reason: The electronic configurations of Zn, Cd and Hg are represented by the general formula $(n-1)d^{10}ns^2$.

6. Assertion: In transition elements, radii of 5d series are virtually the same as those of the corresponding members of 4d series.

Reason: The filling of 4f orbitals before 5d orbitals results in regular decrease in atomic radii.

7. Assertion: In the series Sc to Zn, the enthalpy of atomisation of zinc is the lowest.

Reason: Zinc has greater number of unpaired electrons.

8. Assertion: Cr^{2+} is reducing and Mn^{3+} is oxidising.

Reason: Cr^{2+} and Mn^{3+} have d^4 configuration.

9. Assertion: The maximum oxidation state of chromium in its compounds is +6.

Reason: Chromium has only six electrons in ns and (n-1)d orbitals.

10. Assertion: The basicity of alkali metal oxides decrease down the group.

Reason: This is due to increase in ionisation enthalpy.

Comprehension Type

PASSAGE

Read the given passage and answer the following questions.

Corrosion may be defined as the process of slow eating up of a metal by the gases and water vapours present in air due to formation of certain chemical compounds.

Corrosion is favoured by the following factors:

(i) Position of metal in the reactivity series: Active metals placed above hydrogen in the reactivity series are easily corroded as compared to the metals which are placed below hydrogen.

(ii) Air and moisture: The presence of water vapours and gases like CO_2 , SO_2 etc. in air helps the process of corrosion.

(iii) Uneven metal surface: If the surface of metal is uneven, it will have certain depressions. Water drops will stick in these and take part in the chemical process leading to corrosion.

(iv) Presence of salts: Presence of salts or electrolytes in water promotes corrosion. For example, rusting of iron is faster in sea water (also called saline water) than in ordinary water or distilled water.

1. Chemically rust is

(a) hydrated ferrous oxide

(b) hydrated ferric oxide

(c) only ferric oxide

(d) none of these.

2. Select the processes that are used for preventing rusting of iron.

(a) Galvanisation

(b) Greasing

(c) Electroplating

(d) All of these.

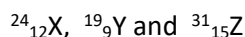
3. Copper and silver get corroded in air by developing a coloured layer. The colour of the layers respectively are

- (a) green and black (b) brown and black
(c) green and blue (d) black and green.

Integer/Numerical Value Type

1. What is the value of x in the formula of gypsum, i.e., $\text{CaSO}_4 \cdot x\text{H}_2\text{O}$?

2. The number of metals among the following elements is _____



3. Number of major oxides known of potassium is _____

4. How many of the following are alkali metals?

Magnesium, sodium, potassium, aluminium, silicon, lithium.

5. How many of the following metals are more reactive than copper?

Gold, Silver, Sodium, Potassium, Iron, Zinc, Platinum.

Case Based Questions

CASE

Read the given paragraph and answer the following questions.

The arrangement of metals in a vertical column in the decreasing order of their reactivities is called the reactivity series or activity series of metals. The most reactive metal is at the top position of the reactivity series. The least reactive metal is at the bottom of the reactivity series.

Hydrogen, though a non-metal, has been included in the activity series of metals only for comparison. Apart from it, the hydrogen atom also has tendency to lose its valence electron and form cation like the behaviour shown by metals.

1. Which metal can be displaced by copper from its salt solution?

- (a) Zinc (b) Silver (c) Iron (d) Lead

2. An element 'X' after reacting with acids liberate hydrogen gas and can displace lead and tin from their salt solution. The metal 'X' is

- (a) copper (b) gold (c) nickel (d) silver.

3. The most reactive metal is

- (a) potassium (b) barium (c) sodium (d) calcium

4. The metal which does not liberate hydrogen gas after reacting with acid is

- (a) zinc (b) lead (c) tin (d) gold.

5. The only non-metal involved in activity series metals is

- (a) sulphur (b) chlorine (c) hydrogen (d) magnesium.

CARBON AND ITS COMPOUNDS

Single Option Correct

1. Valency of carbon atom is

- (a) 2 (b) 4 (c) 6 (d) 3

2. Billions of compounds of carbon are studied under

- (a) organic chemistry (b) inorganic chemistry
(c) physical chemistry (d) analytical chemistry.

3. The general name for a compound with general formula C_nH_{2n-2} is

- (a) alkane (b) alkyne (c) alkene (d) none of these.

4. Which of the following is not an alkene?

- (a) C_4H_8 (b) C_4H_6 (c) C_3H_6 (d) C_5H_{10}

5. Which among the following molecular formula represents a saturated hydrocarbon?

- (a) C_4H_8 (b) C_4H_6 (c) C_3H_4 (d) C_5H_{12}

6. Number of H atoms that are less in alkene in comparison to the alkane having the same number of carbon is

- (a) 2 (b) 3 (c) 4 (d) 5

7. Considering the same number of carbon atoms if M_1 , M_2 and M_3 are the molecular masses of alkane, alkene and alkyne then the correct option is

- (a) $M_1 + M_2 = M_3$ (b) $M_3 - M_2 = M_2 - M_1$
(c) $M_3 + M_1 = M_2$ (d) none of these

8. An alkyne is hydrogenated to give the corresponding alkane with molecular mass of 58 u. The number of carbon atoms in the alkyne is

- (a) 2 (b) 4 (c) 6 (d) 5

9. Identify alkene among the following.

- (a) C_3H_4 (b) C_3H_6 (c) C_2H_6 (d) None of these

10. The total number of bonds formed between carbon atoms in ethene is

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

11. The total number of bonds in acetylene are

- (a) 6 (b) 4 (c) 5 (d) 3

12. Butanone is a four carbon compound with the functional group

- (a) carboxylic acid (b) aldehyde (c) ketone (d) alcohol.

13. In which of the following compounds, $-OH$ is the functional group?

- (a) Butanone (b) Butanol (c) Butanoic acid (d) Butanal

14. Which of the following does not belong to the same homologous series?

- (a) CH_4 (b) C_2H_6 (c) C_3H_8 (d) C_4H_8

15. The first member of alkyne homologous series is

- (a) ethyne (b) ethane (c) propyne (d) methane

16. The name of the compound CH_3-CH_2-CHO is

- (a) propanal (b) propanone (c) ethanol (d) ethanal

17. The heteroatoms present in $CH_3-CH_2-O-CH_2-CH_2Cl$ are

- (i) oxygen (ii) carbon (iii) hydrogen (iv) chlorine
(a) (i) and (ii) (b) (ii) and (iii) (c) (iii) and (iv) (d) (i) and (iv)

18. IUPAC names of the given structures are

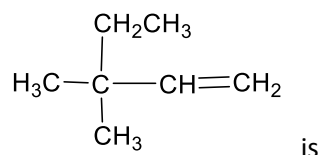


- (a) (i) hexane, (ii) 3-methylbutane
(b) (i) isopentane, (ii) 2,2-dimethylbutane
(c) (i) 3-ethylbutane, (ii) isopentane
(d) (i) 3-methylpentane, (ii) 2-methylbutane.

19. How many structural isomers are possible for C_4H_{10} ?

- (a) 3 (b) 4 (c) 5 (d) 2

20. The IUPAC name of the compound having formula



- (a) 3,3,3-trimethylprop-1-ene (b) 1,1,1-trimethylprop-2-ene
(c) 3,3-dimethylpent-1-ene (d) 2,2-dimethylbut-3-ene.

More than One Options Correct

1. Which of the following are the characteristics of homologous series?

- (a) In a homologous series, all members have same functional group.
- (b) All members of a homologous series have similarity in chemical properties.
- (c) Any two adjacent members differ by a $-\text{CH}_3$ unit.
- (d) Adjacent members differ by 24 mass unit.

2. Which of the following formulae represent hydrocarbon?

- (a) C_nH_{2n}
- (b) $\text{C}_n\text{H}_{2n-2}$
- (c) $\text{C}_n\text{H}_{2n+2}$
- (d) $\text{C}_n\text{H}_{2n+1}\text{OH}$

3. Identify the compounds which do not belong to the same homologous series.

- (a) Propane
- (b) Butyne
- (c) Ethyne
- (d) Hexene

4. Which among the following pairs belong to the same homologous series?

- (a) C_3H_4 , C_5H_{10}
- (b) C_2H_6 , C_4H_{10}
- (c) C_2H_4 , C_4H_8
- (d) C_4H_8 , C_5H_{10} .

5. Which of the following are not alkenes?

- (a) C_4H_8
- (b) C_4H_6
- (c) C_3H_6
- (d) C_5H_{12}

6. Which among the following molecular formula represent alkane?

- (a) C_4H_{10}
- (b) C_4H_6
- (c) C_3H_4
- (d) C_5H_{12}

7. Identify the correct match.

- (a) Alkane: $\text{C}_n\text{H}_{2n+2}$
- (b) Alkene: C_nH_{2n}
- (c) Alkyne: $\text{C}_n\text{H}_{2n-2}$
- (d) Alcohol: $\text{C}_n\text{H}_{2n+1}\text{OH}$

8. Which of the following belong to same homologous series?

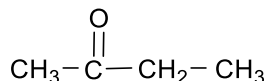
- (a) $\text{C}_2\text{H}_6\text{O}_2$
- (b) C_2H_6
- (c) CH_4O
- (d) $\text{C}_3\text{H}_8\text{O}$

Fill in the Blanks

- The IUPAC name of $\text{CH}_3-\text{CH}=\text{CH}-\text{CH}_3$ is _____.
- An organic compound having $-\text{OH}$ functional group is called _____.
- 2, 3-Dimethylhexane has _____ number of carbon atoms.
- Propyne and cyclopropene are _____ isomers.
- A hydrocarbon ring having 5 'C' atoms and no unsaturation is called _____.

True or False


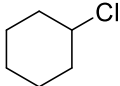
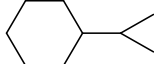
1. Neohexane is 2,2-dimethylbutane.



2. Butanone is represented as
3. Ethanol and dimethyl ether have different number of carbon atoms.
4. $C_nH_{2n+1}OH$ is the general formula of alcohols.
5. n-pentane and n-hexane are homologues.

Match the Following

1. Match the column-I with column-II and mark the appropriate choice.

Column-I(Compound)		Column-II(Nomenclature)	
(A)		(P)	Chlorocyclohexane
(B)		(Q)	Cyclopentane
(C)		(R)	2, 2-Dimethylbutane
(D)	$ \begin{array}{c} \text{CH}_3 \\ \\ \text{CH}_3 - \text{C} - \text{CH}_2\text{CH}_3 \\ \\ \text{CH}_3 \end{array} $	(S)	<i>iso</i> -Propyl cyclohexane

- (a) (A) - (Q), (B) - (R) , (C)-(S), (D)-(P)
 (c) (A)-(P), (B)-(S), (C) -(Q) , (D) - (R)

- (b) (A) -(Q) , (B)-(P), (C)-(S), (D)-(R)
 (d) (A)-(P) ,(B) - (R), (C)-(S), (D)-(Q)

Assertion & Reason Type

Direction: In the following questions, a statement of assertion is followed by a statement of reason. Mark the correct choice as:

- (a) If both assertion and reason are true and reason is the correct explanation of assertion.
- (b) If both assertion and reason are true but reason is not the correct explanation of assertion.
- (c) If assertion is true but reason is false.
- (d) If both assertion and reason are false.

1. Assertion: Pentane and 2-methylpentane are homologues.

Reason: Pentane is a straight-chain alkane, while 2-methylpentane is a branched-chain alkane.

2. Assertion: $\text{CH}_3-\text{C}=\text{C}-\text{CH}_3$ and $\text{CH}_3-\text{CH}_2\text{C}\equiv\text{CH}$ are positional isomers.

Reason: Both have same molecular formula but different positions of triple bond.

3. Assertion: The name of the hydrocarbon $(\text{CH}_3)_2\text{CHCH}_2\text{CH}_2\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}_3$ is 2,5-dimethylheptane and not 3,6-dimethylheptane.

Reason: Numbering should be done in such a way that sum of the locants on the parent chain is lowest possible number.

4. Assertion: Alkanes containing more than three carbon atoms exhibit chain isomerism.

Reason: In an alkane, all carbon atoms are sp^3 hybridised.

5. Assertion: Benzene is a saturated hydrocarbon.

Reason: Benzene is a cyclic compound.

Comprehension Type

PASSAGE

Read the given passage and answer the following questions.

The organic compounds are named on the basis of IUPAC rule. IUPAC is International Union of Pure and Applied Chemistry. According to this, all the compounds are considered as the derivatives of saturated hydrocarbons.

The complete IUPAC name consists of following five parts:

Secondary prefix + Primary prefix + Word root + Primary prefix + Secondary suffix

1. IUPAC name of $(\text{CH}_3)_3\text{C}-\text{CH}=\text{CH}_2$ is

(a) 2,2-dimethylbut-3-ene

(b) 2,2-dimethylpent-4-ene

(c) 3,3-dimethylbut-1-ene

(d) hex-1-ene.


2. The IUPAC name of $\text{CH}_3-\text{CH}_2-\underset{\text{CH}_2-\text{CH}_2-\text{CH}_3}{\text{CH}}-\text{CH}_2-\text{CH}_3$ is

(a) 3-ethyl pentane

(b) 3,3-dimethyl butane

(c) 3-ethyl hexane

(d) n-octane

3. The IUPAC name of  is

(a) n-butane

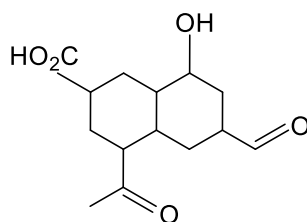
(b) *iso*-butane

(c) 2-methylpropane

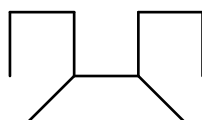
(d) 2,2-dimethylpropane

Integer/Numerical Value Type

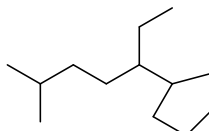
1. How many different functional groups are present in given compound?



2. How many carbon atoms are present in parent carbon chain in the given compound?



3. How many methyl ($-\text{CH}_3$) groups are present as substituent in given alkane?



PERIODIC CLASSIFICATION OF ELEMENTS

1. Elements were classified into metals and non- metals by

- (a) Lavoisier (b) Dobereiner
(c) Newland (d) Faraday

2. The scientist who introduced law of triad is

- (a) Lavoisier (b) Dobereiner
(c) Newland (d) Mendeleev.

3. Law of octaves was proposed by

- (a) Lavoisier (b) Dobereiner
(c) Newland (d) Mendeleev.

4. In 1869, Mendeleev formulated a law, which states that the properties of elements are periodic functions of their atomic masses. It is known as

- (a) periodic law (c) law of triads
(b) law of octaves (d) none of these.

5. Mendeleev predicted the existence of two. elements and named them as Eka-silicon and Eka-aluminium. Identify the element which took their position at later stage.

- (a) Si and Ge (b) Si and Ga
(c) Ge and Ga (d) Si and Al

6. Electronic configurations for four elements A, B, C and D are given below:

- A: 2, 1 B: 2,8
C: 2, 8, 1 D: 2, 8, 8

Identify the correct statements.

- (i) Elements A and B belong to the second period.
(ii) Elements A and C belong to the same group.
(iii) Element C is more reactive than element A.
(iv) Elements C and D belong to the third period

- (a) (i) and (iii) (b) (i), (ii) and (iii)
(c) (ii) and (iv) (d) All the statements are correct.

7. The vertical columns in called a periodic table are called

- (a) periods (b) groups (c) lines (d) rows.

8. Third period of the periodic table contains the following number of elements

- (a) 2 (b) 18 (c) 8 (d) 32

9. Eka-boron predicted by Mendeleev, was named as.....after it's discovery.

- (a) scandium (b) gallium (c) germanium (d) boron

10. The first group elements are called

- (a) alkali metals (b) alkaline earth metals (c) noble gases (d) halogens.

11. The elements which have incomplete penultimate shell are

- (a) representative elements (b) noble gases
(c) transition elements. (d) all of these.

12. Two elements A and B belong to group 1 and 2 respectively. Identify the correct statements.

- (i) Valency of A is one while that of B is two.
(ii) Oxide of A has formula AO and that of B is B₂O
(iii) Element A is more metallic as compared to element B.
(iv) Element A is smaller than B in size.

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

13. What type of oxide would Eka-aluminium form?

- (a) EO₃ (b) E₃O₂ (c) E₂O₃ (d) EO

14. The elements of the group 16 are called

- (a) halogens (b) noble gases
(c) chalcogens (d) alkaline earth metals.

15. The atoms of elements belonging to the same group of periodic table have the same

- (a) number of protons (b) number of electrons
(c) number of neutrons (d) number of electrons in the outermost shell.

16. Which amongst the following is not an alkaline earth metal?

- (a) Mg (b) Ba (c) Fr (d) Sr

17. Which amongst the following is not a noble gas?

- (a) Helium (b) Neon (c) Radium (d) Radon

18. From top to bottom in a group of periodic table the electropositive character of an element

- (a) increases (b) decreases
(c) remain unchanged (d) changes irregularly

19. Arrange the following elements in the order of their increasing atomic size: F, Cl, Br, I

- (a) F < Cl < Br < I (b) F < I < Br < Cl (c) Cl < F < I < Br (d) I < Br < F < Cl

20. Which of the following statements about the modern periodic table is correct?

- (a) 18 horizontal rows are called periods
(b) 18 vertical columns are called groups
(c) 7 vertical columns are called periods
(d) 7 horizontal rows are called groups

- 21.** Which one of the following element is chalcogen?
 (a) Te (b) 1 (c) Sb (d) Bi
- 22.** From left to right in a period, the acidic nature in the oxides of elements is
 (a) decreases (b) increases (c) doesn't change (d) irregular change.
- 23.** On moving from left to right in period
 (a) size of atom decreases (b) metallic character decreases
 (c) electropositive character decreases (d) all of these.
- 24.** Which of the following is the lightest metal?
 (a) Li (b) Mg (c) Na (d) Ca
- 25.** Which one of the following doesn't change from top to bottom in a group of a periodic table?
 (a) Metallic nature (b) Atomic size
 (c) Electronegativity (d) Valence electron
- 26.** An element has atomic number 16 it will belong to which period of the periodic table?
 (a) 2 (b) 3 (c) 4 (d) 5
- 27.** Which one of the following element is most electronegative?
 (a) Cl (b) Na (c) Al (d) P
- 28.** Element A has electronic configuration 2, 7, B has configuration 2, 8, 6, C has configuration 2, 8, 8 while D has 2, 8, 7. Which element will show similar chemical properties?
 (a) A and C (b) A and D (c) B and C (d) B and D
- 29.** The elements belonging to which groups are called representative elements?
 (a) Group 1, 2 and 13 to 17 (b) Group 3 to 12
 (c) Group 13 to 18 (d) Elements lying at the bottom of periodic table
- 30.** The Father of periodic table is
 (a) Dobereiner (b) Mendeleev (c) Lothar Meyer (d) Lewis.
- 31.** Atomic size increases in a group due to
 (a) addition of more electrons (b) decrease in number of protons
 (c) addition of an extra shell (d) all of the above.

Match the following

In this section, each question has two matching lists.

Choices for the correct combination of elements from List-I and List-II are given as options (a), (b), (c) and (d) out of which one is correct.

- 1.**
- | List-I | List-II |
|------------------------|-------------------------------|
| (P) Group 3 to 12 | 1. Noble gases |
| (Q) Group 18 | 2. Halogens |
| (R) Group 17 | 3. Alkali metals |
| (S) Group 1 | 4. Transition elements |
| (a) P-2, Q-3, R-1, S-4 | (b) P-4, Q-1, R-2, S-3 |
| (c) P-1, Q-2, R-4, S-3 | (d) P-3, Q-2, R-4, S-1 |

- 2.**
- | List-I | List-II |
|-------------------------|------------------------|
| (P) Law of octaves | 1. Moseley |
| (Q) Triads of elements | 2. Dobereiner |
| (R) Periodic table | 3. Mendeleev |
| (S) Modern periodic law | 4. Newlands |
| (a) P-4, Q-2, R-3, S-1 | (b) P-1, Q-2, R-4, S-3 |
| (c) P-2, Q-4, R-3, S-1 | (d) P-3, Q-2, R-4, S-1 |

- 3.**
- | List-I
(Group) | List-II
(No. of valence electrons) |
|---------------------------|-----------------------------------------------|
| (P) Group 17 | 1. 7 |
| (Q) Group 13 | 2. 2 |
| (R) Group 2 | 3. 3 |
| (S) Group 1 | 4. 1 |
| (a) P-1, Q-3, R-2, S-4 | (b) P-3, Q-2, R-4, S-1 |
| (c) P-1, Q-2, R-4, S-3 | (d) P-4, Q-1, R-2, S-3 |

- 4.**
- | List-I | List-II |
|------------------------------------|------------------------------------------------------------------------|
| (P) Valence electron in a period | 1. Decreases |
| (Q) Atomic size in a period | 2. Increases |
| (R) Valence electron in a group | 3. Decreases(electro-positive)and
increases(electronegative) |
| (S) Metallic character in a period | 4. Remain same |
| (a) P-2, Q-3, R-1, S-4 | (b) P-2, Q-1, R-4, S-3 |
| (c) P-1, Q-2, R-4, S-3 | (d) P-3, Q-2, R-4, S-1 |

- 5.**
- | List-I | List-II |
|---------------------------|------------------------|
| (P) Horizontal rows | 1. Lithium |
| (Q) Vertical columns | 2. Sodium |
| (R) Lightest metal | 3. Periods |
| (S) Most electro-positive | 4. Groups |
| (a) P-2, Q-3, R-1, S-4 | (b) P-4, Q-1, R-2, S-3 |
| (c) P-1, Q-2, R-4, S-3 | (d) P-3, O-4, R-1, S-2 |

Assertion & Reason Type

Directions: In each of the following questions, a statement of assertion is followed by a statement of reason. Mark the correct answer as:

- (a) If both assertion and reason are true and reason is the correct explanation of assertion
- (b) If both assertion and reason are true but reason is not the correct explanation of assertion
- (c) If assertion is true but reason is false
- (d) If both assertion and reason are false.

1. Assertion: The first ionisation energy of Be is greater than that of B.

Reason: 2p-orbital is lower in energy than 2s.

2. Assertion: According to Mendeleev's periodic law, the properties of elements are periodic function of their atomic numbers.

Reason: Mendeleev's periodic law could explain the phenomena of anomalous pairs.

3. Assertion: The original long form of periodic table was designed by Bohr and is also called Bohr's table.

Reason: The vertical columns of elements in the periodic table are called periods.

4. Assertion: The increasing order of non-metallic character is $\text{Si} < \text{B} < \text{C}$.

Reason: Non-metallic character increases along a period and decreases down the group.

5. Assertion: Alkali metals have the largest size in a period.

Reason: They are at the extreme left of the periodic table.

6. Assertion: Noble gases are almost inert.

Reason: They have completely filled outermost shell.

7. Assertion: Newland's law of octaves of elements is a function of their state that the property of every eighth element is the repetition of the first.

Reason: The maximum of 8 electrons can be accommodated in valence shell.

8. Assertion: F is more electronegative than Cl.

Reason: F has high electron affinity than Cl.

9. Assertion: According to Mendeleev, periodic properties of elements are function of their atomic masses.

Reason: Atomic number is equal to the number of protons.

10. Assertion: Alkali metals do not form dipositive ions.

Reason: After loss of one electron alkali metals achieve stable configuration of noble gas.

11. Assertion: Elements in the same vertical column have similar properties.

Reason: Periodicity of elements depends upon their atomic number.

12. Assertion: Properties of an atom and its corresponding ion remain same.

Reason: Electronic configurations of both atom and ion remain same.

13. Assertion: Group 18 is placed at the extreme right of the periodic table.

Reason: It is in accordance with their electronic configuration.

14. Assertion: NaCl is ionic compound.

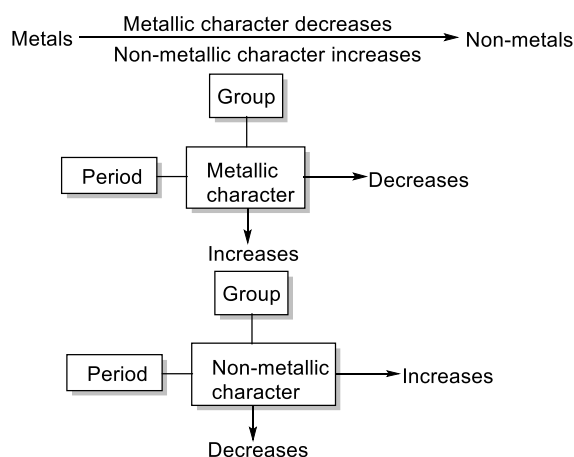
Reason: Electronegativity difference between Na and Cl is greater than 1.9.

15. Assertion: P has higher *I.E.* than sulphur.

Reason: *I.E.* increases from left to right in a period.

Comprehension Type

PASSAGE: The tendency of an element to lose electrons and form positive ions (cations) is called electropositive character. Since metals exhibit such a tendency, the electropositive character is also called metallic character. Hence, metals are electropositive in nature. The tendency of a non-metal to gain electrons and form negative ion (anion) is called electronegative character. Hence non-metals are electronegative in nature. The trend in the metallic character in groups and periods of periodic table is given below.



1. Which of the element contains most metallic character?

- (a) Cs (b) Li (c) K (d) Rb

2. Which of the following element contains least metallic character?

- (a) Li (b) Na (c) K (d) Rb

3. Which of the following is the most non-metallic element?

- (a) Cl (b) Br (c) I (d) F

Integer/Numerical Value Type

1. The period to which element of atomic number 23 belongs is
2. The element with atomic number 26 will be found in group
3. The number of elements called alkali metals is
4. The number of valence electrons in the atom of first element of a periodic table is
5. An element X belongs to 3rd period and group 2 of the periodic table. The number of valence electrons are

Case Based Questions

Case: Maximum number of electrons present in a shell is given by the formula $2n^2$, where n is the orbit number ($n = 1, 2, 3, \dots$).

For example,

K-shell (first orbit) = $2 \times (1)^2 = 2$, hence, K-shell can accommodate maximum 2 electrons.

L-shell = $2 \times (2)^2 = 8$, hence, L-shell can accommodate maximum 8 electrons.

In the modern periodic table, elements are placed according to their electronic configuration. Elements of any particular group have the same number of valence electrons. The elements present in any period contain the same number of shells. The first period of the modern periodic table corresponds to the filling of electrons in the first energy shell, i.e., K-shell, first period has two elements. The second period of the periodic table corresponds to the filling of electrons in the second energy shell, i.e., L-shell, second period contains eight elements. The third, fourth, fifth, sixth and seventh periods have 8, 18, 18, 32 and 32 elements respectively.

1. An element 'A' has electronic configuration 2, 1. The number of elements present in the period to which 'A' belongs is

- (a) 2 (b) 8 (c) 18 (d) 32

2. Which of the given elements P, Q, R, S and T with atomic numbers 2, 3, 7, 10 and 30 respectively, belong to the same period?

- (a) P, Q, R (b) Q, R, S (c) P, R, T (d) Q, S, T

3. Among the given elements P, Q, R and S with atomic numbers 4, 12, 17 and 19 respectively, which pair of elements belong to the same period?

- (a) Q and R (b) Q and S (c) P and S (d) R and P

4. Which of the following pair will have the same number of electrons in their outermost shell?

- (a) Elements with atomic numbers 3, 11, 19
(b) Elements with atomic numbers 14, 15, 16
(c) Elements with atomic numbers 12, 20, 28
(d) Elements with atomic numbers 10, 18, 28

5. An element X has two shells and both are completely filled. X is

- (a) helium (b) neon (c) potassium (d) chlorine.