PART 1

OLYMPIAD WALLAH

ADVANCED CHEMISTRY

FOR JEE & OLYMPIAD 2025

FOR 11th STANDARD STUDENTS

Ultimate Resource for NSEC Preparation

CONTENTS

EXERCISE-1

General Introduction of Chemistry & Characteristics of Chemical Reactions

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

(A) The total mass of the system remains same in a chemical change

(B) A chemical change is permanent and irreversible

(C) A physical change is temporary and reversible

(D) All of these

2. Which of the following statements is/are correct?

(A) A chemical equation tells us about the substances involved in a reaction.

(B) A chemical equation informs us about the symbols and formulae of the substances involved in a reaction.

(C) A chemical equation tells us about the atoms or molecules of the reactants and products involved in a reaction.

(D) All are correct

3. Match the column-I with column-II and select the correct option from the codes given below:

Column-I

a. Expansion of metals on heating.

b. A stone kept in the sunlight

c. Burning of a candle

d. Curdling of milk

Column-II

i. Neither physical nor chemical change

ii. Chemical change

iii. Combination of physical and chemical changes

iv. Physical change

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

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

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

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

4. Select the correct statement among the following.

(A) Crystallization is a chemical change

(B) Digestion of food is a chemical change

(C) Burning of paper is a temporary change

(D) A reversible change is always chemical

5. Read the given statements and select the correct option.

Statement-I: Breaking of a bone china plate is a physical change

Statement-II: When a bone China plate breaks, the pieces can be joined to get back the original plate.

(A) Both statements-I and -II are true and Statement-II is the correct explanation Statement-I.

(B) Both statements-I and -II are true but Statement-II is not the correct explanation Statement-I.

(C) Statement-I is true and Statement-II is false.

(D) Both Statement-I is true and Statement-II is false.

6. The reaction between aqueous solutions of sodium chloride and silver nitrate is:

(A) displacement reaction

(B) synthesis reaction

(C) double displacement reaction

(D) analysis reaction

7. $CH_4 + Cl_2 \longrightarrow CH_3Cl + HCl$ reaction is an example of:

(A) Synthetic (B) Analytical

(C) Displacement (D) Neutralisation

8. A Brown and bright element "x" when heated in presence of air turns into black substance "y". If Hydrogen gas is passed over this heating material again "x" is obtained. "x" and "y" are –

(A) Cu & CuO (B) S & SO_2

(C) C & CO_2 (D) Na & NaH

9. Which of the following is endothermic reaction?

(A) $C(s) + O_2(g) \longrightarrow CO_2(g)$

(B) $N_2(g) + O_2(g) \longrightarrow 2NO(g)$

(C) $2H_2(g) + O_2(g) \longrightarrow 2H_2O(l)$

(D) $2CH_3OH(l) + 3O_2(g) \rightarrow 2CO_2(g) + 4H_2O(l)$

10. When a burning splinter is brought near the gas jar containing hydrogen gas a popping sound is observed. It is _____ reaction.

(A) exothermic

(B) endothermic

(C) exothermic and endothermic

(D) none of these

Chemical Equations & Balancing

1. In the balanced equation, $aFe_2O_3 + bH_2 \longrightarrow cFe + dH_2O$

The values of a, b, c, d are respectively:

(A) 1, 1, 2, 3 (B) 1, 1, 1, 1

(C) 1, 3, 2, 3 (D) 1, 2, 2, 3

2. Which of the following reactions is not balanced?

(A) $2NaHCO_3 \longrightarrow Na_2CO_3 + H_2O + CO_2$

(B) $2C_4H_{10} + 12O_2 \longrightarrow 8CO_2 + 10H_2O$

(C) $2Al + 6H_2O \longrightarrow 2Al(OH)_3 + 3H_2$

(D) $4NH_3 + 5O_2 \longrightarrow 4NO + 6H_2O$

3. The equation - $Cu + xHNO_3 \rightarrow Cu(NO_3)_2 + yNO_2 + 2H_2O$

The values of x and y are -

(A) 3 and 5 (B) 8 and 6

(C) 4 and 2 (D) 7 and 1

4. In the reaction $FeSO_4 + x \rightarrow Na_2SO_4 + Fe(OH)_2$, x is –

(A) Na_2SO_4 (B) H_2SO_4

(C) NaOH (D) none of these

5. In the reaction $xPb(NO_3)_2 \rightarrow yPbO + zNO_2 + O_2$ x, y and z are -

(A) 1,2,2 (B) 2,2,4

(C) 1,2,4 (D) 4,2,2

6. In balancing the reaction.

$xH_2S + 2NaNO_3 + 2HCl \rightarrow y\,S + zNO + kNaCl + 4H_2O$ one would get x, y, z and k, respectively, as:

(A) 3, 3, 2 and 2 (B) 2, 2, 3 and 3

(C) 3, 3, 4 and 4 (D) 4, 4, 3 and 3

Redox Reactions & Oxidation Number

1. In the reaction $Mg + Cl_2 \rightarrow MgCl_2$ Magnesium may be regarded as:

(A) an oxidizing agent

(B) a reducing agent

(C) a catalyst

(D) providing an inert medium

2. When the gases sulphur dioxide and hydrogen sulphide react, the reaction is

$SO_2 + 2H_2S \rightarrow 2H_2O + 3S$

Here hydrogen sulphide is acting as -

(A) an oxidizing agent

(B) a reducing agent

(C) a dehydrating agent

(D) a catalyst

3. Which of the following statements is correct for oxidation reaction?

(A) Gain or addition of electronegative radical or element

(B) Removal of hydrogen atom

(C) Removal or loss of electropositive radical or element

(D) All the above statements are correct.

4. $CuO + H_2 \longrightarrow H_2O + Cu$, reaction is an example of -

(A) redox reaction (B) synthesis reaction

(C) neutralisation (D) analysis reaction

5. Which of the following is an example of oxidation reaction?

(A) $Sn^{+2} - 2e^- \rightarrow Sn^{+4}$ (B) $Fe^{+3} + e^- \rightarrow Fe^{+2}$

(C) $Cl_2 + 2e^- \rightarrow 2Cl^-$ (D) None of these

6. In the process of burning of magnesium in air, magnesium undergoes:
(A) reduction (B) sublimation
(C) oxidation (D) all of these

7. A substance which oxidizes itself and reduces other is known as:
(A) an oxidizing agent (B) a reducing agent
(C) Both of these (D) None of these

8. Oxidation is a process which involves:
(A) addition of oxygen
(B) removal of hydrogen
(C) loss of electrons
(D) All are correct

9. In the reaction $PbO + C \rightarrow Pb + CO$.
(A) PbO is oxidized
(B) C acts as oxidizing agent.
(C) C acts as a reducing agent.
(D) This reaction does not represent a redox reaction.

10. A redox reaction is one in which -
(A) both the substances are reduced.
(B) both the substances are oxidized.
(C) an acid is neutralised by the base.
(D) one substance is oxidized, while the other is reduced.

11. Which of the following is not an example of redox reaction?
(A) $CuO + H_2 \longrightarrow Cu + H_2O$
(B) $Fe_2O_3 + 3CO \longrightarrow 2Fe + 3CO_2$
(C) $2K + F_2 \longrightarrow 2KF$
(D) $BaCl_2 + H_2SO_4 \longrightarrow BaSO_4 + 2HCl$

12. When $KMnO_4$ acts as an oxidizing agent and ultimately forms MnO_4^{2-}, MnO_2, Mn_2O_3 and Mn^{2+}, then the number of electrons transferred in each case is:
(A) 4, 3, 1, 5 (B) 1, 5, 3, 7
(C) 1, 3, 4, 5 (D) 3, 5, 7, 1

Types of Redox Reactions

1. Neutralization reaction is an example of:
(A) exothermic reaction
(B) endothermic reaction
(C) oxidation reaction
(D) none of these

2. $Zn(s) + H_2SO_4(aq) \longrightarrow ZnSO_4(aq) + H_2(g)$ is an example of -
(A) precipitation reaction
(B) endothermic reaction
(C) evolution of gas
(D) change in colour

3. When dilute hydrochloric acid is added to iron fillings -
(A) hydrogen gas and ferric chloride are produced.
(B) chlorine gas and ferric hydroxide are produced.
(C) no reaction takes place.
(D) iron salt and water are produced.

4. Chemical reaction $2Na + Cl_2 \longrightarrow 2NaCl$ is an example of -
(A) combination reaction
(B) decomposition reaction
(C) displacement reaction
(D) double displacement reaction

5. Which of the following equations is representing combination of two elements?
(A) $CaO + CO_2 \longrightarrow CaCO_3$
(B) $4Na + O_2 \longrightarrow 2Na_2O$
(C) $SO_2 + 1/2\ O_2 \longrightarrow SO_3$
(D) $2Na + 2H_2O \longrightarrow 2NaOH + H_2$

6. Which of the following equations is not an example of single displacement reaction?
(A) $2Al + Fe_2O_3 \longrightarrow Al_2O_3 + 2Fe$
(B) $Ca + Cl_2 \longrightarrow CaCl_2$
(C) $2KI + Cl_2 \longrightarrow 2KCl + I_2$
(D) $2Na + 2H_2O \longrightarrow 2NaOH + H_2$

7. Which of the following is/are a decomposition reaction(s)?

(A) $2HgO \longrightarrow 2Hg + O_2$

(B) $CaCO_3 \longrightarrow CaO + CO_2$

(C) $2H_2O \longrightarrow 2H_2 + O_2$

(D) All of these

8. Match the following -

Column-A

Types of chemical reaction

(a) Combination reaction

(b) Decomposition reaction

(c) Displacement reaction

(d) Analysis reaction

Column-B

Chemical equations

(i) $CaCO_3 \longrightarrow CaO + CO_2$

(ii) $2H_2O \longrightarrow 2H_2 + O_2$

(iii) $CaO + CO_2 \dashrightarrow CaCO_3$

(iv) $Fe(s) + CuSO_4(aq.) \longrightarrow FeSO_4(aq) + Cu(s)$

(A) a (ii), b (i), c (iv), d (iii)

(B) a (i), b (ii), c (iii), d(iv)

(C) a (iii), b (i), c (iv), d (ii)

(D) a (iii), b (i), c (iii), d (iv)

9. Which of the following reactions is/are a double displacement reaction(s)?

(i) $AgNO_3 + NaBr \longrightarrow NaNO_3 + AgBr$

(ii) $BaCl_2 + H_2SO_4 \longrightarrow BaSO_4 + 2HCl$

(iii) $As_2O_3 + 3H_2S \longrightarrow As_2S_3 + 3H_2O$

(iv) $NaOH + HCl \longrightarrow NaCl + H_2O$

(A) (i) & (ii) (B) only (iii)

(C) only (iv) (D) (i) to (iv) all

10. $AgNO_3(aq) + NaCl(aq) \longrightarrow AgCl(s) + NaNO_3(aq)$

Above reaction is a -

(A) precipitation reaction

(B) double displacement reaction

(C) combination reaction

(D) (A) and (B) both

11. $H_2SO_4 + 2NaOH \longrightarrow Na_2SO_4 + 2H_2O$

Above equation is a -

(i) neutralization reaction

(ii) double displacement reaction

(iii) decomposition reaction

(iv) addition reaction

(A) (i) to (iv) all (B) (i) and (ii)

(C) (i) and (iii) (D) (ii) and (iv)

12. $Zn + H_2SO_4(dil) \longrightarrow ZnSO_4 + H_2 \uparrow$

Above equation is a:

(A) decomposition reaction

(B) single displacement reaction

(C) combination reaction

(D) synthesis reaction

13. The reaction in which two compounds exchange their ions to form two new compounds is:

(A) a displacement reaction

(B) a decomposition reaction

(C) an addition reaction

(D) a double displacement reaction

14. Stainless steel form by mixing iron, chromium and nickel is a:

(A) a displacement reaction

(B) a decomposition reaction

(C) an oxidation reaction

(D) None of these

15. Burning of fuel is an example of -

(A) Redox reaction

(B) displacement reaction

(C) combustion reaction

(D) (A) & (C)

16. $H_2S(g) + Cl_2(g) \longrightarrow 2\,HCl(g) + S(s)$, The reaction is interpreted as:

(A) H_2S is getting oxidized and Cl_2 is getting reduced

(B) H_2S is getting reduced and Cl_2 is getting oxidized

(C) Only H_2S is oxidized

(D) Both H_2S and Cl_2 are reduced

17. Oxidation is defined as:
(A) loss of electron (B) gain of electron
(C) loss of proton (D) gain of proton

18. The chemical reaction $HNO_3 + KOH \longrightarrow KNO_3 + H_2O$ is an example of
(A) neutralization
(B) double displacement
(C) neutralization and double displacement
(D) combination

Application of Redox Reaction

1. The term 'rancidity' represents -
(A) acid rain
(B) oxidation of fatty food
(C) rotting of fruit
(D) fading of coloured clothes in the sun.

2. Combination of phosphorus and oxygen is an example of -
(A) oxidation (B) reduction
(C) rancidity (D) none of these

3. Rancidity can be prevented by -
(A) adding antioxidants
(B) packaging oily food in nitrogen gas
(C) both (A) and (B)
(D) none of these

4. Which of the following is a combustion reaction?
(A) Boiling of water (B) Melting of wax
(C) Burning of petrol (D) None of these

5. Nitrogen gas is filled in packets of chips because:
(A) It is unreactive
(B) It is major part of atmosphere
(C) Air contains oxygen
(D) None of these

Oxidation & Reduction

1. The oxidation number of Oxygen in Na_2O_2 is:
(A) + 1 (B) + 2
(C) – 2 (D) – 1

2. One of the following has both positive and negative oxidation states
(A) F (B) Cl
(C) He (D) Na

3. The oxidation state of osmium (Os) in OsO_4 is
(A) + 7 (B) + 6
(C) + 4 (D) + 8

4. Oxidation number of nitrogen in $(NH_4)_2SO_4$ is
(A) $-\frac{1}{3}$ (B) – 1
(C) + 1 (D) – 3

5. In which of the following compounds, the oxidation number of iodine is fractional?
(A) IF_7 (B) I_3^-
(C) IF_5 (D) IF_3

6. The oxidation number of cobalt in $K_3[Co(NO_2)_6]$ is
(A) 0 (B) +4
(C) +3 (D) +6

7. Phosphorus has the oxidation state of +3 in
(A) Phosphorous acid
(B) Orthophosphoric acid
(C) Hypophosphorous acid
(D) Metaphosphoric acid

8. The oxidation number of Phosphorus in $Mg_2P_2O_7$ is:
(A) + 3 (B) + 2
(C) + 5 (D) – 3

9. In which of the following compounds, nitrogen has an oxidation state of –1?
(A) N_2O (B) NO_2^-
(C) NH_2OH (D) N_2H_4

EXERCISE-2

1. 0.0026 M I_2 solution having unknown volume is reacted with excess of ferrous thiocyanate solution to form Fe_2O_3, SO_4^{2-}, CN^- along with I^-. If all the sulphate ions formed are precipitated using $BaCl_2$ such that 1.6776 gm of $BaSO_4$ is obtained calculate volume of I_2 consumed in Litre. (At. mass: Ba = 137)

2. 100ml of H_2O_2 solution having volume strength 11.2 V is mixed with 500 ml of 0.5 M KI solution to liberate I_2 gas such that equilibria gets established. All the I_2 gas liberated is dissolved to form 500 ml solution. 200 ml of the solution required 50 ml of $\frac{2}{3}$M hypo solution. Calculate volume strength of remaining H_2O_2 mixture.

3. 100 ml of 0.1MKMnO$_4$ is consumed in its titration with oxalic acid in presence of dil HCl whose excess amount was taken. The $Cl_{2(g)}$ produced is reacted with excess of KI solution producing I_2 which required 170 ml of 0.2 M hypo solution for complete reaction. Calculate millimoles of oxalic acid consumed.

4. A 4 M, 500 ml aqueous solution containing M^{1+} is made to react with 1M, 1L HNO_3. As a result some of M^{1+} is converted into M^{X+} and all HNO_3 into NO(g). After the reaction concentration of M^{X+} ions becomes $\frac{1}{3}$M value of X is :

5. Calculate molarity of 50 ml $H_2C_2O_4$, which can be oxidised by 200 ml of MnO_4^- solution. In separate titration 20 ml of same MnO_4^- solution is capable of oxidising 30 ml of 1 N of I^- solution to I_2 in neutral medium.

6. When 3 gm of a certain metal sulphide was roasted in air, 2.5 gm of metal oxide was formed and along with SO_2 gas release. If oxidation number of metal is +2. Calculate molar mass of metal.

7. Some gm of an element 'X' is heated with NaOH and $NaNO_3$ to produce Na_2XO_2 and NH_3. Ammonia produced is absorbed in 100 ml of 0.11 M-H_2SO_4 and excess of acid is back titrated with 48 ml of0.25 M-NaOH. How many moles of H_2 gas would be liberated when 2 moles of 'X' is treated with excess of NaOH solution. 'X' again converts into Na_2XO_2 in this reaction.

8. Find the number of moles of NaOH required to neutralize 448 gm equimolar mixture of $Na_2C_2O_4$ and $H_2C_2O_4$.

9. The ion A^{+n} is oxidised to AO_3^- by MnO_4^- in acidic medium. 2.5 millimoles of A^{+n} require 10 ml of 0.1 M $KMnO_4$. What is value of 'n'?

10. 36.4 gm V_2O_5 is dissolved in acid and reduced to V^{2+} using zinc dust. What volume (in l) of 0.1 M-I_2 solution is needed for complete oxidation of V^{2+} formed, into V^{4+} ? (V = 51)

11. A volume of 33.33 cm^3 of 0.1 N NaOH is required for neutralization of 0.1 g of an organic acid (VD of acid is 30). Then basicity of acid is _____.

12. Titration of 0.88 g sample of impure $Na_2B_4O_7$ require 32 ml of 0.1 M HCl

$$B_4O_7^{2-} + 2H_3O^+ + 3H_2O \longrightarrow 4H_3BO_3$$

Find % of B in sample.

13. Calculate number of moles of iodine containing product formed due to oxidation of one mole of iodide using per manganate ion in faintly alkaline solution.

14. An element A form two oxides. The weight ratio of A and O in oxides are x : y and y : x respectively. If equivalents weight of A in first oxide is $\frac{32}{3}$. What is equivalent weight of A in second oxides?

EXERCISE-3

1. In the balanced equation -

$aHgS + bHCl + cHNO_3 \longrightarrow dH_2HgCl_4 + eNO + fS + gH_2O$

The values of b, c, e, and g are respectively:

(A) 2, 2, 4, 12 (B) 6, 1, 1, 2

(C) 12, 2, 2, 4 (D) both (B) and (C)

2. In the reaction $FeSO_4 + x \longrightarrow Na_2SO_4 + Fe(OH)_2$, x is -

(A) Na_2SO_4 (B) H_2SO_4

(C) NaOH (D) none of these

3. In the reaction the possible state of $Ca(OH)_2$ is -

(A) liquid (B) aqueous

(C) gaseous (D) solid

4. Combustion is a process involving -

(A) oxidation (B) reduction

(C) liberation of heat (D) All (A), (B) & (C)

5. $aK_2Cr_2O_4 + bKCl + cH_2SO_4 \longrightarrow xCrO_2Cl_2 + y KHSO_4 + zH_2O$

The above equation balances when

(A) a = 2, b = 4, c = 6 and x = 2, y = 6, z = 3

(B) a = 4, b = 2, c = 6 and x = 6, y = 2, z = 3

(C) a = 6, b = 4, c = 6 and x = 6, y = 3, z = 2

(D) a = 1, b = 4, c = 6 and x = 2, y = 6, z = 3

6. In the reaction $Mg + Cl_2 \rightarrow MgCl_2$

Chlorine may be regarded as -

(A) an oxidizing agent

(B) a reducing agent

(C) a catalyst

(D) providing an inert medium

7. The antioxidant which is used to prevent rancidity in foods is

(A) butylated hydroxyl anisole.

(B) sodium hydroxide.

(C) sodium carbonate.

(D) methylated hydroxyl anisole

8. The colour of the chemical that changes when it is left open in sunlight is -

(A) $FeSO_4$ (s) (B) $Pb(NO_3)_2$ (s)

(C) AgCl (s) (D) $BaCl_2$ (aq)

9. Sun produces heat and light by -

(A) combustion

(B) inflammation

(C) nuclear reactions

(D) photochemical reactions

10. Heating of calcium carbonate to give calcium oxide and carbon dioxide is -

(A) An oxidation process

(B) A reduction process

(C) Disproportionation

(D) Decomposition

11. Which of the following statement(s) is/are correct?

(A) Many compounds can be used as oxidizing as well as reducing agent

(B) We need equal moles and equal volumes of strong monobasic acid and strong monoacidic base to completely neutralize themselves

(C) The quantity of a catalyst does not change at the end of a chemical reaction

(D) All of these are correct

12. The elements undergoing reduction and oxidation during the reaction,

$(NH_4)_2Cr_2O_7 \longrightarrow N_2 + Cr_2O_3 + 4H_2O$ are respectively

(A) N and Cr (B) Cr and N

(C) N and O (D) Cr and O

13. The decomposition of $KClO_3$ to KCl and O_2 on heating is an example of:

(A) Intermolecular redox change

(B) Intramolecular redox change

(C) Disproportionation or auto redox change

(D) None of the above

14. Which of the following can act as oxidant?

(A) H_2O_2 (B) H_2S

(C) NH_3 (D) None of these

15. Conversion of $PbSO_4$ to PbS is -

(A) reduction of S (B) oxidation of S

(C) dissociation (D) none of these

16. Which of the following is redox reaction?

(A) $NaOH + HCl \longrightarrow NaCl + H_2O$

(B) $AgNO_3 + KI \longrightarrow AgI + KNO_3$

(C) $BaO_2 + H_2SO_4 \longrightarrow BaSO_4 + H_2O_2$

(D) $SnCl_2 + HgCl_2 \longrightarrow SnCl_4 + Hg$

17. In a conjugate pair of reductant and oxidant, the reductant has:

(A) Lower ox. no. (B) Higher ox. no.

(C) Same ox. no. (D) Either of these

18. Oxidation is process which involves:

(A) De-electronation

(B) Electronation

(C) Addition of hydrogen

(D) Addition of metal

19. Oxidants are substances which:

(A) Show a decrease in their oxidation number during a change

(B) Gain electrons during a change

(C) Oxidize others and reduce themselves

(D) All of the above

20. If an iron rod is dipped in $CuSO_4$ solution:

(A) Blue colour of the solution turns red

(B) Brown layer is deposited on iron rod

(C) No change occurs in the colour of the solution

(D) None of the above

21. Which of the following is a redox reaction?

(A) $CaCO_3 \longrightarrow CaO + CO_2$

(B) $H_2 + Cl_2 \longrightarrow 2HCl$

(C) $CaO + 2HCl \longrightarrow CaCl_2 + H_2O$

(D) $NaOH + HCl \longrightarrow NaCl + H_2O$

22. Which of the following statement about the following reaction is correct?

$ZnO + CO \longrightarrow Zn + CO_2$

(A) ZnO is being oxidized

(B) CO is being reduced

(C) CO_2 is being oxidized

(D) ZnO is being reduced

23. Calorific value of a fuel may be defined as -

(A) The amount of heat produced when 1000 kg of a fuel is completely burnt.

(B) The amount of heat produced when 1g of fuel is incompletely burnt.

(C) The amount of heat produced when 10 g of a fuel is completely burnt.

(D) The amount of heat produced in kilo joules when unit mass of a fuel is completely burnt.

24. Which of the following fuels has the highest calorific value?

(A) Petrol (B) Hydrogen

(C) LPG (D) Natural gas

25. In which zone of a candle flame does complete combustion take place?

(A) Inner (B) Outer

(C) Middle (D) All three zones

26. The zone of no combustion is -

(A) the middle zone

(B) outermost zone

(C) the base of the flame

(D) innermost zone.

27. The colour of the flame in luminous zone is -

(A) blue (B) red

(C) yellow (D) black

28. The non-combustible substance among the following is -

(A) coal (B) glass

(C) wood (D) paper

JEE MAIN PYQ

1. To neutralise completely 20 mL of 0.1 M aqueous solution of phosphorous acid (H_3PO_3), the volume of0.1 M aqueous KOH solution required is: **[AIEEE 2004]**

(A) 10 mL (B) 20 mL

(C) 40 mL (D) 60 mL

2. The oxidation state of Cr in $[Cr(NH_3)_4Cl_2]^+$ is: **[AIEEE-2005]**

(A) +2 (B) +3

(C) 0 (D) +1

3. The oxidation state of chromium in the final product formed by the reaction between Kl and acidified potassium dichromate solution is: **[AIEEE-2005]**

(A) +6 (B) +4

(C) +3 (D) +2

4. Which of the following chemical reactions depicts the oxidizing behaviour of H_2SO_4? **[AIEEE 2006]**

(A) $Ca(OH)_2 + H_2SO_4 \rightarrow CaSO_4 + 2H_2O$

(B) $NaCl + H_2SO_4 \rightarrow NaHSO_4 + HCl$

(C) $2PCl_5 + H_2SO_4 \rightarrow 2POCl_3 + 2HCl + SO_2Cl_2$

(D) $2HI + H_2SO_4 \rightarrow I_2 + SO_2 + 2H_2O$

5. Amount of oxalic acid present in a solution can be determined by its titration with $KMnO_4$ solution in the presence of H_2SO_4. The titration gives unsatisfactory result when carried out in the presence of HCl, because HCl: **[AIEEE 2008]**

(A) gets oxidised by oxalic acid to chlorine

(B) furnishes H^+ ions in addition to those from oxalic acid

(C) reduces permanganate to Mn^{2+}

(D) oxidises oxalic acid to carbon dioxide and water

6. Three reactions involving $H_2PO_4^-$ are given below:

(i) $H_3PO_4 + H_2O \longrightarrow H_3O^+ + H_2PO_4^-$

(ii) $H_2PO_4^- + H_2O \longrightarrow HPO_4^{2-} + H_3O^+$

(iii) $H_2PO_4^- + OH^- \longrightarrow H_3PO_4 + O^{2-}$

In which of the above does $H_2PO_4^-$ act as an acid? **[AIEEE 2010]**

(A) (i) only (B) (ii) only

(C) (i) and (ii) (D) (iii) only

7. The mass of potassium dichromate crystals required to oxidise 750 cm^3 of 0.6 M Mohr's salt solution

is: (Given molar mass: potassium dichromate = 294, Mohr's salt = 392) **[JEE Main-2011]**

(A) 22.05 g (B) 2.2 g

(C) 0.49 g (D) 0.45 g

8. Consider the following reaction: **[JEE Main-2013]**

$$xMnO_4^- + yC_2O_4^{2-} + zH^+ \rightarrow xMn^{2+} + 2yCO_2 + \frac{z}{2}H_2O$$

The value of *x*, *y* and *z* in the reaction are, respectively:

(A) 2, 5 and 8 (B) 2, 5 and 16

(C) 5, 2 and 8 (D) 5, 2 and 16

9. In which of the following reactions H_2O_2 acts as a reducing agent? **[JEE Main 2014]**

(i) $H_2O_2 + 2H^+ + 2e^- \rightarrow 2H_2O$

(ii) $H_2O_2 - 2e^- \rightarrow O_2 + 2H^+$

(iii) $H_2O_2 + 2e^- \rightarrow 2OH^-$

(iv) $H_2O_2 + 2OH^- - 2e^- \rightarrow O_2 + 2H_2O$

(A) (iii), (iv) (B) (i), (iii)

(C) (ii), (iv) (D) (i), (ii)

10. The volume of 0.1 M strong dibasic acid sufficient to neutralize 1 g of a base that furnishes 0.04 mole of OH^- in aqueous solution is: **[JEE Main-2016]**

(A) 400 mL (B) 600 mL

(C) 200 mL (D) 800 mL

11. The pair of compounds having metals in their highest oxidation state is: **[JEE Main-2017]**

(A) Mn_2O_7 and CrO_2Cl_2

(B) $[Fe(CN)_6]^{3-}$ and $[Cu(CN)_4]^{2-}$

(C) $[NiCl_4]^{2-}$ and $[CoCl_4]^{2-}$

(D) $[FeCl_4]^{-}$ and Co_2O_3

12. An alkali is titrated against acid with methyl orange as an indicator, which of the following is a correct combination? **[JEE Main-2018]**

(A) Base $\rightarrow$ Strong; Acid $\rightarrow$ Strong; End point $\rightarrow$ Pink to colourless

(B) Base $\rightarrow$ Weak; Acid $\rightarrow$ Strong; End point $\rightarrow$ Colourless to pink

(C) Base $\rightarrow$ Strong; Acid $\rightarrow$ Strong; End point $\rightarrow$ Pinkish red to yellow

(D) Base $\rightarrow$ Weak; Acid $\rightarrow$ Strong; End point $\rightarrow$ Yellow to pinkish red

13. In the reaction of oxalate with permanganate in acidic medium, the number of electrons involved in producing one molecule of CO_2 is: **[JEE Main-2019]**

(A) 2 (B) 10

(C) 1 (D) 5

14. 50 mL of 0.5 M oxalic acid is needed to neutralize 25 mL of sodium hydroxide solution. What is the amount of NaOH in 50 mL of the given sodium hydroxide solution? **[JEE Main-2019]**

(A) 2 g (B) 4 g

(C) 1 g (D) 8 g

15. Given that,

$E^{\circ}_{O_2/H_2O} = +1.23V$; $E^{\circ}_{S_2O_8^{2-}/SO_4^{2-}} = 2.05V$

$E^{\circ}_{Br_2/Br^-} = +1.09V$; $E^{o}_{Au^3/Au} = 1.4V$

The strongest oxidizing agent is: **[JEE Main-2019]**

(A) O_2 (B) $S_2O_8^{2-}$

(C) Br_2 (D) Au^{3+}

16. In order to oxidize a mixture of one mole of each of FeC_2O_4, $Fe_2(C_2O_4)_3$, $FeSO_4$ and $Fe_2(SO_4)_3$ in acidic medium, the number of moles of $KMnO_4$ is: **[JEE Main-2019]**

(A) 1 (B) 2

(C) 3 (D) 1.5

17. Given:

$Co^{3+} + e^- \rightarrow Co^{2+}$; $E^{\circ} = +1.81V$

$Pb^{3+} + 2e^- \rightarrow Pb^{2+}$; $E^{\circ} = +1.67V$

$Ce^{4+} + e^- \rightarrow Ce^{3+}$; $E^{o} = +1.61V$

$Bi^{3+} + 3e^- \rightarrow Bi$; $E^{o} = +0.20V$

Oxidizing power of the species will increase in the order: **[JEE Main-2019]**

(A) $Co^3 + < Ce^{4+} < Bi^{3+} < Pb^{4+}$

(B) $Bi^3 + < Ce^{4+} < Pb^{4+} < Co^{3+}$

(C) $Co^3 + < Pb^{4+} < Ce^{3+} < Bi^{4+}$

(D) $Ce^4 + < Pb^{4+} < Bi^{3+} < Co^{3+}$

18. Oxidation number of potassium in K_2O, K_2O_2 and KO_2 respectively, is: **[JEE Main-2020]**

(A) +2, +1 and +1/2 (B) +1, +1 and +1

(C) +1, +4 and +2 (D) +1, +2 and +4

19. Consider the following reactions: **[JEE Main-2020]**

$NaCl + K_2Cr_2O_7 + H_2SO_4 \rightarrow$ (A) + side products (Conc.)

(A) $+NaOH \rightarrow$ (B) + side products

(B) $+H_2SO_4 + H_2O_2 \rightarrow$ (C) + side products (dilute)

The sum of the total number of atoms in one molecule each of (A), (B) and (C) is_____.

20. The redox reaction among the following is: **[JEE Main-2020]**

(A) formation of ozone from atmospheric oxygen in the presence of sunlight

(B) reaction of $[Co(H_2O)_6]Cl_3$ with $AgNO_3$

(C) reaction of H_2SO_4 with NaOH

(D) combination of dinitrogen with dioxygen at 2000 K

NSEC PYQ

1. If the equivalent weight of an element is 32, then the percentage of oxygen in its oxide is: **[NSEC-2000]**

(A) 16 (B) 40
(C) 32 (D) 20

2. In alkaline medium, $KMnO_4$ reacts as follows (Atomic weights K = 39.09, Mn = 54.94, O = 16.00)

$2KMnO_4 + 2KOH \rightarrow 2K_2MnO_4 + H_2O + [O]$

Hence, its equivalent weight is: **[NSEC-2000]**

(A) 31.6 (B) 63.2
(C) 126.4 (D) 158

3. When 25 g of Na_2SO_4 is dissolved in 10^3 Kg of solution, its concentration will be **[NSEC-2000]**

(A) 2.5 ppm (B) 25 ppm
(C) 250 ppm (D) 100 ppm

4. Which amongst the following has the highest normality? **[NSEC-2002]**

(A) 16.0 g of NaOH in 200 mL of water
(B) 1 N oxalic acid
(C) 2 M sulphuric acid
(D) 1.5 hydrochloric acid

5. The volume of water which must be added to 0.4 dm^3 of 0.25 N oxalic acid in order to make it exactly decinormal is : **[NSEC-2002]**

(A) 0.2 dm^3 (B) 0.4 dm^3
(C) 0.6 dm^3 (D) 0.8 dm^3

6. The quantity of electricity required to reduce 0.05 mol of MnO_4^- to Mn^{2+} in acidic medium would be **[NSEC-2003]**

(A) 0.01 F (B) 0.05 F
(C) 0.15 F (D) 0.25 F

7. You are given a solution of an alkali. In order to estimate its concentration in terms of normality, you need to know **[NSEC-2003]**

(A) the volume of the solution, the volume of the alkali present in it and its formula weight
(B) the mass of the solution, the mass of the alkali present in it and its equivalent weight.
(C) the volume of the solution, the mass of the alkali present in it and its equivalent weight
(D) the mass of the solution, the volume of the alkali present in it and its equivalent weight.

8. The normality of '20 volume' H_2O_2 solution is **[NSEC-2005]**

(A) 2.0 (B) 2.5
(C) 3.0 (D) 3.5

9. Hydrazine N_2H_4 acts as a reducing agent. To prepare 100 ml of 2 N hydrazine solution, the weight required will be **[NSEC-2006]**

(A) 6.4 g (B) 1.6 g
(C) 3.2 g (D) 0.8 g

10. For the reaction shown below, which statement is true ? **[NSEC-2007]**

$2Fe + 3CdCl_2 \rightleftharpoons 2FeCl_3 + 3Cd$

(A) Fe is the oxidizing agent
(B) Cd undergoes oxidation
(C) Cd is the reducing agent
(D) Fe undergoes oxidation

11. Oxalic acid ($H_2C_2O_4$) reacts with permanganate ion according to the balanced equation given below:

$5H_2C_2O_{4(aq)} + 2MnO_{4\,(aq)} + 6H^+_{(aq)} \rightarrow 2Mn^{2+}\,(aq) + 10CO_{2(g)} + 8H_2O_{(l)}$

How many mL of 0.0154 M $KMnO_4$ solution are required to react with 25.0 mL of 0.0208 M $H_2C_2O_4$ solution? **[NSEC-2008]**

(A) 13.5 mL (B) 18.5 mL
(C) 33.8 mL (D) 84.4 mL

12. What volume of water should be added to 1600 ml of a 0.205 N solution so that the resulting solution will be 0.2 N ? **[NSEC-2008]**

(A) 40 mL (B) 50 mL
(C) 100 mL (D) 20 mL

13. The compound which can act as an oxidizing agent as well as reducing agent is **[NSEC-2010]**

(A) HNO_2 (B) HI
(C) HCN (D) HCOOH

14. Oxalic acid, $H_2C_2O_4$, reacts with paramanganate ion according to the balanced equation

$5H_2C_2O_4(aq) + 2MnO_4^-(aq) + 6H^+(aq) \rightleftharpoons 2Mn^{2+}(aq) + 10\ CO_2(g) + 8\ H_2O(l)$. The volume in mL of 0.0162 M $KMnO_4$ solution required to react with 25.0 mL of 0.022 M $H_2C_2O_4$ solution is: **[NSEC-2011]**

(A) 13.6 (B) 18.5
(C) 33.8 (D) 84.4

15. A 500 g toothpaste sample has 0.4 g fluoride concentration. The fluoride concentration in terms of ppm will be **[NSEC-2012]**

(A) 200 (B) 400
(C) 500 (D) 800

16. The number of moles of $KMnO_4$ that will be needed to react completely with one mole of ferrous oxalate [$Fe(C_2O_4)$] in acidic solution is **[NSEC-2012]**

(A) 1 (B) 2/5
(C) 3/5 (D) 4/5

17. The rate of the reaction $MnO_4^-{}_{(aq.)} + 8H^+_{(aq.)} + 5Fe^{2+}_{(aq.)} \rightarrow Mn^{2+}_{(aq.)} + 5Fe^{3+}_{(aq.)} + 4H_2O$ can be best measured by monitoring calorimetrically the concentration of : **[NSEC-2012]**

(A) $MnO_4^-{}_{(aq.)}$ (B) $Mn^{2+}_{(aq.)}$
(C) $Fe^{2+}_{(aq.)}$ (D) $Fe^{3+}_{(aq.)}$

18. I. $5H_2O + 2MnO_4^- + 6H^+ \rightarrow 2Mn^{2+} + 5O_2 + 8H_2O$
II. $H_2O_2 + Ag_2O \rightarrow 2Ag + H_2O + O_2$
The role of hydrogen peroxide in the above reaction is: **[NSEC-2014]**

(A) oxidising in I and reducing in II
(B) reducing in I and oxidising in II
(C) reducing in I as well as in II
(D) oxidising in I as well as in II

19. A bottle of H_3PO_4 solution contains 70% acid. If the density of the solution is 1.54 g cm^{-3}, the volume of the H_3PO_4 solution required to prepare 1L of IN solution is. **[NSEC-2015]**

(A) 90mL (B) 45mL
(C) 30mL (D) 23mL

20. The unbalanced equation for the reaction of P_4S_3 with nitrate in aqueous acidic medium is given below.
$P_4S_3 + NO_3^- \rightarrow H_3PO_4 + SO_4^{2-} + NO$
The number of mol of water required per mol of P_4S_3 is **[NSEC-2015]**

(A) 18 (B) 8/3
(C) 8 (D) 28

21. In the redox reaction, $2MnO_4^- + 5C_2O_4^{2-} + 16H^+ \rightarrow 2Mn^{2+} + 10CO_2 + 8H_2O$,
20 mL of 0.1 M $KMnO_4$ react quantitatively with **[NSEC-2015]**

(A) 20 mL of 0.1 M oxalate
(B) 40 mL of 0.1 M oxalate
(C) 50 mL of 0.25 M oxalate
(D) 50 mL of 0.1 M oxalate

22. 1.250 g of metal carbonate (MCO_3) was treated with 500 mL of 0.1 M HCl solution. The unreacted HCl required 50.0 mL of 0.500 M NaOH solution for neutralization. Identify the metal M **[NSEC-2016]**

(A) Mg (B) Ca
(C) Sr (D) Ba

23. Battery acid (H_2SO_4) has density 1.285 g cm^{-3}. 10.0 cm^3 of this acid is diluted to 1L. 25.0 cm^3 of this diluted solution requires 25.0 cm^3 of 0.1 N sodium hydroxide solution for neutralization. The percentage of sulphuric acid by mass in the battery acid is : **[NSEC-2016]**

(A) 98 (B) 38
(C) 19 (D) 49

24. A sample of water from a river was analyzed for the presence of metal ions and the observations were recorded as given below

Reagent added	Observation
dil. HCl	No change
aq. Na_2CO_3	White precipitate
aq. Na_2SO_4	No change

The water sample is likely to contain: **[NSEC-2018]**

(A) Ba^{2+} (B) Cu^{2+}
(C) Li^+ (D) Mg^{2+}

25. An ion exchange resin, RH_2 can replace Ca^{2+} in hard water as $RH_2 + Ca^{2+} \rightarrow RCa^{2+} + 2H^+$. When a 1.0 L hard water sample was passed through the resin, all H^+ ions were replaced by Ca^{2+} ions and the pH of eluted water was found to be 2.0. The hardness of water (as ppm of Ca^{2+}) in the sample of water treated is **[NSEC-2018]**

(A) 50 (B) 100
(C) 125 (D) 200

26. Among the following, the reaction/s that can be classified as oxidation-reduction is/are. **[NSEC-2018]**

(i) $Cr_2O_7^{2-}(aq.)\ 2OH^-(aq) \rightarrow 2CrO_4^{2-} + H_2O(l)$

(ii) $SiCl_4(l) + 2Mg(s) \rightarrow 2MgCl_2(l) + Si(s)$

(iii) $6Cl_2(l) + 12KOH(l) \rightarrow 2KClO_3(g) + 10\ KCl + 6H_2O(l)$

(iv) $2H_2O_2 \rightarrow 2H_2O(l) + O_2(g)$

(A) I and IV (B) I, II and III
(C) II, III and IV (D) IV only

27. In the following reaction, the values of a, b and c, respectively are: **[NSEC-2018]**

$aF_2(g) + b\ OH^-(aq) \rightarrow cF^-(aq) + d\ OF_2(g) + e\ H_2O(l)$

(A) 3, 2, 4 (B) 3, 4, 2
(C) 2, 2, 4 (D) 2, 2, 2

28. The results obtained by four students, each performing a set of four titrations with the same solution under identical conditions, are given below. If the expected titre value is 20.0 mL, the set of data (mL) with good accuracy and poor precision is: **[NSEC-2022]**

(A) 19.9, 20.0, 20.1, 19.9
(B) 18.1, 18.2, 18.0, 18.1
(C) 17.9, 18.1, 21.5, 21.0
(D) 20.0, 19.8, 19.4, 20.2

29. Br_2 disproportionate to Br^- and BrO_3^- in a hot alkaline solution as

$$3Br_2 + 6OH^- \rightarrow 5Br^- + BrO_3^- + 3H_2O$$

The equivalent weight of Br_2 is: $(M =$ molar mass of $Br_2)$ **[NSEC-2022]**

(A) M/5 (B) M/6
(C) 3M/5 (D) 5M/3

30. Which of the following statements is true with respect to sodium salts of oxoanions of phosphorus NaH_2PO_2 and Na_2HPO_3 **[NSEC-2023]**

(A) NaH_2PO_2 is reducing and Na_2HPO_3 is oxidizing
(B) NaH_2PO_2 is more reducing than Na_2HPO_3
(B) NaH_2PO_2 is more oxidizing than Na_2HPO_3
(C) NaH_2PO_2 is oxidizing and Na_2HPO_3 is reducing

31. In each of the following reactions, role of water is: **[NSEC-2023]**

(i) $H_2O + HCl \rightarrow H_3O^+ + Cl^-$

(ii) $6H_2O + Mg^{2+} \rightarrow \left[Mg(H_2O)_6\right]^{2+}$

(iii) $2H_2O + 2F_2 \rightarrow 4HF + O_2$

(A) (i) oxidant; (ii) reductant; (iii) base
(B) (i) reductant; (ii) oxidant; (iii) base
(C) (i) base; (ii) base; (iii) reductant
(D) (i) acid; (ii) base; (iii) reductant

32. Consider the following statements about the given mechanism: **[NSEC-2024]**

$A + B \rightarrow C + D$

$2C \rightarrow F$

$F + B \rightarrow 2A + G$

(i) The overall reaction is $3B \rightarrow 2D + G$
(ii) A is a catalyst and B is a reactant
(iii) C and F are intermediates
(iv) D and G are products

The correct set of statements is:

(A) (i) and (ii) only
(B) (iii) and (iv) only
(C) (ii), (iii) and (iv) only
(D) All (i), (ii), (iii) and (iv)

JEE ADVANCED PYQ

1. Consider a titration of potassium dichromate solution with acidified Mohr's salt solution using diphenylamine as indicator. The number of moles of Mohr's salt required per mole of dichromate is: **[JEE 2007]**

(A) 3 (B) 4
(C) 5 (D) 6

2. Match the reactions in Column I with nature of the reactions / type of the products in Column II. Indicate your answer by darkening the appropriate bubbles of the 4 × 4 matrix given in the OMR. **[JEE 2007]**

[For Class 11th students, attempt only "A" and "C" part]

Column I

(A) $O_2^- \rightarrow O_2 + O_2^{2-}$

(B) $CrO_4^{2-} + H^+ \rightarrow$

(C) $MnO_4^- + NO_2^- + H^+ \rightarrow$

(D) $NO_3^- + H_2SO_4 + Fe^{2+} \rightarrow$

Column II

(P) Redox reaction
(Q) one of the products has trigonal planar structure
(R) dimeric bridged tetrahedral metal ion
(S) disproportionation

3. White phosphorus on reaction with NaOH gives PH_3 as one of the products. This is a: **[JEE 2008]**

[Given: $P + NaOH \longrightarrow PH_3 + NaH_2PO_2$]

(A) dimerization reaction
(B) disproportionation reaction
(C) condensation reaction
(D) precipitation reaction

4. Reaction of Br_2 with Na_2CO_3 in aqueous solution gives sodium bromide and sodium bromate with evolution of CO_2 gas. The number of sodium bromide molecules involved in the balanced chemical equation is: **[JEE 2011]**

5. Reduction of the metal centre in aqueous permanganate ion involves: **[JEE 2011]**

(A) 3 electrons in neutral medium
(B) 5 electrons in neutral medium
(C) 3 electrons in alkaline medium
(D) 5 electrons in acidic medium

6. Which ordering of compounds is according to the decreasing order of the oxidation state of nitrogen? **[JEE 2012]**

(A) HNO_3, NO, NH_4Cl, N_2
(B) HNO_3, NO, N_2, NH_4Cl
(C) HNO_3, NH_4Cl, NO, N_2
(D) NO, HNO_3, NH_4Cl, N_2

7. Bleaching powder and bleach solution are produced on a large scale and used in several household products. The effectiveness of bleach solution is often measured by iodometry. **[JEE 2012]**

25 mL of household bleach solution was mixed with 30 mL of 0.50 M KI and 10 mL of 4N acetic acid. In the titration of the liberated iodine, 48 mL of 0.25 N $Na_2S_2O_3$ was used to reach the end point. The molarity of the household bleach solution is:

(A) 0.48 M (B) 0.96 M
(C) 0.24 M (D) 0.024 M

8. For the reaction: **[JEE Adv. 2014]**

$I^- + ClO_3^- + H_2SO_4 \rightarrow Cl^- + HSO_4^- + I_2$

The correct statement(s) in the balanced equation is/are:

(A) Stoichiometric coefficient of HSO_4^- is 6
(B) Iodide is oxidized
(C) Sulphur is reduced
(D) H_2O is one of the products

9. In dilute aqueous H_2SO_4, the complex diaquodioxalatoferrate(II) is oxidized by MnO_4^-. For this reaction, the ratio of the rate of change of $[H^+]$ to the rate of change of $[MnO_4^-]$ is **[JEE Adv. 2015]**

Answer Key

EXERCISE-1

General Introduction of Chemistry & Characteristics of Chemical Reactions

1.	(D)	**2.**	(D)	**3.**	(A)	**4.**	(B)	**5.**	(C)	**6.**	(C)	**7.**	(C)
8.	(A)	**9.**	(B)	**10.**	(A)								

Chemical Equations & Balancing

1.	(C)	**2.**	(B)	**3.**	(C)	**4.**	(C)	**5.**	(B)	**6.**	(A)

Redox Reactions & Oxidation Number

1.	(B)	**2.**	(B)	**3.**	(D)	**4.**	(A)	**5.**	(A)	**6.**	(C)	**7.**	(B)
8.	(D)	**9.**	(C)	**10.**	(D)	**11.**	(D)	**12.**	(C)				

Types of Redox Reactions

1.	(A)	**2.**	(C)	**3.**	(A)	**4.**	(A)	**5.**	(B)	**6.**	(B)	**7.**	(D)
8.	(C)	**9.**	(D)	**10.**	(D)	**11.**	(B)	**12.**	(B)	**13.**	(D)	**14.**	(D)
15.	(D)	**16.**	(A)	**17.**	(A)	**18.**	(B)						

Application of Redox Reaction

1.	(B)	**2.**	(A)	**3.**	(C)	**4.**	(C)	**5.**	(A)

Oxidation & Reduction

1.	(D)	**2.**	(B)	**3.**	(D)	**4.**	(D)	**5.**	(B)	**6.**	(C)	**7.**	(A)
8.	(C)	**9.**	(C)	**10.**	(B)	**11.**	(C)	**12.**	(D)	**13.**	(D)		

Redox Reactions

1.	(A)	**2.**	(D)	**3.**	(C)	**4.**	(B)	**5.**	(D)	**6.**	(B)	**7.**	(B)
8.	(D)	**9.**	(B)	**10.**	(C)	**11.**	(C)	**12.**	(D)				

Concept of Equivalent and Titration

1.	(D)	**2.**	(D)	**3.**	(A)	**4.**	(C)	**5.**	(B)	**6.**	(B)	**7.**	(D)
8.	(C)	**9.**	(A)	**10.**	(B)	**11.**	(A)	**12.**	(D)	**13.**	(A)	**14.**	(D)
15.	(B)	**16.**	(D)	**17.**	(C)	**18.**	(B)	**19.**	(C)	**20.**	(A)	**21.**	(B)
22.	(C)	**23.**	(C)	**24.**	(A)	**25.**	(C)	**26.**	(B)				

EXERCISE-2

1.	(9)	**2.**	(1)	**3.**	(8)	**4.**	(7)	**5.**	(5)	**6.**	(8)	**7.**	(2)
8.	(4)	**9.**	(3)	**10.**	(4)	**11.**	(2)	**12.**	(8)	**13.**	(1)	**14.**	(6)
15.	(6)	**16.**	(5)	**17.**	(2)	**18.**	(2)	**19.**	(5)	**20.**	(8)		

OLYMPIAD WALLAH

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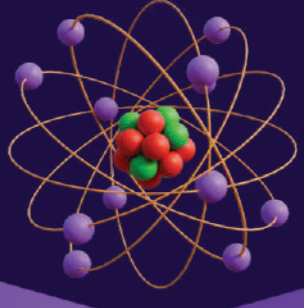

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