

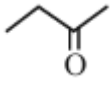
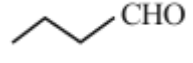
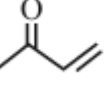
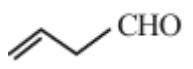


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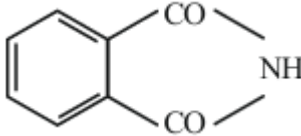
Chemistry

- Select the correct statement :
 - Roasting involves heating the ore in the absence of air
 - Calcination involves heating the ore above its melting point
 - Smelting involves heating the ore with suitable reducing agent and flux below its melting point
 - Calcination of calcium carbonate is endothermic
- N_2O gas is:
 - Colourless, neutral
 - Colourless, acidic
 - Brown, acidic
 - Brown, neutral
- Identify the incorrect statement from the following :
 - Oxides of nitrogen in the atmosphere can cause depletion of the ozone layer
 - Ozone absorbs the intense ultraviolet radiation of Sun
 - Depletion of ozone layer is because of its chemical reactions with chlorofluoro alkanes
 - Ozone absorbs infrared radiation
- Gold sol is not a :
 - Macromolecular colloid
 - Lyophobic colloid
 - Multimolecular colloid
 - Negatively charged colloid
- The incorrect statement about Hall-Heroult process is :
 - Carbon anode is oxidised to CO and CO_2
 - Na_3AlF_6 helps to decrease the melting point of the electrolyte
 - CaF_2 helps to increase the conductivity of the electrolyte
 - Oxidation state of oxygen changes in the overall cell reaction
- Propanone and Propanal are :
 - Position isomers
 - Functional isomers
 - Chain isomers
 - Geometrical isomers
- Sodium ethanoate on heating with soda lime give 'X'. Electrolysis of aqueous solution of sodium ethanoate gives 'Y', 'X' and 'Y' respectively are :
 - Methane and Ethane
 - Methane and Methane
 - Ethane and Methane
 - Ethane and Ethane
- But-1-yne on reaction with dil. H_2SO_4 in presence of Hg^{2+} ions at 333 K gives :

(A) 	(B) 
(C) 	(D) 
- Biologically active adrenaline and ephedrine used to increase blood pressure contain :
 - Primary amino group
 - Secondary amino group
 - Tertiary amino group
 - Quaternary ammonium salt
- In the reaction

$$\text{Aniline} \xrightarrow[\text{dil.HCl}]{\text{NaO}_2} \text{P} \xrightarrow[\text{NaOH}]{\text{Phenol}} \text{Q}$$
 'Q' is:
 - $C_6H_5N_2Cl$
 - ortho-hydroxyazobenzene
 - para-hydroxyazobenzene
 - meta-hydroxyazobenzene
- The female sex hormone which is responsible for the development of secondary female characteristics and participates in the control of menstrual cycle is:
 - Testosterone
 - Estradiol
 - Insulin
 - Thyroxine



12. The type of linkage present between nucleotides is :
- (A) Phosphoester linkage
(B) Phosphodiester linkage
(C) Amide linkage
(D) Glycosidic linkage
13. α - D - (+) - glucose and β - D - (+) - glucose are:
- (A) Enantiomers (B) Conformers
(C) Epimers (D) Anomers
14. Which of the following set of polymers are used as fibre?
- (i) Teflon (ii) Starch (iii) Terylene (iv) Orlon
(A) (i) and (ii) (B) (ii) and (iii)
(C) (iii) and (iv) (D) (i) and (iv)
15. The biodegradable polymer obtained by polymerisation of Glycine and Aminocaproic acid is :
- (A) Nylon 6 (B) PHBV
(C) Nylon 2-Nylon 6 (D) Nylon 6, 10
16. The compound  is:
- (A) Sucralose (B) Aspartame
(C) Saccharin (D) Alitame
17. Which one of the following is a cationic detergent ?
- (A) Cetyltrimethylammonium bromide
(B) Sodium dodecylbenzene sulphonate
(C) Dodecylbenzene sulphonic acid
(D) Dodecylbenzene
18. In the following scheme of reaction,
- $$\text{C}_2\text{H}_5\text{Cl} \begin{cases} \xrightarrow{\text{X}} \text{C}_2\text{H}_5\text{F} \\ \xrightarrow{\text{Y}} \text{CH}_2=\text{CH}_2 \\ \xrightarrow{\text{Z}} \text{C}_2\text{H}_6 \end{cases}$$
- X, Y and Z respectively are:
- (A) AgF, alcoholic KOH and benzene
(B) HF, aqueous KOH and Na in dry ether
(C) Hg₂F₂, alcoholic KOH and Na in dry ether
(D) COF₂, aqueous KOH and benzene
19. 8.8 g of monohydric alcohol added to ethyl magnesium iodide in ether liberates 2240 cm³ of ethane at STP. This monohydric alcohol when oxidised using pyridinium-chlorochromate, forms a carbonyl compound that answers silver mirror test (Tollens' test). The monohydric alcohol is :
- (A) butan-2-ol
(B) 2, 2-dimethyl propan-1-ol
(C) pentan-2-ol
(D) 2, 2-dimethyl ethan-1-ol
20. When a tertiary alcohol 'A' (C₄H₁₀O) reacts with 20% H₃PO₄ at 358K, it gives a compound 'B' (C₄H₈) as a major product. The IUPAC name of the compound 'B' is:
- (A) But-1-ene (B) But-2-ene
(C) Cyclobutane (D) 2-Methylpropene
21. PCC is:
- (A) K₂Cr₂O₇ + Pyridine
(B) CrO₃ + CHCl₃
(C) CrO₃ + H₂SO₄
(D) A complex of chromium trioxide with pyridine + HCl
22. On treating 100 mL of 0.1 M aqueous solution of the complex CrCl₃.6H₂O with excess of AgNO₃, 2.86 g of AgCl was obtained. The complex is:
- (A) [Cr(H₂O)₃Cl₃].3H₂O
(B) [Cr(H₂O)₄Cl₂].2H₂O
(C) [Cr(H₂O)₅Cl].H₂O
(D) [Cr(H₂O)₆Cl₃]
23. The complex compounds [Co(NH₃)₅SO₄]Br and [Co(NH₃)₅Br]SO₄ are:
- (A) Coordination isomers
(B) Geometrical isomers
(C) Optical isomers
(D) Ionisation isomer
24. Which of the following statements are true about [CoF₆]³⁻ ion?
- I. The complex has octahedral geometry.
II. Coordination number of Co is 3 and oxidation state is + 6.
III. The complex is sp³d² hybridised.
IV. It is a high spin complex.
- (A) I, II and IV (B) I, III and IV
(C) II and IV (D) II, III and IV



25. A haloalkane undergoes S_N2 or S_N1 reaction depending on :
- (A) Solvent used in the reaction
 (B) Low temperature
 (C) The type of halogen atom
 (D) Stability of the haloalkane
26. 2-Methyl propane can be prepared by Wurtz reaction. The haloalkanes taken along with metallic sodium and dry ether are :
- (A) chloromethane and 2-chloropropane
 (B) chloroethane and chloromethane
 (C) chloroethane and 1-chloropropane
 (D) chloromethane and 1-chloropropane
27. In the analysis of III group basic radicals of salts, the purpose of adding $NH_4Cl(s)$ to NH_4OH is:
- (A) To increase the concentration of OH^- ions.
 (B) To precipitate the radicals of group IV and V.
 (C) To suppress the dissociation of NH_4OH .
 (D) To introduce Cl^- ions.
28. Solubility product of CaC_2O_4 at a given temperature in pure water is 4×10^{-9} (mol L^{-1})². Solubility of CaC_2O_4 at the same temperature is:
- (A) $6.3 \times 10^{-5} \text{ mol L}^{-1}$
 (B) $2 \times 10^{-5} \text{ mol L}^{-1}$
 (C) $2 \times 10^{-4} \text{ mol L}^{-1}$
 (D) $6.3 \times 10^{-4} \text{ mol L}^{-1}$
29. In the reaction between moist SO_2 and acid field permanganate solution:
- (A) SO_2 is oxidised to SO_4^{2-} MnO_4^- is reduced to Mn^{2+}
 (B) SO_2 is reduced to S MnO_4^- is oxidised to MnO_4
 (C) SO_2 is oxidised to SO_3^{2-} MnO_4^- is reduced to MnO_2
 (D) SO_2 is reduced to H_2S MnO_4^- is oxidised to MnO_4
30. Which one of the following properties is generally not applicable to ionic hydrides ?
- (A) Non-volatile
 (B) Non-conducting in solid state
 (C) Crystalline
 (D) Volatile
31. Which one of the following nitrate will decompose to give NO_2 on heating ?
- (A) $NaNO_3$ (B) KNO_3
 (C) $RbNO_3$ (D) $LiNO_3$
32. Which of the following halides cannot be hydrolysed?
- (A) CCl_4 (B) $SiCl_4$
 (C) $GeCl_4$ (D) $SnCl_4$
33. 0.48 g of an organic compound on complete combustion produced 0.22 g of CO_2 . The percentage of C in the given organic compound is:
- (A) 25 (B) 50
 (C) 12.5 (D) 87.5
34. In the given sequence of reactions, identify 'P', 'Q', 'R' and 'S' respectively.
- $$CH_2 = CH_2 \xrightarrow{P} \begin{array}{c} CH_2 - CH_2 \\ | \quad | \\ Br \quad Br \end{array} \xrightarrow{Q} CH_2 =$$
- $$CH - Br \xrightarrow{R} CH \equiv CH \xrightarrow{S} C_6H_6$$
- (A) Br_2 , Alc, KOH, NaOH, Al_2O_3
 (B) HBr, Alc, KOH, CaC_2 , $KMnO_4$
 (C) HBr, Alc, KOH, $NaNH_2$, Red hot iron tube
 (D) Br_2 , Alc, KOH, $NaNH_2$, Red hot iron tube
35. The first chlorinated organic insecticide prepared is:
- (A) Gammexane (B) Chloroform
 (C) $CoCl_2$ (D) DDT
36. Which of the following crystals has the unit cell such that $a = b \neq c$ and $\alpha = \beta = 90^\circ$, $\gamma = 120^\circ$?
- (A) Zinc blende
 (B) Graphite
 (C) Cinnabar
 (D) Potassium dichromate
37. MnO exhibits:
- (A) Ferrimagnetism (B) Antiferromagnetism
 (C) Ferromagnetism (D) Paramagnetism



38. The number of atoms in 4.5 g of a face-centered cubic crystal with edge length 300 pm is:
(Given density = 10 g cm^{-3} and $N_A = 6.022 \times 10^{23}$).
- (A) 6.6×10^{20} (B) 6.6×10^{23}
(C) 6.6×10^{19} (D) 6.6×10^{23}
39. Vapour pressure of a solution containing 18 g of glucose and 178.2 g of water at 100°C is:
(Vapour pressure of pure water at $100^\circ\text{C} = 760$ torr)
- (A) 76.0 torr (B) 752.4 torr
(C) 7.6 torr (D) 3207.6 torr
40. A mixture of phenol and aniline shows negative deviation from Raoult's law. This is due to the formation of:
- (A) Polar covalent bond
(B) Non-polar covalent bond
(C) Intermolecular Hydrogen bond
(D) Intramolecular Hydrogen bond
41. Which one of the following pairs will show positive deviation from Raoult's Law?
- (A) Water - HCl (B) Benzene - Methanol
(C) Water- HNO_3 (D) Acetone-Chloroform
42. How many Coulombs are required to oxidise 0.1 mole of H_2O to oxygen?
- (A) $1.93 \times 10^5\text{C}$ (B) $1.93 \times 10^4\text{C}$
(C) $3.86 \times 10^4\text{C}$ (D) $9.65 \times 10^3\text{C}$
43. A current of 3 A is passed through a molten calcium salt for 1 hr 47 min 13 sec. The mass of calcium deposited is: (Molar mass of Ca = 40 g mol^{-1})
- (A) 6.0 g (B) 2.0 g
(C) 8.0 g (D) 4.0 g
44. The value of 'A' in the equation $\lambda_m = \lambda_m^0 - A\sqrt{C}$ is same for the pair:
- (A) NaCl and CaCl_2
(B) CaCl_2 and MgSO_4
(C) NaCl and KBr
(D) MgCl_2 and NaCl
45. For the reaction, $\text{A} \rightleftharpoons \text{B}$, $E_a = 50 \text{ kJ mol}^{-1}$ and $\Delta H = -20 \text{ kJ mol}^{-1}$. When a catalyst is added, E_a decreases by 10 kJ mol^{-1} . What is the E_a for the backward reaction in the presence of catalyst?
- (A) 60 kJ mol^{-1} (B) 40 kJ mol^{-1}
(C) 70 kJ mol^{-1} (D) 20 kJ mol^{-1}
46. For the reaction $\text{PCl}_5 \rightarrow \text{PCl}_3 + \text{Cl}_2$, rate and rate constant are $1.02 \times 10^{-4} \text{ mol L}^{-1} \text{ s}^{-1}$ and $3.4 \times 10^{-5} \text{ s}^{-1}$ respectively at a given instant. The molar concentration of PCl_5 at that instant is:
- (A) 8.0 mol L^{-1} (B) 3.0 mol L^{-1}
(C) 0.2 mol L^{-1} (D) 2.0 mol L^{-1}
47. Which one of the following does not represent Arrhenius equation?
- (A) $\log k = \log A - \frac{E_a}{2.303 RT}$
(B) $k = Ae^{-E_a/RT}$
(C) $\ln k = -\frac{E_a}{RT} + \ln A$
(D) $k = Ae^{E_a/RT}$
48. Identify the incorrect statement :
- (A) Values of colligative properties of colloidal solution are of small order compared to values of true solution
(B) Tyndall effect is observed only when diameter of the dispersed particles is not much smaller than wavelength of incident light
(C) Colour of colloidal solution depends on the wavelength of light scattered by the dispersed particles
(D) Brownian movement is due to balanced bombardment of molecules of dispersion medium on colloidal particles
49. For the coagulation of positively charged hydrated ferric-oxide sol, the flocculating power of the ions is in the order :
- (A) $\text{PO}_4^{3-} > \text{SO}_4^{2-} > \text{Cl}^- > [\text{Fe}(\text{CN})_6]^{4-}$
(B) $\text{Cl}^- > \text{SO}_4^{2-} > \text{PO}_4^{3-} > [\text{Fe}(\text{CN})_6]^{4-}$
(C) $\text{SO}_4^{2-} = \text{Cl}^- = \text{PO}_4^{3-} = [\text{Fe}(\text{CN})_6]^{4-}$
(D) $[\text{Fe}(\text{CN})_6]^{4-} > \text{PO}_4^{3-} > \text{SO}_4^{2-} > \text{Cl}^-$



50. For which one of the following mixtures is composition uniform throughout?
 (A) Sand and water
 (B) Grains and pulses with stone
 (C) Mixture of oil and water
 (D) Dilute aqueous solution of sugar
51. The energy associated with first orbit is He^+ is
 (A) 0J (B) $-8.72 \times 10^{-18}\text{J}$
 (C) $-4.58 \times 10^{-18}\text{J}$ (D) $-0.545 \times 10^{-18}\text{J}$
52. A metalloid is
 (A) Bi (B) Sb
 (C) P (D) Se
53. A pair of isoelectric species having bond order of one is:
 (A) N_2 , CO (B) N_2 , NO^+
 (C) O_2^{2-} , F_2 (D) CO, NO^+
54. Identify the wrong relation for real gases
 (A) $Z = \frac{V_{\text{ideal}}}{V_{\text{real}}}$
 (B) $P_{\text{ideal}} = P_{\text{real}} + \frac{an^2}{V^2}$
 (C) $V_{\text{real}} = V_{\text{ideal}} - nb$
 (D) $\left(p + \frac{a}{V^2}\right)(V - b) = RT$
55. From the diagram
-
- $\Delta_r H$ for the reaction $\text{C} \rightarrow \text{A}$ is
- (A) +35J (B) -15J
 (C) -35J (D) +15J
56. The transition element ($\approx 5\%$) present with lanthanoid metal in Misch metal is:
 (A) Mg (B) Fe
 (C) Zn (D) Co
57. Match the following:
 I. Zn^{2+} i. d^8 configuration
 II. Cu^{2+} ii. Colourless
 III. Ni^{2+} iii. $\mu = 1.73 \text{ BM}$
 (A) I-I, II-II, III-III (B) I-ii, II-iii, III-i
 (C) I-ii, II-i, III-iii (D) I-i, II-iii, III-ii
58. Which of the following statements related to lanthanoids is incorrect?
 (A) Lanthanoids are silvery white soft metals
 (B) Samarium shows +2 oxidation state
 (C) Ce^{+4} solutions are widely used as oxidising agents in titrimetric analysis
 (D) Colour of Lanthanoid ion in solution is due to d-d transition
59. The correct decreasing order of boiling point of hydrogen halides is
 (A) $\text{HF} > \text{HCl} > \text{HBr} > \text{HI}$
 (B) $\text{HI} > \text{HBr} > \text{HCl} > \text{HF}$
 (C) $\text{HF} > \text{HI} > \text{HBr} > \text{HCl}$
 (D) $\text{HI} > \text{HF} > \text{HBr} > \text{HCl}$
60. The synthetically produced radioactive noble gas by the collision of ${}^{249}_{98}\text{Cf}$ with ${}^{48}_{20}\text{Ca}$ is
 (A) Radon (B) Radium
 (C) Oganesson (D) Xenon