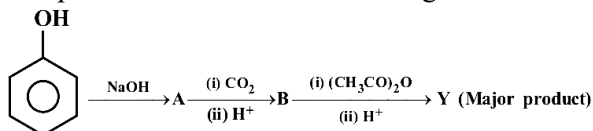




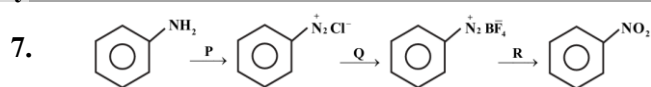
## Chemistry

1. Compounds P and R in the following reaction are



- (A) Metamers (B) Identical  
(C) Position isomers (D) Functional isomers
2. Aniline does not undergo  
(A) Friedel-Craft reaction  
(B) Bromination  
(C) Nitration  
(D) Sulphonation
3. The heating of phenyl methyl ether with HI produces an aromatic compound A which on treatment with con. HNO<sub>3</sub> gives B, A and B respectively are,  
(A) Iodobenzene, 1-Iodo-4-nitrobenzene  
(B) Phenol, Picric acid  
(C) Methanol, Ethanoic acid  
(D) Picric acid, Phenol
4. Fig.  
Y in the above reaction is  
(A) Cumene (B) Picric acid  
(C) Salicylaldehyde (D) Aspirin
5. A better reagent to oxidize primary alcohols into aldehyde is:  
(A) Acidified K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>  
(B) CrO<sub>3</sub>  
(C) PCC  
(D) Alkaline KmnO<sub>4</sub>
6. In the reaction:  

$$\text{C}_6\text{H}_5\text{CN} \xrightarrow[\text{(ii) H}_3\text{O}^+]{\text{(i) SnCl}_2 + \text{HCl}} \text{X} \xrightarrow{\text{con. KOH}} \text{Y} + \text{Z}$$
 Formation of X, formation of Y and Z are known by  
 (A) Wolff-Kishner reduction, Wurtz reaction  
 (B) Stephen reaction, Cannizaro reaction  
 (C) Rosenmund reduction, Cannizaro reaction  
 (D) Clemmensen reduction, Sandmeyer reaction



P, Q and R respectively are:

- (A) NaNO<sub>2</sub> + dil.HCl, BF<sub>3</sub>, Cu + NaNO<sub>2</sub>  
 (B) NaNO<sub>3</sub> + dil.HCl, F<sub>2</sub>, Cu + NaNO<sub>3</sub>  
 (C) NaNO<sub>2</sub> + dil.HCl, HBF<sub>4</sub>, Cu + NaNO<sub>2</sub>  
 (D) NaNO<sub>2</sub> + con.HCl, F<sub>2</sub>, Cu + NaNO<sub>3</sub>
8. Thyroxine produced in the thyroid gland is an iodinated derivative of  
(A) Tyrosine (B) Tryptophan  
(C) Threonine (D) Lysine
9. Sucrose is dextrorotatory but after hydrolysis the mixture show laevorotation, this is because of  
(A) Racemic mixture is formed.  
(B) Laevorotation of fructose is more than dextrorotation of glucose.  
(C) Laevorotation of glucose is more than dextrorotation of fructose.  
(D) Sucrose is a non-reducing sugar
10. The correct order of match between column X and column Y is:
- | X    |           | Y    |                               |
|------|-----------|------|-------------------------------|
| I.   | Vitamin A | i.   | Muscular weakness             |
| II.  | Vitamin D | ii.  | Increased blood clotting time |
| III. | Vitamin E | iii. | Night-blindness               |
| IV.  | Vitamin K | iv.  | Osteomalacia                  |
- (A) I-iii, II-ii, III-iv, IV-i  
 (B) I-iii, II-iv, III-i, IV-ii  
 (C) I-iv, II-iii, III-ii, IV-i  
 (D) I-ii, II-i, III-iii, IV-iv
11. Which of the following monomers form biodegradable polymers?  
 (A) Phenol and formaldehyde  
 (B) 3-hydroxybutanoic acid and 3-hydroxypentanoic acid  
 (C) Ethylene glycol and phthalic acid  
 (D) Caprolactum and 1,3- Butadiene



12. Match the List-I with List-II in the following:

List-I		List-II	
1.	Caprolactum	(a)	$\text{-(CH}_2\text{-CH)}_n$   $\text{CH}_3$
2.	Vinyl chloride	(b)	$\text{-(CH}_2\text{-CH)}_n$   $\text{C}_6\text{H}_5$
3.	Styrene	(c)	$\text{-(CH}_2\text{-CH)}_n$   $\text{Cl}$
4.	Propene	(d)	$\text{-(C(CH}_2)_5\text{N)}_n$    $\text{O}$   $\text{H}$

- (A) 1-d, 2-c, 3-a, 4-b (B) 1-d, 2-c, 3-b, 4-a  
(C) 1-c, 2-d, 3-a, 4-b (D) 1-a, 2-d, 3-c, 4-b

13. Which one of the following is a non-narcotic analgesic?

- (A) Aspirin (B) Morphine  
(C) Heroin (D) Codeine

14. Receptors are proteins and crucial to body communication process. These receptors are embedded in

- (A) Endocrine gland (B) Chromosomes  
(C) Cell membrane (D) Protein

15. A gas at a pressure of 2 atm is heated from 25°C to 323 °C and simultaneously compressed to  $\frac{2^{\text{nd}}}{3}$  of its original value. Then the final pressure is

- (A) 2 atm (B) 4 atm  
(C) 1.33 atm (D) 6 atm

16. Lattice enthalpy for NaCl is +788 kJ mol<sup>-1</sup> and  $\Delta H_{\text{Hyd}} = -784$  kJ mol<sup>-1</sup>. Enthalpy of solution of NaCl is

- (A) -572 kJ mol<sup>-1</sup> (B) -4 kJ mol<sup>-1</sup>  
(C) +572 kJ mol<sup>-1</sup> (D) +4 kJ mol<sup>-1</sup>

17. At 500K, for a reversible reaction  $\text{A}_{2(\text{g})} + \text{B}_{2(\text{g})} \rightleftharpoons 2\text{AB}_{(\text{g})}$  in a closed container,  $K_C = 2 \times 10^{-5}$ . In the presence of catalyst, the equilibrium is attaining 10 times faster. The equilibrium constant  $K_C$  in the presence of catalyst at the same temperature is

- (A)  $2 \times 10^{-10}$  (B)  $2 \times 10^{-5}$   
(C)  $2 \times 10^{-4}$  (D)  $2 \times 10^{-6}$

18. A weak acid with  $\text{pK}_a$  5.9 and weak base with  $\text{pK}_b$  5.8 are mixed in equal proportions pH of the resulting solution is

- (A) 7 (B) 7.05  
(C) 7.005 (D) 7.5

19. Temperature at 25°C in Fahrenheit and Kelvin scale respectively are

- (A) 45°F and 260.15 K  
(B) 47°F and 312.15 K  
(C) 77°F and 298.15 K  
(D) 17°F and 298.15 K

20. The number of protons, neutrons and electrons in the ion  $^{32}_{16}\text{S}^{2-}$  respectively are

- (A) 18, 16, 16 (B) 16, 16, 16  
(C) 16, 18, 16 (D) 16, 16, 18

21. The correct order of first ionisation enthalpy of given elements is

- (A)  $\text{C} < \text{B} < \text{Be} < \text{Li}$  (B)  $\text{Li} < \text{Be} < \text{B} < \text{C}$   
(C)  $\text{Li} < \text{B} < \text{Be} < \text{C}$  (D)  $\text{Be} < \text{Li} < \text{B} < \text{C}$

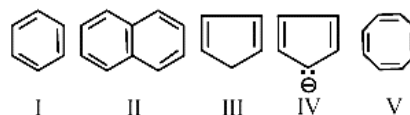
22. Which of the following statement is INCORRECT?

- (A) Bond length of  $\text{O}_2 <$  Bond length of  $\text{O}_2^{2-}$   
(B) Bond order of  $\text{O}_2 >$  Bond order of  $\text{O}_2^{2-}$   
(C) Bond length of  $\text{O}_2 >$  Bond length of  $\text{O}_2^{2+}$   
(D) Bond length of  $\text{O}_2 >$  Bond length of  $\text{O}_2^{2+}$

23. IUPAC name of the compound is

- (A) 1, 1, 2, 2-tetra methylethene  
(B) 2, 3-dimethyl butene  
(C) 2, 3-dimethylbut-2-ene  
(D) 2-3-dimethyl butyne

24. Among the following:



The set which represents aromatic species is

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

25. When one of the following gases converts haemoglobin into carboxy haemoglobin?

- (A) NO (B)  $\text{CO}_2$   
(C) CO (D)  $\text{O}_2$



26. What is the oxidation number of S in  $\text{H}_2\text{S}_2\text{O}_8$ ?  
 (A) +7 (B) +6  
 (C) +5 (D) +4
27. A 30% solution of hydrogen peroxide is  
 (A) '50 volume' hydrogen peroxide  
 (B) '100 volume' hydrogen peroxide  
 (C) '30 volume' hydrogen peroxide  
 (D) '10 volume' hydrogen peroxide
28. A pair of amphoteric oxides is  
 (A)  $\text{BeO}$ ,  $\text{MgO}$  (B)  $\text{BeO}$ ,  $\text{ZnO}$   
 (C)  $\text{Al}_2\text{O}_3$ ,  $\text{Li}_2\text{O}$  (D)  $\text{BeO}$ ,  $\text{BO}_3$
29. The composition of water gas is  
 (A)  $\text{CO}_{(g)} + \text{H}_2\text{O}_{(g)}$  (B)  $\text{CO}_{(g)} + \text{H}_{2(g)}$   
 (C)  $\text{CO}_{(g)} + \text{N}_{2(g)}$  (D)  $\text{CH}_{4(g)}$
30. The swelling in feet and ankles of an aged person due to sitting continuously for long hours during travel, is reduced by soaking the feet in warm salt water. This is because of:  
 (A) Edema (B) Diffusion  
 (C) Reverse Osmosis (D) Osmosis
18. A sample of water is found to contain  $5.85\% \left(\frac{w}{w}\right)$  of AB (molecular mass 58.5) and  $9.50\% \left(\frac{w}{w}\right)$   $\text{XY}_2$  (molecular mass 95). Assuming 80% ionisation of AB and 60% ionisation of  $\text{XY}_2$ , the freezing point of water sample is  
 [Given:  $K_f$  for water  $1.86 \text{ K kg mol}^{-1}$ , Freezing point of pure water is  $273 \text{ K}$  and A, B and Y are monovalent ions]  
 (A)  $280.44 \text{ K}$  (B)  $281.75 \text{ K}$   
 (C)  $264.25 \text{ K}$  (D)  $265.56 \text{ K}$
32. Match the column A (type of crystalline solid) with the column B (example for each type):
- | A  |                 | B    |                      |
|----|-----------------|------|----------------------|
| P. | Molecular Solid | i.   | $\text{SiC}$         |
| Q. | Ionic Solid     | ii.  | $\text{Mg}$          |
| R. | Metallic Solid  | iii. | $\text{H}_2\text{O}$ |
| S. | Network Solid   | iv.  | $\text{MgO}$         |
- (A) P-ii, Q-ivv, R-iii, S-i  
 (B) P-iii, Q-iv, R-Ss, S-i  
 (C) P-iii, Q-i, R-ii, S-iv  
 (D) P-iv, Q-iii, R-ii, S-i
33. A metal crystallises in a body centered cubic lattice with the metallic radius  $\sqrt{3}\text{Å}$ . The volume of the unit cell in  $\text{m}^3$  is  
 (A)  $6.4 \times 10^{-29}$  (B)  $4 \times 10^{-10}$   
 (C)  $64 \times 10^{-29}$  (D)  $4 \times 10^{-29}$
34. If 'a' stands for the edge length of the cubic systems-The ratio of radii in simple cubic, body centered cubic and face centered cubic unit cells is  
 (A)  $\frac{1}{2}a : \frac{\sqrt{3}}{2}a : \frac{\sqrt{2}}{2}a$  (B)  $\frac{1}{2}a : \sqrt{3}a : \frac{1}{\sqrt{2}}a$   
 (C)  $1a : \sqrt{3}a : \sqrt{2}a$  (D)  $\frac{1}{2}a : \frac{\sqrt{3}}{4}a : \frac{1}{2\sqrt{2}}a$
35. Dimerisation of solute molecules in low dielectric constant solvent is due to :  
 (A) Co-ordinate bond  
 (B) Ionic bond  
 (C) Hydrogen bond  
 (D) Covalent bond
36. For a reaction, the value of rate constant at  $300 \text{ K}$  is  $6.0 \times 10^5 \text{ s}^{-1}$ . The value of Arrhenius factor A at infinitely high temperature is:  
 (A)  $\frac{6 \times 10^{-5}}{300}$  (B)  $6 \times 10^5$   
 (C)  $6 \times 10^5 \times e^{-E_a/300R}$  (D)  $e^{-E_a/300R}$
37. The rate constants  $k_1$  and  $k_2$  for two different reactions are  $10^{16} \times e^{-2000/T}$  and  $10^{15} \times e^{-1000/T}$  respectively. The temperature at which  $k_1 = k_2$  is:  
 (A)  $\frac{1000}{2.303} \text{ K}$  (B)  $1000 \text{ K}$   
 (C)  $\frac{2000}{2.303} \text{ K}$  (D)  $2000 \text{ K}$
38. During the electrolysis of brine, by using inert electrodes,  
 (A) Na deposits on cathode  
 (B)  $\text{Cl}_2$  liberates at anode  
 (C)  $\text{O}_2$  liberates at anode  
 (D)  $\text{H}_2$  liberates at anode



39. Consider the following 4 electrodes  
 A :  $\text{Ag}^+$  (0.0001 M)/ $\text{Ag}_{(s)}$  ; B :  $\text{Ag}^+$  (0.1 M)/ $\text{Ag}_{(s)}$   
 C :  $\text{Ag}^+$  (0.01 M)/ $\text{Ag}_{(s)}$ ; D :  $\text{Ag}^+$  (0.001 M)/ $\text{Ag}_{(s)}$ ;  
 $E_{\text{Ag}^+/\text{Ag}}^0 = +0.80 \text{ V}$ .
- Then reduction potential in volts of the electrodes in the order  
 (A)  $A > D > C > B$  (B)  $A > B > C > D$   
 (C)  $B > C > D > A$  (D)  $C > D > A > B$
40. The resistance of 0.1 M weak acid HA in a conductivity cell is  $2 \times 10^3 \text{ Ohm}$ . The cell constant of the cell is  $0.78 \text{ C m}^{-1}$  and  $\lambda_m^0$  of acid HA is  $390 \text{ S cm}^2 \text{ mol}^{-1}$ . The pH of the solution is  
 (A) 5 (B) 3  
 (C) 3.3 (D) 4.2
41. In which one of the following reactions, rate constant has the unit  $\text{mol L}^{-1} \text{ s}^{-1}$ .  
 (A)  $2\text{NO}_{(g)} + \text{O}_{2(g)} \rightarrow 2\text{NO}_{2(g)}$   
 (B) Decomposition of H1 on the surface of Gold  
 (C) Acid catalysed hydrolysis of  $\text{CH}_3\text{COOCH}_3$   
 (D)  $\text{CHCl}_3 + \text{Cl}_2 \rightarrow \text{CCl}_4 + \text{HCl}$
42. For the formation of which compound in Ellingham diagram  $\Delta G^\circ$  becomes more and more negative with increase in temperature?  
 (A) ZnO (B)  $\text{Cu}_2\text{O}$   
 (C) CO (D) FeO
43. Which of the following compound does not give dinitrogen on heating ?  
 (A)  $\text{NH}_4\text{NO}_3$  (B)  $(\text{NH}_4)_2 \text{Cr}_2\text{O}_7$   
 (C)  $\text{Ba}(\text{N}_3)_2$  (D)  $\text{NH}_4\text{NO}_2$
44. Aqueous solution of raw sugar when passed over beds of animal charcoal, it becomes colourless. Pick the correct set of terminologies that can be used for the above example.
- | Adsorbent               | Adsorbate           | Process    |
|-------------------------|---------------------|------------|
| (A) Animal Charcoal     | Colouring Substance | Adsorption |
| (B) Colouring Substance | Animal Charcoal     | Adsorption |
| (C) Solution of Sugar   | Animal Charcoal     | Sorption   |
| (D) Animal Charcoal     | Solution of Sugar   | Absorption |
45. For Freundlich adsorption isotherm, a graph of  $\log(x/m)$  Vs.  $\log(P)$  gives a straight line. The slope of line and its Y-axis intercept respectively are  
 (A)  $\log\left(\frac{1}{n}\right), \log K$  (B)  $\frac{1}{n}, K$   
 (C)  $\log\left(\frac{1}{n}\right), K$  (D)  $\frac{1}{n}, \log K$
46. When  $\text{FeCl}_3$  is added to excess of hot water gives a sol 'X'. When  $\text{FeCl}_3$  is added to  $\text{NaOH}_{(aq)}$  solution, gives sol 'Y'.  
 X and Y formed in the above processes respectively are  
 (A)  $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O} / \text{Cl}^-$  and  $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O} / \text{OH}^-$   
 (B)  $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O} / \text{Fe}^{3+}$  and  $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O} / \text{OH}^-$   
 (C)  $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O} / \text{OH}^-$  and  $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O} / \text{Fe}^{3+}$   
 (D)  $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O} / \text{H}^+$  and  $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O} / \text{Na}^+$
47. The reducing agent in the given equations:  
 $4 \text{Ag}_{(s)} + 8 \text{CN}^-_{(aq)} + 2\text{H}_2\text{O}_{(aq)} + \text{O}_{2(g)} \rightarrow 4[\text{Ag}(\text{CN})_2]^-_{(aq)} + 4\text{OH}^-_{(aq)}$   
 (A)  $\text{H}_2\text{O}$  (B)  $\text{CN}^-$   
 (C) Zn (D)  $\text{O}_3$
48. Which of the following is CORRECT with respect to melting point of a transition element?  
 (A)  $\text{Mn} > \text{Fe}$  (B)  $\text{Ti} > \text{V}$   
 (C)  $\text{V} > \text{Cr}$  (D)  $\text{Cr} > \text{Mn}$
49.  $a\text{MnO}_4^- + b\text{S}_2\text{O}_3^{2-} + \text{H}_2\text{O} \rightarrow x\text{MnO}_2 + y\text{SO}_4^{2-} + z\text{OH}^-$  a and y respectively are  
 (A) 3; 6 (B) 8; 8  
 (C) 8; 3 (D) 8; 6
50. Which formula and name combination is INCORRECT?  
 (A)  $[\text{CoCl}_2(\text{en})_2]\text{Cl}^-$  Dichloridodiethylenediammine cobalt (II) chloride  
 (B)  $[\text{Co}(\text{NH}_3)_4(\text{H}_2\text{O})\text{Cl}]\text{Cl}_2^-$  Tetraammineaquachloridocobalt (III) chloride



- (C)  $K_3[Al(C_2O_4)_3]$  - Potassium trioxalatoaluminate (III)  
 (D)  $[Pt(NH_3)_2Cl(NO_2)]$  - Diamminechloridonitrito-N-platinum (II)
51. Which of the following system in an octahedral complex has maximum unpaired electrons?  
 (A)  $d^4$  (low spin) (B)  $d^7$  (high spin)  
 (C)  $d^9$  (high spin) (D)  $d^6$  (low spin)
52. The correct decreasing order of basicity of hydrides of Group-15 elements is  
 (A)  $AsH_3 > SbH_3 > NH_3 > PH_3$   
 (B)  $NH_3 > PH_3 > AsH_3 > SbH_3$   
 (C)  $SbH_3 > AsH_3 > PH_3 > NH_3$   
 (D)  $PH_3 > AsH_3 > SbH_3 > NH_3$
53. Which one of the following oxoacids of phosphorus can reduce  $AgNO_3$  to metallic silver?  
 (A)  $H_4P_2O_6$  (B)  $H_3PO_4$   
 (C)  $H_3PO_2$  (D)  $H_4P_2O_7$
54. In solid state,  $PCl_5$  is a/an  
 (A) Ionic solid with  $[PCl_4]^+$  and  $[PCl_6]^-$   
 (B) Covalent solid present in the form of  $P_2Cl_{10}$   
 (C) Octahedral structure  
 (D) Ionic solid with  $[PCl_6]^+$  and  $[PCl_4]^-$
55. In which one of the following pairs, both the elements does not have  $(n-1)d^{10}ns^2$  configuration in its elementary state?  
 (A) Hg, Cn (B) Cu, Zn  
 (C) Zn, Cd (D) Cd, Hg
56.  $CH_3 - CH = CH - CH_2OH \xrightarrow{PCC} CH_3 - CH = CH - CHO$
- Hybridisation change involved at C-1 in the above reaction  
 (A)  $sp^2$  to  $sp^3$  (B)  $sp$  to  $sp^2$   
 (C)  $sp^3$  to  $sp$  (D)  $sp^3$  to  $sp^2$
57. If a didentate ligand ethane -1, 2-diamine is progressively added in the molar ratio en:Ni::1:1, 2:1, 3:1 to  $[Ni(H_2O)_6]^{2+}$  aq solution, following coordination entities are formed.  
 I.  $[Ni(H_2O)_4en]_{(aq)}^{2+}$  pale blue  
 II.  $[Ni(H_2O)_2(en)_2]_{(aq)}^{2+}$  -blue/purple  
 III.  $[Ni(en)_3]_{(aq)}^{2+}$  violet  
 The wavelength in nm of light absorbed in case of I and III are respectively  
 (A) 310 nm and 500 nm  
 (B) 600 nm and 535 nm  
 (C) 475 nm and 310 nm  
 (D) 300 nm and 475 nm
58. Which of the following is an organometallic compound?  
 (A)  $(CH_3COO)_2Ca$  (B)  $CH_3ONa$   
 (C)  $CH_3COONa$  (D)  $CH_3CH_2MgBr$
59. A pair of compounds having the same boiling points are  
 (A) Benzene and naphthalene  
 (B) (+) butan -2 -ol and (-) butan -2 and -ol  
 (C) cis but-2-ene and trans but-2-ene  
 (D) n-hexane and neo-hexane
60. Identify A, B and C in the sequence:  
 $CH_3CH_2Br \xrightarrow[alc]{KCN} A \xrightarrow{LiAlH_4} B \xrightarrow[0^\circ C]{HNO_3} C$   
 (A)  $CH_3CH_2CN$ ,  $C_2H_5OH$ ,  $C_2H_5N_2Cl$   
 (B)  $CH_3CH_2CN$ ,  $CH_3CH_2NH_2$ ,  $C_2H_5OH$   
 (C)  $CH_3CH_2CN$ ,  $CH_3CH_2CH_2NH_2$ ,  $CH_3CH_2CH_2OH$   
 (D)  $CH_3CH_2NC$ ,  $CH_3CH_2OH$ ,  $CH_3CH_2CH_2NH_2$