

# Chemistry - 2019

## General Instructions :

- (i) All questions are compulsory. सभी प्रश्न अनिवार्य हैं।  
 (ii) Question Nos. 1 to 8 are Multiple Choice Type which carry 1 mark each. प्रश्न संख्या 1 से 8 तक बहुविकल्पीय प्रश्न हैं जिनका प्रत्येक का मान 1 अंक है।  
 (iii) Question Nos. 9 to 15 are Very Short Answer Type which carry 1 mark each. प्रश्न संख्या 9 से 15 तक अति लघु उत्तरीय प्रश्न हैं जिनका प्रत्येक का मान 1 अंक है।  
 (iv) Question Nos. 16 to 23 are Short Answer Type-I which carry 2 marks each. प्रश्न संख्या 16 से 23 तक लघु उत्तरीय-I प्रश्न हैं जिनका प्रत्येक का मान 2 अंक है।  
 (v) Question Nos. 24 to 31 are Short Answer Type-II which carry 3 marks each. प्रश्न संख्या 24 से 31 तक लघु उत्तरीय-II प्रश्न हैं जिनका प्रत्येक का मान 3 अंक है।  
 (vi) Question Nos. 32 to 34 are Long Answer Type which carry 5 marks each. प्रश्न संख्या 32 से 34 तक दीर्घ उत्तरीय प्रश्न हैं जिनका प्रत्येक का मान 5 अंक है।

1.  $H_2O$  (ice) is an example of  
 (a) Polar molecular solid  
 (b) Hydrogen bonded molecular solid  
 (c) Ionic solid  
 (d) None of these.
2.  $\text{Rate} = K[H_2O_2]$  is an example of  
 (a) zero order reaction  
 (b) first order reaction  
 (c) second order reaction  
 (d) none of these.
3.  $CH_3Br + 2Na + CH_3Br \xrightarrow{\text{Dry ether}} CH_3-CH_3 + 2NaBr$  The reaction is  
 (a) Friedel-Crafts reaction  
 (b) Wurtz reaction  
 (c) Fittig reaction  
 (d) none of these.
4. Calamine is an ore of  
 (a) Zn (b) Al  
 (c) Cu (d) Fe.
5. Toluene  $\xrightarrow{Cl_2/h\nu}$  A 'A' is  
 (a) Benzene (b) Benzaldehyde  
 (c) Chlorobenzene (d) none of these.
6. Acetaldehyde + 4 [H]  $\xrightarrow{Zn-Hg/HCl}$  A 'A' is  
 (a) Methane (b) Ethane  
 (c) Propane (d) none of these.
7. Which enzyme helps in converting sucrose into glucose and fructose?  
 (a) Lactase (b) Invertase  
 (c) Urease (d) none of these.
8.  $CH_3COOH + SOCl_2 \longrightarrow$  Product The product is  
 (a)  $CH_3COCl$  (b)  $CH_3Cl$   
 (c)  $C_2H_5Cl$  (d) none of these.
- (Very Short Answer Type Questions)
9. Calculate the overall order of a reaction which has the rate expression  $\text{Rate} = K[A]^1[B]^1$   
 Ans.  $\text{Rate} = K[A]^1[B]^1$   
 order of reaction = 1 + 1 = 2.
10. Beri-beri occurs due to the deficiency of which vitamin?  
 Ans. Vitamin B
11. Write dispersed phase and dispersion medium of milk, a colloidal solution.  
 Ans. In milk, dispersed phase is got and dispersion medium is water.
12. Write the monomer used for getting the polymer, Glyptal.  
 Ans. Phthalic acid and Ethylene glycol
13. Write IUPAC name of  $CH_3CH_2C(CH_3)_2CH_2I$ .  
 Ans. 2-methyl iodobutane
14. Give an example of aldohexose.  
 Ans. Glucose
15. Give an example of food preservative.  
 Ans. Vinegar
- (Short Answer-I Type Questions)
16. Define conductance and give its unit.  
 Ans. The reciprocal of resistance is called conductance. It may be due to glow of electron or charge. Its unit is  $\text{ohm}^{-1}$ , mho or siemec
- conductance,  $C = \frac{1}{R}$

17. Giving examples, differentiate between roasting and calcination.

Ans. Roasting

- (i) Heating the ore in a regular supply of oxygen.
- (ii) used for sulphide ore e.g. -  $ZnS$

Calcination -

- (i) Heating the ore in a absence of oxygen.
- (ii) used for casonate ore e.g. -  $ZnCO_3$

18. Write any two features that distinguish between physisorption and chemisorption.

Ans. Physisorption -

- (i) There exists a weak van del waals forces between the molecule of adsorbate and adsorbent.
- (ii) It is reversible in nature.

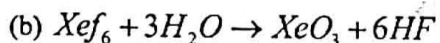
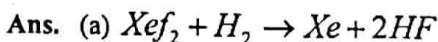
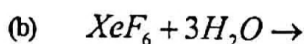
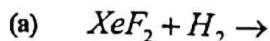
Chemisorption -

- (i) There exists a strong chemical bond between the molecules of absarate and adsorbent.
- (ii) It is irreversible in nature.

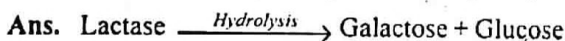
19. What are the different oxidation states exhibited by Lanthanoids ?

Ans. The different oxidation states exhibited by Lanthanoids are +3, +2 and +4

20. Complete the following :



21. What are the expected products of hydrolysis of Lactose?.



on hydrolysis of lactase , it gives galactase and glucose

22. Explain the difference between Buna-N and Buna-S.

Ans. (i) Buna-s is a copolymer of L,3- butadiene and styrene while Buna-N is a copolymer of L, 3- butadiene and acrylonitrile.

(ii) For making Buna-s , polymerisation take place in presence of sodium as aninitiator while, it is not required Buna - N

23. Write briefly with one example on the following :

(a) Analgesics (b) Antiseptic.

Ans. Analgesics - These are chemical substance used to reduce suffering from pain without causing impairment of consciousness. e.g. - Aspirin

Antiseptic - The chemicals used to kill microorganism or prevent the growth of microorganism without affecting the living human tissues.

e.g. - Dettol

(Short Answer-II Type Questions)

24. Explain ferromagnetic substance and anti-ferromagnetic substance.

Ans. Ferromagnetic Substance - These are strongly attracted by magnetic field and show permanent magnetism even the magnetic field is removed. The magnetic dipoles are aligned in one direction.

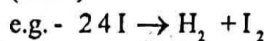


Anti - ferromagnetic substance - The substance have magnetic dipoles moment aligned in a compensatory manner to give zero net magetic moment.



25. Explain rate of chemical reaction.

Ans. Rate of chemical reaction is defined as the change in concentration of reactant or product with time each divided by its stoichomptric coefficient It has unit (conc) (time<sup>-1</sup>)



$$\text{Rate} = -\frac{1}{2} \frac{d[HI]}{dt} = +\frac{d[H_2]}{dt} = \frac{d[I_2]}{dt}$$

26. Explain the following terms :

(a) Dialysis (b) Tyndall effect.

Ans. (a) Dialysis - The process of removal of soluble impurities from colloidal solution by a semi - permeable membrane is know as dialysis.

The principal of dialysis is based on the fact that collodal particles can't pass through parchment while the ions of the electrolyte can pass. The colloidal sol' is taken in a parchment bag which is suspended in Irsh waters. The impusities slowly diffuse out of the bag leaving pure colloidal solution.

(b) Thndall Effect - When beam of light is passed through a colloidal solution , the path is illuminted It is called lyndal effect. The illuminated path is called Tyndal cone.

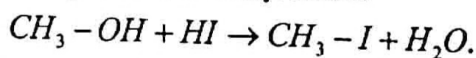
27. How will you bring about the following transformations?

(a) Methyl alcohol to Methyl iodide

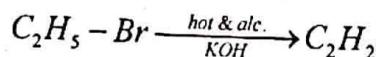
(b) Ethyl bromide to Ethene

(c) Benzyl bromide to Benzyl cyanide.

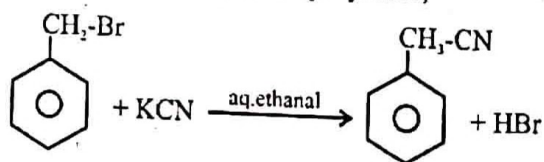
Ans. (a) Methyl alcohol to methyl iodide.



(b) Ethyl bromide to ethene.

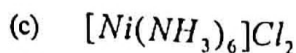
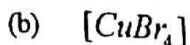
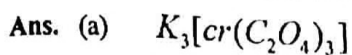


(c) Benzyl bromide to Benzyl cyanide,



28. Using IUPAC norms write formulae for the following:

- (a) Potassium tri(oxalato)chromate (III)  
 (b) Tetrabromido cuprate (II)  
 (c) Hexammine nickel (II) chloride.



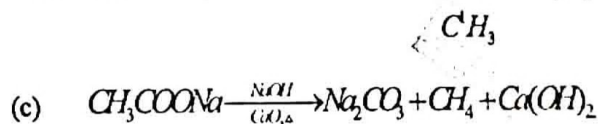
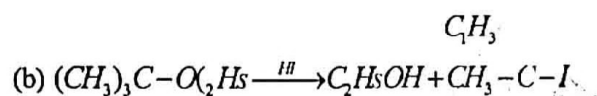
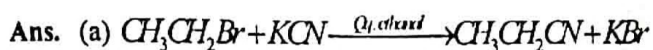
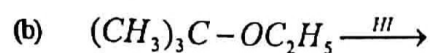
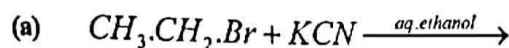
29. What are oxidation potential and reduction potential?

Ans. **Oxidation potential** - The potential at which Oxidation occurs at the anode in an electrochemical cell. is called Oxidation potential

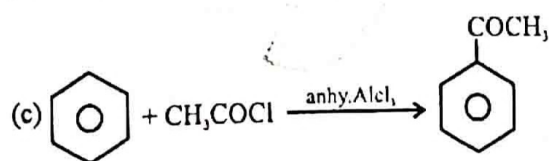
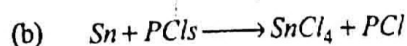
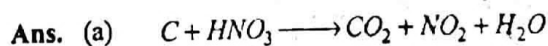
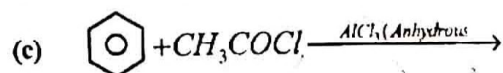
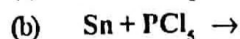
**Reduction potential** - The potential at which reduction occurs at the cathode in an

electrochemical cell is called reduction potential

30. Predict the product:



31. Complete the following reactions:



(Long Answer Type Questions)

32. Vapour pressure of water at 293 K is 17.535 mm Hg.

Calculate the vapour pressure of water at 293 K when 25 g of glucose is dissolved in 450 g of water.

OR

Draw the structures of the following compounds:

- (a)  $XOF_2$  (b)  $H_3PO_4$   
 (c)  $H_3PO_3$  (d)  $IF_5$   
 (e)  $IF_7$

Ans. Given,

Vapour pressure of water,  $P^0 = 17.535$  mm Hg.

Mass of glucose,  $W_2 = 25$ g

Mass of water,  $W_1 = 450$ g

Molar mass of glucose,  $M_2 = 180$  g Mol<sup>-1</sup>

Molar mass of water,  $M_1 = 18$ g Mol<sup>-1</sup>

Applying Raoult's law,

$$\frac{P^0 - P_s}{P^0} = \frac{n_2}{n_1 + n_2} \text{ or } \frac{P^0 - P_s}{P^0} = \frac{n_2}{n_1}$$

$$1 - \frac{P_s}{P^0} = \frac{W_2}{M_2} \times \frac{M_1}{W_1}$$

$$1 - \frac{P_s}{17.535} = \frac{25}{180} \times \frac{18}{450}$$

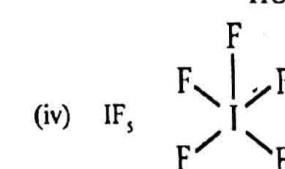
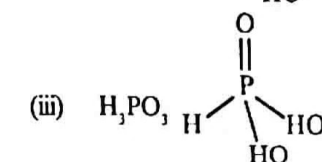
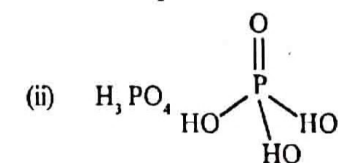
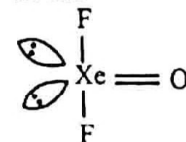
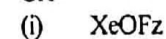
$$1 - \frac{P_s}{17.535} = \frac{25}{4500}$$

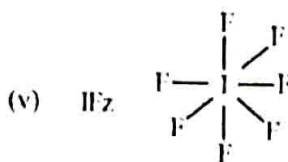
$$\frac{17.535}{P_s} = 1 + \frac{25}{4500}$$

$$P_s = \frac{4500 \times 17.535}{4525}$$

$$P_s = 17.44 \text{ mm Hg}$$

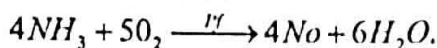
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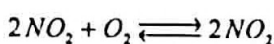


33. Give the principle involved in the manufacture of nitric acid by Ostwald process. How does concentrated  $\text{HNO}_3$  react with (i) C and (ii)  $\text{I}_2$ ?

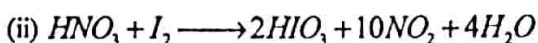
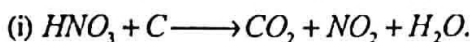
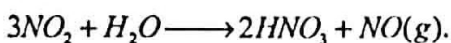
Ans. on large scale, nitric acid is prepared by Ostwald process. This method is based upon catalytic oxidation, of  $\text{NH}_3$  by atmospheric oxygen



Nitric oxide combine with oxygen giving  $\text{NO}_2$ .

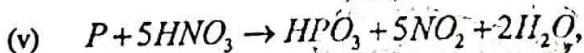
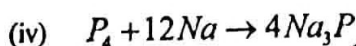
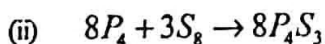
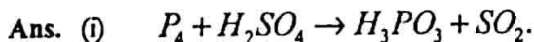


Nitrogen dioxides dissolves in water to give  $\text{HNO}_3$ ,



OR

How does white phosphorus react with (i)  $\text{H}_2\text{SO}_4$ , (ii) sulphur, (iii) Mg, (iv) Na and (v)  $\text{HNO}_3$ ?



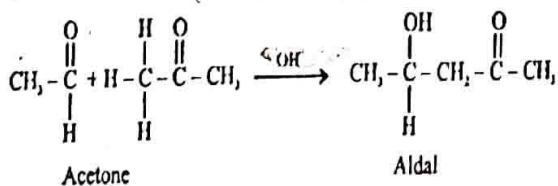
34. Write short notes on the following :

(a) Aldol condensation

(b) Sandmeyer reaction

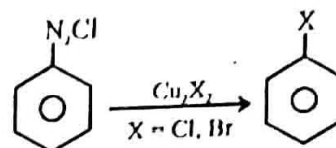
(c) Stephen reaction.

Ans. (a) Aldol Condensation- In presence of dilute alkali aldehydes and ketones with at least one  $\alpha$ -H atom take part in condensation called aldol condensation

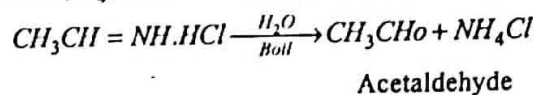
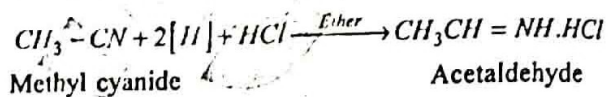


(b) Sandmeyer Reaction-

It is a method to prepare chloro or bromo benzene by reacting benzene diazonium chloride with cuprous chloride/bromide.



(c) Stephen Reaction- When cyanides are treated with  $\text{SnCl}_2$  and  $\text{HCl}$  gas at r.t. imine hydrochloride is formed which upon boiling with water gives aldehyde



OR

Identify 'X', 'Y' and 'Z' in the following :

