CHEMISTRY

Question Bank

Bihar Board

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2015

CHEMISTRY

Section-I (Objective Type)

Time : 1 Hour 10 Minutes] [Marks : 28

Instructions to the Candidates : See Question Paper 2016.

For the following Question Nos. 1 to 28 there is only one correct answer against each question. For each question, mark the correct option on the answer sheet. $28 \times 1 = 28$

1. **If 96500 coulomb of electricity is passed through $CuSO_4$ solution, it will liberate**
   (A) 63.5 gm of Cu (B) 31.76 gm of Cu
   (C) 96500 gm of Cu (D) 100 gm of Cu

2. **The shape of XeF_4 is**
   (A) tetrahedral (B) square planar (C) pyramidal (D) linear

3. **Which one of the following is the strongest Lewis acid?**
   (A) BF_3 (B) BCl_3 (C) BBr_3 (D) BI_3

4. **In chemical equation $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$, the equilibrium constant K_p depends on**
   (A) total pressure (B) catalyst used
   (C) amount of H_2 and I_2^- (D) temperature

5. **If the rate of a reaction is expressed by, Rate $= k[A]^2[B]$, then the order reaction will be**
   (A) 2 (B) 3 (C) 1 (D) 0

6. **If 2 gm of NaOH is present in 200 ml of its solution, its molarity will be**
   (A) 0.25 (B) 0.5 (C) 5 (D) 10

7. **Which one of the following does not form hydrogen bonding?**
   (A) NH_3 (B) H_2O (C) HCl (D) HF

8. **Main source of helium is**
   (A) air (B) radium (C) monazite (D) water

9. **Which one of the following elements is liquid at normal temperature?**
   (A) Zinc (B) Mercury (C) Bromine (D) Water

10. **Which one of the following is least basic?**
    (A) NCl_3 (B) NBr_3 (C) NI_3 (D) NF_3

11. **H_2SO_4 is a/an**
    (A) acid (B) base (C) alkali (D) salt

12. **Which one of the following is called green vitriol?**
    (A) $FeSO_4 \cdot 7H_2O$ (B) $CuSO_4 \cdot 5H_2O$
    (C) $CaSO_4 \cdot 2H_2O$ (D) none of these

13. **Which block of elements are known as transition elements?**
    (A) *p*-block (B) *s*-block (C) *d*-block (D) *f*-block

14. **Concentration of sulphide are is done by**
    (A) froth flotation process (B) electrolysis
    (C) roasting (D) none of these

15. **Sodium is a member of which group in periodic table?**
    (A) Group I (B) Group II (C) Group IV (D) none of these

16. Most abundant element in earth's crust is
(A) Si (B) Al (C) Zn (D) Fe

17. Malachite is an ore of
(A) iron (B) copper (C) zinc (D) silver

18. Formula of copper pyrite is
(A) Cu_2S (B) CuFeS (C) $CuFeS_2$ (D) $Cu_2Fe_2S_2$

19. Ore of aluminium is
(A) bauxite (B) hematite (C) dolomite (D) none of these

20. K_4 [Fe(CN)$_6$] is a/an
(A) double salt (B) complex salt (C) acid (D) base

21. General formula of Alkene is
(A) C_nH_{2n} (B) C_nH_{2n+2} (C) C_nH_{2n-2} (D) none of these

22. Hybridisation of carbon in ethane is
(A) sp^3 (B) sp^2 (C) sp (D) sp^3d^2

23. Dry distillation of calcium formate gives
(A) HCHO (B) HCOOH (C) CH_3COOH (D) CH_3CHO

24. Volume of one mole of any gas at NTP is
(A) 11.2 litre (B) 22.4 litre (C) 10.2 litre (D) 22.8 litre

25. Avogadro's number (N) is equal to
(A) 6.023×10^{24} (B) 6.023×10^{23} (C) 6.023×10^{-23} (D) 11.2

26. Number of π bonds in ethyne is
(A) one (B) two (C) three (D) four

27. Modern periodic table is given by
(A) Debonair (B) Mendeleef (C) Mendel (D) none of them

28. Which one of the following is an alkalin earth element?
(A) Carbon (B) Sodium (C) Zinc (D) Iron

ANSWERS

1. (B)	2. (B)	3. (D)	4. (D)	5. (B)	6. (A)	7. (C)
8. (C)	9. (B)	10. (D)	11. (A)	12. (A)	13. (C)	14. (A)
15. (A)	16. (B)	17. (B)	18. (C)	19. (A)	20. (B)	21. (A)
22. (A)	23. (A)	24. (B)	25. (B)	26. (B)	27. (D)	

28. none of these

Section-II (Non-Objective Type)

Time : 2 Hour 05 Minutes] [Marks : 42

Instructions to the Candidates : See Question Paper 2016.

Question Nos: 1 to 11 are of short answer type. Each question carries 2 marks.

$11 \times 2 = 22$

Short Answer Type Questions

1. Explain in which of the following compounds, the chemical bond would have less ionic character : LiCl or KCl.
Ans. LiCl because size of Li is smaller than K.

2. What is activation energy? Establish the relation between rate constant of a reaction and activation energy.

Ans. The minimum extra amount of energy absorbed by the reactant molecules so that their energy becomes equal to threshold value is called activation energy. It is denoted by E_a.

According to Arrhenius equation, we know that $K = Ae^{-E_a/RT}$

Taking logarithm of both side, we get

$$\ln K = \ln A - \frac{E_a}{RT} \therefore \log K = \log A - \frac{E_a}{2.303RT}.$$

3. Discuss briefly the structure of CsCl.

Ans. In the structure of CsCl, Cl^- ions occupy position at the corner and Cs^+ ion occupy the position at the body centre. 8 : 8 co-ordination number is found in CsCl. The number of unit cell is 1.

4. The osmotic pressure of sugar solution is 2.46 atm at 27°C. Calculate the concentration of the solution.

Ans. $\pi = 2.46$ atm, $T = 27°C + 273 = 300$ K, $C = ?$

$$\because \quad \pi = CRT \quad \therefore \quad C = \frac{\pi}{RT} = \frac{2.46}{0.0821 \times 300} = 0.1 \text{ M (approx)}$$

5. How is molarity of a solution different from molality?

Ans. Difference between molarity and molality :

Molarity	Molality
(i) The no. of moles of solute present in one litre solution.	(i) The no. of moles of solute present in one kg solvent.
(ii) It is effected by temperature.	(ii) It is not affected by temperature.
(iii) Its unit is mole/litre.	(iii) Its unit is mole/kg.

6. Discuss Raoult's law of relative lowering of vapour pressure.

Ans. The relative lowering of vapour pressure of a solution is equal to the mole fraction of solute. Let p^s be the vapour pressure of pure solvent. X_1 be the mole fraction of solvent white X_2 be the mole fraction of solute.

$$p^s = p^o X_1 \Rightarrow \frac{p^s}{p^o} = X_1 \Rightarrow 1 - \frac{p^s}{p^o} = 1 - X_1 \Rightarrow \frac{p^o - p^s}{p^o} = X_2.$$

7. How many moles of Cu will be deposited by passing 24125 coulombs of electric current from $CuSO_4$ solution?

Ans. $\because$ 96500 coulombs gives 31.75 g Cu

$$\therefore \text{ 1 coulombs give } \frac{31.75}{96500} \text{ g Cu}$$

$$\therefore \text{ 24125 coulombs gives } \frac{31.75}{96500} \times 24125 \text{g Cu} = 31.75 \times 0.25 \text{ g.}$$

$$\text{No. of moles } \frac{\text{wt.}}{\text{atomic wt.}} = \frac{31.75 \times 0.25}{63.5} = 0.125.$$

8. If in a chemical reaction $A + B \rightarrow$ product, rate law is given by $R = K[A]^{1/2}[B]^{3/2}$, find the order of reaction.

Ans. Order of reaction $= \frac{1}{2} + \frac{3}{2} = \frac{1+3}{2} = \frac{4}{2} = 2.$

9. What is Tyndall effect? Discuss.

Ans. The phenomenon of the scattering of light by the solution particles is called Tyndall effect. On passing a powerful beam of light through a colloidal solution placed in a darkened room, the solution appears to be luminescent when viewed from direction at right angles to that of the beam.

The path of light is made visible by the scattering of light from colloidal particles. A true solution does not show Tyndall effect.

10. Give the names of two copper ores.

Ans. Names of two copper ores :

(a) Copper Pyrites — $CuFeS_2$ (b) Chalcocite — Cu_2S

11. How will you convert the following :

(a) Ethyl alcohol from ethylamine

(b) Ethylamine from ethyl alcohol

Ans. (a) $C_2H_5NH_2 + HNO_2 \xrightarrow[HCl]{NaNO_2} C_2H_2OH$

(b) $C_2H_5OH \xrightarrow{PCl_5} C_2H_5Cl \xrightarrow{NH_3} C_2H_5NH_2$

Question Nos. 12 to 15 are of long answer type. Each question carries 5 marks.

$4 \times 5 = 20$

12. Name two important ores of iron. How is iron extracted from its ore? Give chemical equations.

Ans. See answer Q.No. 12 in 2013.

Or,

Write the names of important ores of aluminium. Discuss the principle of extraction of it from ore.

Ans. See answer Q.No. 12 (Or) in 2013.

13. How does nitric acid react with the following? Give reason.

(i) Copper (ii) Iron

Ans. (i) Reaction with Copper : *(a) Reaction with cold and dilute* HNO_3 *:* Cu is treated with cold and dilute HNO_3, N_2O is obtained.

$$4Cu + 10HNO_3 \rightarrow 4Cu(NO_3)_2 + N_2O + 5H_2O$$

(b) Reaction with hot and moderate HNO_3 *:* It gives NO.

$$3Cu + 8HNO_3 \rightarrow 3Cu(NO_3)_2 + 2NO + 4H_2O$$

(c) Reaction with concentration HNO_3 *:* It gives NO_2.

$$Cu + 4HNO_3 \rightarrow Cu(NO_3)_2 + 2NO + 2H_2O$$

(d) Reaction with fuming HNO_3 *:* It gives N_2.

$$5Cu + 12HNO_3 \rightarrow 5Cu(NO_3)_2 + 6H_2O + N_2$$

(ii) Reaction with Iron :

(a) Reaction with very dilute HNO_3 *:* It gives NH_4NO_3.

$$4Fe + 10HNO_3 \rightarrow 4Fe(NO_3)_2 + NH_4NO_3 + 3H_2O$$

(b) Reaction with dilute HNO_3 : It gives N_2O.

$$4Fe + 10HNO_3 \rightarrow 4Fe(NO_3)_2 + N_2O + 5H_2O$$

(c) Reaction with hot and dilute HNO_3 : It gives NO.

$$2Fe + 8HNO_3 \rightarrow 2Fe(NO_3)_3 + 2NO + 4H_2O$$

(d) Reaction with concentration HNO_3 : It gives NO_2.

$$Fe + 6HNO_3 \rightarrow Fe(NO_3)_3 + 3NO_2 + 3H_2O$$

Or,

How is sulphuric acid prepared by lead chamber process? Give its principles.

Ans. Following steps are involved formation of H_2SO_4 by lead chamber process.

(a) Formation of SO_2 *:* It is formed by burning sulphur in air or by roasting iron pyrite in excess of air

$$S + O_2 \rightarrow SO_2$$
$$4FeS_2 + 11O_2 \rightarrow 2Fe_2O_3 + 8SO_2$$

(b) Oxidation of SO_2 *into* SO_3 *:* SO_2 is oxidised into SO_3 in presence of NO_2 in large lead sheet chambers.

$$2SO_2 + O_2 \rightarrow 2SO_3$$
$$SO_2 + NO_2 \rightarrow SO_3 + NO$$
$$2NO + O_2 \rightarrow 2NO_2$$

NO and NO_2 act as an oxygen carrier.

(c) Conversion of SO_3 *into* H_2SO_4 *:* SO_3 dissolves in steam to give H_2SO_4.

$$SO_3 + H_2O \rightarrow H_2SO_4$$
$$NO + NO_2 \rightarrow N_2O_3$$
$$2SO_2 + N_2O_3 + O_2 + H_2O \rightarrow 2HSO_4NO$$
$$2HSO_4NO + H_2O \rightarrow 2H_2SO_4 + NO + NO_2$$

78% H_2SO_4 is obtained.

Or,

What are the main sources of iodine? How is iodine extracted from sea weeds?

Ans. Manufacture of Iodine : The sea weeds are collected dried and burnt in shallow pits. The ash left is called kelp. The ash is extracted with hot water which dissolves out chlorides, carbonates, sulphates and iodides of sodium and potassium. The solution on concentration and cooling separate out chlorides, sulphates and carbonates, white iodides remain in solution. The solution is mixed with MnO_2 and concentrated H_2SO_4 Iodine is obtained.

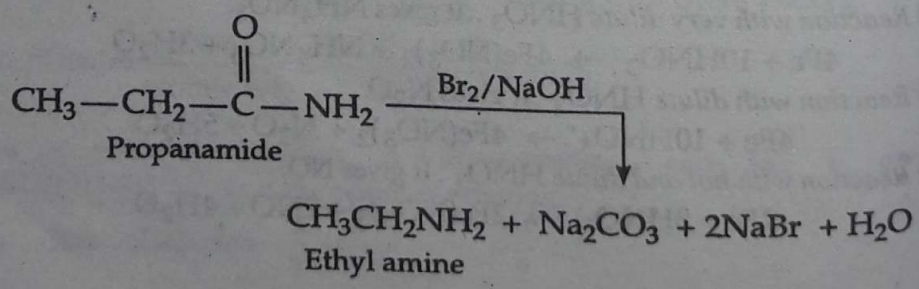
$$2NaI + MnO_2 + 3H_2SO_4 \rightarrow 2NaHSO_4 + MnSO_4 + H_2O + I_2$$

Obtained I_2 is sublimated, pure iodine is obtianed.

14. How will you prepare ethylamine in laboratory?

Ans. In the laboratory formed ethyl amine in hoffman bromide reaction. Propanamide react in bromine and sodium hydroxide in this reaction, formed ethyl amine.

Process : About 20 gram propanamide and 18 ml bromine water is taken in a round bottom flask. A droping funnel and thermometer is connected with round bottom flask with the help of cork. 60% NaOH solution is added to the flask with the help of droping funnel. Flask is heated at 70°C, ehthyl amine is obtained. It is absorbed with HCl. Again it is distilled with NaOH solution, pure ethyl amine is obtained.



Or,

How will you prepare aniline in laboratory?

Ans. Principle : When nitrobenzene is reduced with gramulated tin and concentration HCl, aniline is obtained.

$$2C_6H_5NO_2 + 3Sn + 12HCl \rightarrow 2C_6H_5NH_2 + 3SnCl_4 + 4H_2O$$

Aniline reacts with $SnCl_4$ and HCl to form a double salt aniline stannic chloride.

$$2C_6H_5NH_2 + 2HCl + SnCl_4 \rightarrow (C_6H_5NH_2)_2SnCl_4$$

So, it is distilled with NaOH solution, aniline is obtained.

$$(C_6H_5NH_2)_2SnCl_4 + 8NaOH \rightarrow 2C_6H_5NH_2 + Na_2SnO_2 + 6NaCl + 5H_2O$$

Or,

What are carbohydrates? How are they classified?

Ans. See answer Q.No. 15 (a) in 2013.

15. Explain why—

(a) Boiling point of NH_3 is higher than PH_3.

(b) Chloroacetic acid is stronger than acetic acid.

(c) Only Xe forms chemical compound among inert gases.

(d) HF is weaker than Hi in acetic strength.

(e) H_3PO_3 is a di-protic acid.

Ans. (a) See answer Q.No. 15 (a) in 2013.

(b) In chloroacetic acid, chloro group is – I effect group. Acid strength is directly oportional to – I effect group. While CH_3 group is + I effect group. Acid strength is versly proporhonal to + I effect group. Hence chloro acetic acid is stronger than acetic acid.

(c) See answer Q.No. 15 (d) in 2013.

(d) See answer Q.No. 15 (c) in 2013.

(e) See answer Q.No. 15 (b) in 2013.

Or,

What happens when

(a) Sodium acetate is heated with soda lime?

(b) Calcium carbide is allowed to react with water?

(c) Acetylene is passed through red hot copper tube?

(d) Methane reacts with chlorine in diffused sunlight?

(e) Ethyl alcohol is oxidised?

Ans. (a) Sodium acetate is heated with soda lime, CH_4 is obtained.

$$CH_3COONa + NaOH \xrightarrow[\Delta]{CaO} CH_4 + Na_2CO_3$$

(b) Calcium carbide is allowed to react with H_2O, acetylene is obtained.

$$CaC_2 + 2H_2O \rightarrow Ca(OH)_2 + C_2H_2 \uparrow$$

(c) Acetylene is passed through red hot Cu-tube, benzene is obtained.

$$3C_2H_2 \xrightarrow[\text{Cu-tube}]{\text{Red hot}} C_6H_6$$

(d) Methane is treated with Cl_2 in diffused sun light, CCl_4 is obtained.

$$CH_4 + 4Cl_2 \xrightarrow{h\nu} CCl_4 + 4HCl$$

(e) Ethyl alcohol is oxidised acetic acid is obtained.

$$CH_3 - CH_2OH \xrightarrow{[O]} CH_3CHO \xrightarrow{[O]} CH_3COOH$$

□