Chemistry - 2017

Multiple Choice Type Questions

Q.1. The presence of Frenkel defects in a crystal ..... its density.
(a) decreases (b) increases
(c) does not change (d) either increase or decrease
Ans. (c) does not change

Q.2. Radioactive decay follows the ..... kinetics.
(a) zero order (b) second order
(c) first order (d) n^{th} order.
Ans. (c) first order

Q.3. A 1% solution of Phenol is a/an
(a) antiseptic (b) disinfectant
(c) anti-malarial drug (d) anti-histamine.
Ans. (b) disinfectant

Q.4. Amongst the following, the strongest base is
(a) benzylamine (b) aniline
(c) acetanilide (d) p-nitroaniline.
Ans. (a) benzylamine

Q.5. A new carbon-carbon bond formation is possible in
(a) Cannizzaro reaction
(b) Friedel-Crafts reaction
(c) Clemmensen reaction
(d) Reimer-Tiemann reaction
Ans.

Q.6. The compound which reacts with HBr in accordance with the Markownikoff's rule is
(a) $HC = CH_2$ (b) cis-but-2-ene
(c) trans-but-2-ene (d) $(CH_3)_2C=CH_2$.
Ans. (d) $(CH_3)_2C=CH_2$

Q.7. Galena is an ore of
(a) Fe (b) Cu
(c) Zn (d) Pb.
Ans. (d) Pb

Q8. Vitamin C is the compound called
(a) Riboflavin (b) Rabimose
(c) Ascorbic acid (d) Thiamine.
Ans. (c) Ascorbic acid

Very Short Answer Type Questions

Q.9. What is glycosidic linkage?
Ans. Glycosidic linkage is that linkage which is used to attach two monosaccharidise.

Q.10. Write the IUPAC name of $K_3[Al(C_2O_2)_3]$.
Ans. Potassium trioxalatealuminium (11)

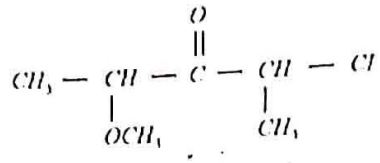
Q.11. Name the monomers of Buna-S rubber.
Ans. 1-3 butadiene and styouns.

Q.12. Give an example of food preservative.
Ans. Sodium benzoic, benzoic acid.

Q.13. What are antihistamines?
Ans. An antihistamines is a type of drug that opposes the activity of histamine receptar.

Q.14. Give an example of heterogeneous catalysis.
Ans. Amonia synthesis from $N_2 + H_2$ over iron catalysts.

Q.15. Write the IUPAC name of the following :

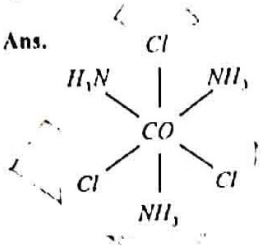


Ans. 2-Chloro, 4-methoxy pentan-3-one.

(Short Answer I Type Questions)

Q.16. Write the geometrical isomers of $[CoCl_3(NH_3)_3]$.

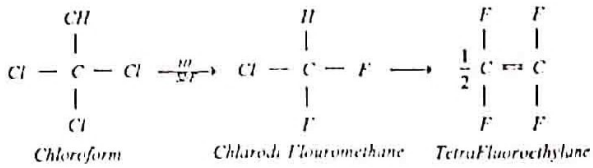
Ans.



Q.17. Write any two functions of RNA found in the cells.
Ans. (i) It provides the structure and shape producing the catalystic regions of the rebosome.
(ii) It helps speed up, or catalyze, protein synthesis by interaction between the tRNA and the protien synthesis machinery.

Q.18. Why do transition metals form complex compouds?
Ans. These metals have empty d-orbitals or they have empty valence orbitals that can accept pairs of electron from a base.

Q.19. Write chemical equations for the synthesis of
(a) Teflon (b) Neoprene
Ans. (a) Teflan :



Chloroform *Chlarodi Flouromethane* *TetraFluoroethylane*

(b) Neoprene :

Chloroprene *Neoprene*

Q.20. Why is limestone added of the blast furnace in the extraction of iron from haematite?
Ans. Iron ore contains impurities mainly silica. Limestone is added to the iron ore which reacts with silica to form molten calcium silicate in the blast furnance. The Calcium Silicate floats on the liquid iron. Since iron is below carbon in the reactivity series. Iron in the ore is reduced to iron metal by heating with carbon (coke). It is actually co which does the reducing in blast furnance.

Q.21. Define molar conductivity of a substance. How does it vary with concentration for weak and strong electrolytes?

Ans. Molar Conductivity is defined as the conductuvity of an electrolyte solution divided by the molar concentration of the electrolyte, and so measures the efficiency with which a given electrolyte conducts electricity in a solution.
It changes with concentration of electrolyte conductivity always dicreaes with dicrease in concentration.

Q.22. 6.02×10^{20} molecules of urea are present in 100 ml of its solution. What is the concentration of the urea solution.

Ans. No. of moles $= \frac{6.02\times10^{20}}{6.02\times10^{23}} = 10^{-3}$

$$\text{Molarity} = \frac{10^{-3}}{100}\times1000$$

$$= 10^{-2}$$

$$= 0.01M$$

Q.23. Distinguish between molarity and molality.

Ans.

Molarity	Molality
• It is the no. of moles of solute per kg of the solvent.	It is the no. of moles of solute per litre of the solution.
• It does not depend on temperature or does not afected by temperature.	It changes with change in temperature.

Q.24. Complete the following:

(i) $P_4 + HNO_3 \rightarrow$

(ii) $Ca_3P_2 + H_2O \rightarrow$

(iii) $NaClO_4 + HCl \rightarrow$

Ans. (i) $P_4 + HNO_3 \rightarrow H_3PO_4 + NO_2 + H_2O$

(ii) $Ca_3P_2 + H_2O \rightarrow Ca(OH)_2 + PH_3$

(iii) $NaClO_4 + HCl \rightarrow HClO_4 + NaCl$

Q.25. Describe with the help of chemical equations, the preparation of potassium dichromate from chromite ore.

Ans. Potassium dichromate is prepared from chromite are ($FeCr_2O_4$) in the following steps :

Step-1

Preparation of sodium chromate

$$4FeCr_2O_4 + 16NaOH + 7O_2 \rightarrow 8NaCrO_4 + 2Fe_2O_3 + 8H_2O$$

Step-2

Conversion of sodium chromate into sodium dichromate

$$2Na_2CrO_4 + conc.H_2SO_4 \rightarrow Na_2Cr_2O_7 + Na_2SO_4 + H_2O$$

Step-3

Conversion of sodium dichromate to potassium dichromate

$$Na_2Cr_2O_7 + 2KCl \rightarrow K_2Cr_2O_7 + 2NaCl$$

Potassium dichromate bring less soluble than sodium chloride is obtained in the form of orange coloured crystals and can be removed by filtration.

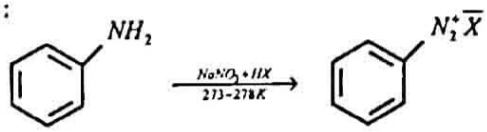
Q.26. Explain the following reactions with an example in each case:

(i) Sandmeyer's Reaction

(ii) Diazotisation Reaction

Ans. (i) Sandmeyer's Reaction is a reaction used for conversion of diazonium salt to aryl halide. It is applicable to primary aromatic amines.

Example :



Benzene diazonium halide

(ii) Diazotisation : The nitrosation of primary aromatic amines with nitrous acid (generated in situ from sodium nitrate and a strong acid, such as hydrochloric acid, sulfuric acid, or HBF_4) leads to diazonium salts, which can be isolated if the counterion is non-nucleophilic.

Q.27. Give reasons for the following:

(a) Phenol is more acidic than ethanol.

(b) o- and p-nitrophenols are more acidic than phenol.

Ans. (a) However both ethanol and phenols are weak acids the ethanol are less acidic then phenols because it is very tough to remove the H ion from ethanol. Phenol can lose ion easily because phenoxide ion formed is stabilised to some extent, this is as the negative charge on the oxygen atom is delocalised around the ring i.e. having a cyclic structure in phenol helps it stay stable even after hydrogen is removed. Delocalized charge means negative charge is distributed almost equally through the compounds. The more stable ion is, the more likely it is to form. In this case phenol, the alcohol is almost similar to being non charged even after the hydrogen ion is removed and thus can have some acidic effect.

(b) The nitro-group is an electron- with drawing group. The presence of this group in the ortho or para position decreases the electron density in the O, H bond. As a result, it is easier to lose a proton. Alfo, the O-nitrophenoxide or pnitrophenoxide ion formed after the loss of protons is stabilized by resonance. Hence, ortho and para nitrophenols are stronger acid than phenol

Q.28. Define the following terms:

(i) Micelles

(ii) Peptization

(iii) Electrophoresis.

Ans. **(i) Micelle :** An agregate of molecules in a colloidal solution, such as those formed by detergents.

(ii) Peptization : Peptization is the process responsible for the formation of stable dispersion of colloidal particles in dispersion medium.

(iii) Electrophoresis : The movemen of charged particles in a fluid or gel under the influence of an electric field.

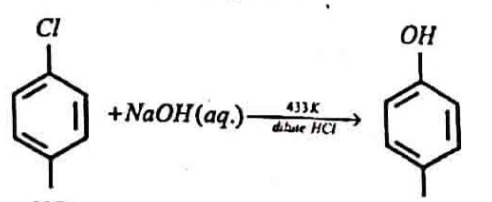
Q.29. How will you bring out following conversions?

(i) Chlorobenzene to p-nitrophenol

(ii) 2-bromopropane to 1-bromopropane

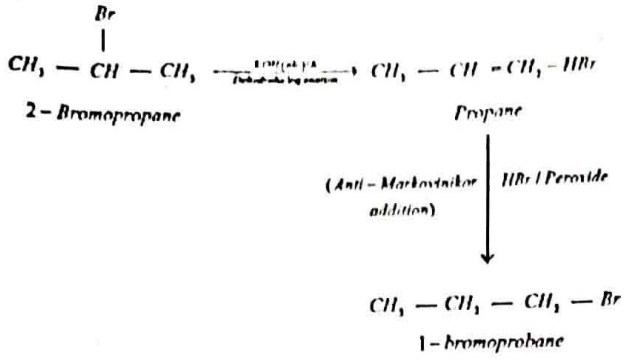
(iii) Aniline to Phenyl isocyanide.

Ans. (i)



Chlorobenzene *P–Nitrophenol*

(ii)



(iii) $C_6H_5-NH_2 + KOH + CHCl_3 \longrightarrow \underset{\text{Isocyanide}}{C_6H_5-NC}$
Aniline

Q.30. Aluminium crystallises in a cubic close packed structure. Its metallic radius is 125 pm.

(a) What is the length of the side of the unit cell?

(b) How many unit cells are there in 1.00 cm^3 or aluminium?

Ans. (a) For the cubic close packed structure.

Let a is the edge of the cube and r is the radius of atom.

Given, $r = 125\,pm$

$$a = 2\sqrt{2}r$$

plug the value of r we get

$$= 2 \times 1.414 \times 125\,pm$$

$$= 354\,pm\ (approx.)$$

(b) Volume of one unit cell $= (side)^3$

$$= (354\,pm)^3$$

$$1\ pm = 10^{-10}\,cm$$

$$= (354 \times 10^{-10}\,cm)^3$$

$$= (3.54 \times 10^{-8}\,cm)^3$$

$$= 44.36 \times 10^{-24}\,cm^3$$

$$= 4.4 \times 10^{-23}\,cm^3$$

Total number of unit cells in 1.00 cm^3

$$= \frac{total\ volume}{size\ of\ each\ cell}$$

$$= \frac{1.00\,cm^3}{4.4 \times 10^{-23}\,cm^3}$$

$$= 2.27 \times 10^{22}\ unit\ cell.$$

Q.31. What will happen to the value of emf of the cell

$Zn|Zn^{2+}(0.1M)||Cu^{2+}(0.1M)|Cu$, if the concentration of the electrolyte in the anode compartment is increased?

Ans. At anode (oxidation) : $Zn \rightarrow Zn^{2+} + 2e^-$

At cathode (reduction) : $Cu^{2+} + 2e^- \Rightarrow Cu$

$$Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu$$

$$E = E^\circ - \frac{0.0591}{n} \log \frac{[Zn^{2+}]}{[Cu^{2+}]}$$

Hence, increasing the concentration at anode compartment, will increase the concentration of Zn^{2+} ions, and therefore, from above eqn. we can see that the negative value of right hand side of the eqn. increases and the emf. of the cell decreases.

Long Answer Type Questions

Q.32. Give reasons for the following :

(i) SiF_6^{2-} is known but $SiCl_6^{2-}$ is not.

(ii) H_3PO_2 acts as a monobasic acid.

(iii) PbO_2 is a stronger oxidizing agent than SnO_2.

(iv) Sulphur exhibits paramagnetic behaviour in vapour state.

(v) Bond dissociation energy of F_2 is less than that of Cl_2.

Ans. (i) The size of the fluorine is smal therefore can be easily arranged around silicon to form SiF_6^{2-} while the size of the chlorine is large enough which create steric hindrance to each other therefore cannot be arranged around silicon in excess.

(ii) The structure of H_3PO_2 contains only one P-OH bond. since number of P-OH bonds determine the bascisity of oxo acids of phasphorus, H_3PO_2 which has single P-OH bond is monobasic.

(iii) This is because in case of $Sn+4$ oxidation state is more stable as compared to +2 oxidation state. But in case of Pb due to more dominant effect of inert effect +2 oxidation state is more stable and hence Pb^{+4} get converted into Pb^{+2} easily and acts as a good oxidizing agent.

(iv) In vapour state, sulphur partly exists as S_2 molecules which has two unpaired electrons in antibinding pie orbitals, just like the O_2 molecules. Hence, it exhibits paramagnetism.

(v) The size of fluorine is smaller than chlorine. Due to which there is higher electron density on fluorine due to the smaller size and higher electron density there is repulsion between the electron which is known as interelectronic replusion. Due to this replusion between the electron both the atoms want to move apart. Hence, the bond can be cleaved easily and the bond dissociation energy is less.

Or

Q. If the half-life of a first order reaction A is 2 mins, how long will it take A to reach-

(a) 25% of its initial concentration?

(b) 10% of its initial concentration?

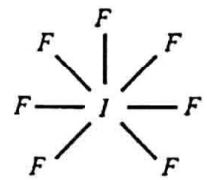
Q.33. Draw the structures of the following compounds:

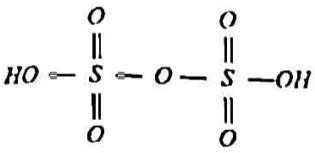
(i) IF_7 **(ii) $H_2SO_2O_7$**

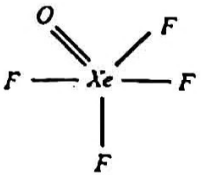
(iii) $XeOF_4$ **(iv) S_8**

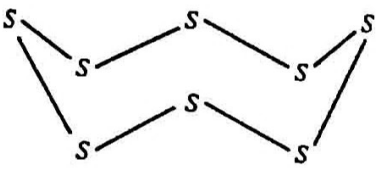
(v) H_3PO_3.

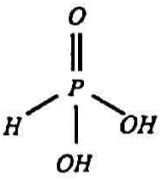
Ans. (i)



(ii) 

(iii) 

(iv) 

(v) 

Or

Q. **Give two chemical tests to distinguish between the following:**
(a) Methyl acetate and ethyl acetate
(b) Benzaldehyde and benzoic acid.

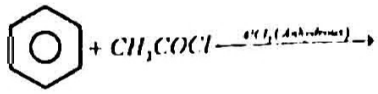
Ans. **(a) Methyl acetate and ethyl acetate**

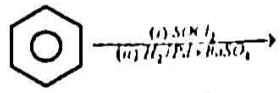
	Methyl acetate	Ethyle acetate
(i)	It will give iodoform test	It will not give iodoform test
(ii)	When methyl acetate gets hydrolysed in presence of strong oxidising agent, it will give one type of acid that will be methanoic acid.	When ethyl acetate gets hydrolysed, it will give different types of acid like ethanoic acid and methanoic acid.

(b) Benzaldehyde and benzoic acid.

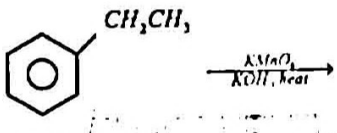
	Benzaldehyde	Benzoic acid
(i)	It can give cannizzaro's reaction.	It cannot give cannizzaro's reaction.
(ii)	It reacts with ammonia to give a complex called hydrobenzamide.	It reacts with ammonia to give a benzamide.

Q.34. Complete the following:

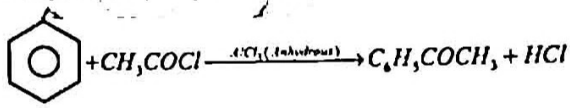
(i) 

(ii) 

(iii) $CH_3COONa \xrightarrow{NaOH}$

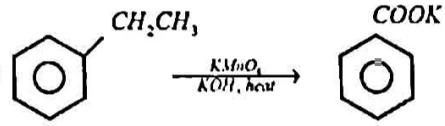
(iv) 

(v) $CH_3COOCH_3 + I_2 + NaOH \xrightarrow{warm}$

Ans. (i) 

(ii)

(iii) $CH_3COONa \xrightarrow[KOH,\,heat]{KMnO_4} CH_4 + Na_2CO_3$

(iv) 

(v) $CH_3COCH_3 + I_2 NaOH \xrightarrow{warm} CH_3COONa + CHI_3 + H_2O$

Or

Q. **(a) State the Arrhenius equation for the rate constant of a reaction.**
(b) Show that for a first order reaction, the time required for half the change is independent of initial concentration.

Ans. (a) The rate of equation for a reaction between two substances A and B is :

$rate = K[A]^x[B]^y$

The rate equation shows the effect of changing the concentration of the reactants on the rate of the reaction.

□□□