# Model Question- 1 <br> Chemistry XII 

Time :3 hours
Full marks: 75
Attempt all questions
Group 'A'
Tick the correct answer. ( $11 \times 1=11$ )

1. What weight of sodium hydroxide is required to neutralize 100 ml of 0.1 N HCl ?
a. 4 g
b. 2 g
c. 0.4 g
d. 0.04 g
2. Ostwald's dilution law is not applicable for
a. $\mathrm{CH}_{3} \mathrm{COOH}$
b. HCl
c. $\mathrm{NH}_{4} \mathrm{OH}$
d. HCOOH
3. The addition of a catalyst during a chemical reaction alters which of the following quantities?
a. Enthalpy
c. Activation energy
b. Entropy
d. Internal energy
4. Which of the following is the concentration of $\mathrm{H}+$ in standard hydrogen electrode?
a. 1 M
b. 0.01 M
c. 0.1 M
d. 2 M
5. Formation of interstitial compounds makes the transition metals more
a. soft
b. ductile
c. malleable d. none of the above
6. For which of the following ores froth floatation method is used for concentration?
a. Haematite b. Zinc blende
c. Magnetite d. Camallite
7. Most reactive alkyl halide towards $\mathrm{SN}^{1}$ reaction is
a) n-butyl chloride
b) sec-Butyl chloride
c) tert - butyl chloride
d) iso-butyl chloride
8. When alkane nitrile is hydrolyzed in the presence of dil.acid to give
a) Acid amide
b. Carboxylic acid
c. Ester
d. Alcohol
9. Cannizzaro's reaction is an example of
a. Oxidation reaction
b. reduction reaction
c. disproportionation reaction
d. none of these
10. Which one of the following are Gamma rays.
a. Low energy waves
b. High energy protons
c. High energy electron
d. High energy electromagnetic waves
11. Raw material used for making pulp are
a.wood pulp
b. grasses and reeds
c. recycle paper
d. all of them

## Group 'B'

Short answer questions. ( $8 \times 5=40$ )

1. a) How is normality differed from molarity?
b) Write two differences between acid-base titration and redox titration. [2]
c) 0.715 gram of $\mathrm{Na}_{2} \mathrm{CO}_{3} \cdot \mathrm{xH}_{2} \mathrm{O}$ required 20 mL of semi normal HCl solution for complete reaction. Find the value of $x$.

Or

The following data are given for the reaction: $\mathrm{P}+\mathrm{Q} \rightarrow \mathrm{Z}$ is first-order w.r.to P and zero-order w.r.to Q. fill the following table.

| Exp. No. | $[\mathrm{P}], \mathrm{mol} \mathrm{L}^{-1}$ | [Q], mol L- | Rate of formation of (Z) mol <br> $\mathrm{L}^{-1} \mathrm{~s}^{-1}$ |
| :---: | :---: | :---: | :---: |
| 1 | 0.1 | 0.1 | $2 \times 10^{-2}$ |
| 2 | - | 0.2 | $4 \times 10^{-2}$ |
| 3 | 0.4 | 0.4 | - |
| 4 | - | 0.2 | $2 \times 10^{-2}$ |

2. Predict the spontaneity of exothermic and endothermic reaction in term of enthalpy, entropy and free energy change. [5]
3. Cast iron is extacted in a furnace which is known as blast furnace. Write the chemical reactions involved in the zone of reduction of blast furnace. What happens when copper sulphate is allowed to react with ammonia solution till excess? Write the important use of silver. [2+2+1]
4. What are volatile metals? How is steel manufactured by open hearth process? Explain with well labelled diagram. [1+4]
5. Write the equations for
a) excess ethanol is heated with conc. $\mathrm{H}_{2} \mathrm{SO}_{4}$ at $140^{\circ} \mathrm{C}$
b) ethanol is heated with excess $\mathrm{H}_{2} \mathrm{SO}_{4}$ at $160^{\circ} \mathrm{C}-170^{\circ} \mathrm{C}$
c) 2-methylpropan-2-ol vapour is passed through heated copper at $300^{\circ} \mathrm{C}$
d) Ethanol is refluxed with $\mathrm{SOCl}_{2}$ in the presence of pyridine
e) Ethanol reacts with sodium metal

Or
Chloroform is an important chemical compound which has wide scope of synthetic utility as well as medicinal value, how does chloroform reacts with
a. Zn in the presence of steam
b. Conc. Nitric acid
c. Air in the presence of sunlight
d. Phenol in the presence of NaOH
e. Acetone in the presence of alkali
$[1+1+1+1+1]$
6. Write the two methods of preparation of chlorobenzene. Why is nucleophilic substitution in chlorobenzene difficult in comparison to chloroethane? How is chlorobenzene converted into benzoic acid? [2+2+1]
7. i) Write the functional isomer of $\mathrm{CH}_{3} \mathrm{COCH}_{3}$ and give a chemical test to distinguish them.
ii) Identify the compound $\mathrm{X}, \mathrm{Y}$ and Z in the following reaction.


X is the aliphatic aldehyde, which can give cannizzaro's reaction. [1+1+1]
8. What do you mean by OPC and PPC cement? Write down the flow sheet diagram for the manufacture of portland cement. [3+2]

## Group 'C'

Long answer questions ( $3 \times 8=24$ )
9.a) What is the solubility product? Write the application of common ion effect and solubility product.
b) The solubility of AgCl in water at $25^{\circ} \mathrm{C}$ is $1.43 \times 10^{-3} \mathrm{gL}^{-1}$. Calculate its solubility in 0.5 M KCl solution. [3]

Or
a. Draw energy profile diagram for exothermic and endothermic reaction. What is Gibb's free energy? Derive Gibb's Helmholtz equation. [2+1+1]
a. What is a calomel electrode? Why is this electrode used as a reference electrode? [2]
b. Give the reason why the blue colour of copper sulphate solution is discharged when an iron rod is dipped in it. Given $\mathrm{E}_{\mathrm{Cu}^{2}+/ \mathrm{cu}}^{0}=0.34 \mathrm{~V}$ and

$$
\begin{equation*}
\mathrm{E}_{\mathrm{Fe}^{2}+/ \mathrm{Zn}}^{0}=-0.44 \mathrm{~V} \tag{2}
\end{equation*}
$$

10.i) An alkene (A) on ozonolysis yields acetone and an aldehyde. The aldehyde is easily oxidized to an acid (B). When (B) is treated with $\mathrm{Br}_{2} / \mathrm{P}$ it yields a compound (C), which on hydrolysis gives a hydroxyl acid (D). This acid can also be obtained from acetone by the reaction with HCN followed by hydrolysis. Identify the compound A, B, C and D.
ii) How does methanal reacts with
a) $\mathrm{NH}_{3}$
b) Conc. NaOH
11. A. Give reason:
a. It is dangerous to boil old sample of ether.
b. Ethers are stored in the bottle containing iron wire.
c. The boiling point of ethers are low as compared to boiling point of corresponding alcohols.
d. Ethers are commonly used as solvents.
e. Ethers are considered as inert compounds. [1+1+1+1+1]
B. Why is nucleophilic substitution in chlorobenzene difficult in comparison to chloroethane? How is chlorobenzene converted into benzoic acid? [2+1]

