

HSC Maharashtra Board question paper: March 2013

Note:

- All question are compulsory
- Answer to the two sections are to be written in the same answer book.
- Figure to the right hand side indicate full marks.
- Write balanced chemical equations and draw neat and labelled diagrams wherever necessary.
- Encery new question must be started on a new page.
- Use of logarithmic table is allowed

CHEMISTRY: SECTION – I

Q. 1. Select and write the most appropriate answer from the given alternatives for each sub-question: [7]

- In body centred cubic structure the space occupied is about

(A) 68 %	(B) 53 %
(C) 38 %	(D) 32 %
- For a gaseous reaction the unit of rate of reaction is

(A) $L \text{ atm s}^{-1}$	(B) $\text{atm mol}^{-1} \text{ s}^{-1}$
(C) atm s^{-1}	(D) mol s
- Which of the following compounds contains S = O as well as S = S bonds?

(A) Sulphuric acid	(B) Thiosulphuric acid
(C) Sulphurous acid	(D) Thiosulphurous acid
- Which of the following solutions shows maximum depression in freezing point?

(A) 0.5 M Li_2SO_4	(B) 1 M NaCl
(C) 0.5 M $\text{Al}_2(\text{SO}_4)_3$	(D) 0.5 M BaCl_2
- For a chemical reaction $\Delta S = -0.035 \text{ kJ/K}$ and $\Delta H = -20 \text{ kJ}$.

(A) 5.14 K	(B) 57.14 K
(C) 571.4 K	(D) 5714.0 K
- The standard e.m.f of the following cell is 0.463 V
 $\text{Cu} | \text{Cu}_{(1M)}^{++} || \text{Ag}_{(1M)}^+ | \text{Ag}$. If $E_{\text{Ag}}^0 = 0.800 \text{ V}$,
 What is the standard potential of Cu electrode?

(A) 1.137 V	(B) 0.337 V
(C) 0.463 V	(D) -0.463 V
- Fe_2O_3 is reduced to spongy iron near the top of blast furance by

(A) H_2	(B) CaO
(C) SiO_2	(D) CO

Q. 2. (A) Answer any SIX of the following:

[12]

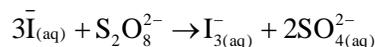
- i. Distinguish between crystalline solid and amorphous solid.
- ii. State Kohlrausch Law and write mathematical expression of molar conductivity of the given solution at infinite dilution.
- iii. Write cell reactions in lead storage battery during discharge.
- iv. Draw structures and write geometry of PCl_3 and PCl_5 .
- v. Prove that $\Delta H = \Delta U + \Delta n RT$. What is the condition under which $\Delta U = \Delta H$?
- vi. Mention names and formulae of two ores of aluminium.
- vii. Derive the relationship between relative lowering of vapour pressure and molar mass of nonvolatile solute.
- viii. What is pseudo first order reaction? Give one example of it.

Q. 3. Answer any THREE of the following:

[9]

- i. Calculate the mole fraction and molality of HNO_3 in a solution containing 12.2 % HNO_3 .
(Given – atomic masses : H = 1, N = 14, O = 16)

- ii. Consider the reaction –



At particular time t, $\frac{d[\text{SO}_4^{2-}]}{dt} = 2.2 \times 10^{-2} \text{ m/s}$.

What are the values of the following at the same time?

- a. $-\frac{d[\text{I}^-]}{dt}$
 - b. $-\frac{d[\text{S}_2\text{O}_8^{2-}]}{dt}$
 - c. $-\frac{d[\text{I}_3^-]}{dt}$
- iii. 300 M mol of perfect gas occupies 13 L at 320 K. Calculate the work done in joules when the gas expands –
 - a. isothermally against a constant external pressure of 0.20 atm.
 - b. isothermal and reversible process.
 - c. into vacuum until the volume of gas is increased by 3L. ($R = 8.314 \text{ J mol}^{-1} \text{ K}^{-1}$)
 - iv. What is the action of the following reagents on ammonia?
 - a. Excess of air
 - b. Excess of chlorine
 - c. Na metal

Q. 4. Answer any ONE of the following:

[7]

- i. a. Explain with reason sign conventions of ΔS in the following reactions :
1. $\text{N}_{2(g)} + 3\text{H}_{2(g)} \longrightarrow 2\text{NH}_{3(g)}$
 2. $\text{CO}_{2(g)} \longrightarrow \text{CO}_{2(s)}$
- b. Explain the following terms:
1. Smelting
 2. Flux
- c. Gold occurs as face centred cube and has a density of 19.30 kg dm^{-3} . Calculate atomic radius of gold. (Molar mass of Au = 197)
- ii. a. Explain the trends in the following properties with reference to group 16:
1. Atomic radii and ionic radii
 2. Density
 3. ionisation enthalpy
 4. Electronegativity
- b. In the electrolysis of AgNO_3 solution 0.7g of Ag is deposited after a certain period of time. Calculate the quantity of electricity required in coulomb.
(Molar mass of Ag is 107.9 g mol^{-1}).
- c. Define Osmosis.