

2023

4th Semester Examination

CHEMISTRY (Honours)

Paper : GE 4-T

(Solutions, Phase Equilibria, Conductance,
Electrochemistry & Analytical and
Environmental Chemistry-I)

[CBCS]

Full Marks : 40

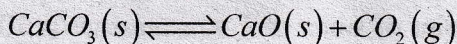
Time : Two Hours

*The figures in the margin indicate full marks.
Candidates are required to give their answers
in their own words as far as practicable.*

Group - A

Answer any **five** questions : $2 \times 5 = 10$

1. What is Azeotrope?
2. What is UCST?
3. Calculate degree of freedom for the system :



4. Define specific conductance. Write its S.I. unit.
5. Write applications of electrolysis in metallurgy.

P.T.O.

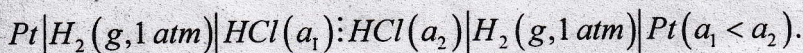
(2)

6. Write the principle of estimation of amount sulphate ion by gravimetric analysis.
7. What is photochemical smog?
8. Define equivalent conductance and mention its unit.

Group - B

Answer any **four** of the following : $5 \times 4 = 20$

9. Derive an expression for the liquid junction potential for the following concentration cell.



5

10. (a) State and explain Kohlrausch's law of independent migration of ions.

- (b) The specific conductance of a saturated solution of silver chloride at 25°C , after subtracting the specific conductance of water, is $2.26 \times 10^{-6} \text{ S cm}^{-1}$. Calculate the solubility of silver chloride. Given

$$\Lambda_{m, AgCl}^0 = 138.3 \text{ S cm}^2 \text{ mol}^{-1} \quad M_{AgCl} = 143.5 \text{ g mol}^{-1}.$$

2+3

11. (a) What is eutectic temperature?

- (b) Boiling point of water at 1 atm pressure is 100°C . Calculate the boiling point of water at a place where the atmospheric pressure is 5 atm. (Given : latent heat of vapourization of water is 536 cal/g).

2+3

12. (a) Two liquids A and B form ideal solutions. At 60°C , the vapour pressure of a solution consisting of 2 mol of A and 3 mol of B is 280 mm of Hg. On addition of further one mole of A to this solution at 60°C , the vapour pressure rises to 300 mm Hg. Calculate the vapour pressure of pure A and Pure B at 60°C .
- (b) Write short note on 'solvent extraction'. 3+2
13. (a) Write the principle of estimation of Na_2CO_3 and NaHCO_3 present in a mixture.
- (b) What is R_f factor? 3+2
14. (a) Write problems of ozone layer depletion.
- (b) Write differences between COD and BOD. 3+2

Group - C

Answer any **one** question : 10×1=10

15. (a) Derive Gibb's phase rule thermodynamically.
- (b) Draw and explain the conductometric titration curve between oxalic acid vs. NaOH .
- (c) Write short note on standard hydrogen electrode. 5+3+2
16. (a) Write the role of phosphoric acid during the titration of Fe^{2+} by KMnO_4 solution.

P.T.O.

- (b) Why the solution of $Na_2S_2O_3$ cannot be used as primary standard solution?
- (c) Explain how cyclone separator controls pollution of air.
- (d) Write short note on 'radioactive pollution and their effects on animal and plant life'. 2+2+3+3

বঙ্গানুবাদ

বিভাগ - ক

যে কোনো পাঁচটি প্রশ্নের উত্তর দাও। $2 \times 5 = 10$

- ১। অ্যাজিওট্রপ কী?
- ২। UCST বলতে কী বোঝ?
- ৩। $CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$; এই সিস্টেমের স্বাধীনতার মাত্রা নির্ণয় কর।
- ৪। আপেক্ষিক পরিবাহিতার সংজ্ঞা লেখ। এর এস.আই একক লেখ।
- ৫। ধাতুবিদ্যায় তড়িৎবিশ্লেষণ-এর ব্যবহারগুলি লেখ।
- ৬। তৈলিক বিশ্লেষণের দ্বারা সালফেট আয়নের পরিমাণ নির্ণয়ের নীতি লেখ।
- ৭। আলোকে-রাসায়নিক ধোঁয়াশা কাকে বলে?
- ৮। 'Equivalent conductance' বলতে কি বোঝ এবং তার একক লেখ।