

Vamshik

CAMBRIDGE SCHOOL SRINIVASPURI
HALF-YEARLY EXAMINATION 2017-18
CHEMISTRY-(SET-A)
CLASS-12

Max Marks = 70

Time: 3Hours

General Instructions:

- (I). All questions are compulsory.
- (II). Question numbers 1 to 5 are very short answer questions each of 1 mark each. Answer them in one sentence.
- (III). Question numbers 6 to 10 are short answer questions of 2 marks each. Answer them in about 30 words each.
- (IV). Question numbers 11 to 22 are short answer questions of 3 marks each. Answer them in about 40 words each
- (V) Q23 is a question carrying 4 marks.
- (VI). Question numbers 24 to 26 are long answer questions of 5 marks each.
- (VII). There is no overall choice in the paper. However, there is an internal choice in one question of 2 marks weightage, one question of 3 marks weightage and all the three questions are of 5 marks weightage.
- (VII) Use of calculator is prohibited. Log tables can be used if necessary. +

1	What is Frenkel defect?	1
2	How much electric charge is required to oxidise 1 mole of H ₂ O to O ₂ ?	1
3	Write an expression for the order of the reaction. $\text{NO} + \text{Br}_2 \xrightarrow{k'} \text{NOBr}_2 \quad (\text{fast}) \quad \dots (i)$ $\text{NOBr}_2 + \text{NO} \xrightarrow{k'} 2\text{NOBr} \quad (\text{slow}) \quad \dots (ii)$ <hr style="width: 20%; margin: auto;"/> $\text{Overall} \quad 2\text{NO} + \text{Br}_2 \xrightarrow{k} 2\text{NOBr}$	1
4	How does it become possible to cause artificial rain by spraying silver iodide on the clouds?	1
5	How is ethanol distinguished from phenol solution?	1
6	25 ml of 0.2 M Phosphorous acid (H ₃ PO ₃) neutralizes exact 80 ml of a solution containing 10 g NaOH per dm ³ . Report basicity of acid and write balanced chemical equation for neutralization.	2
7	A first order reaction takes 40minutes for 30% decomposition. Calculate half life.	2
8	How is phenol commercially prepared. Give its important uses.	2
9	Why are aromatic amines weaker bases than aliphatic amines?	2
10	Predict all the alkenes that would be formed by dehydrohalogenation of the following halides with sodium ethoxide in ethanol and identify the major alkene: (i) 1-Bromo-1-methylcyclohexane (ii) 2-Chloro-2-methylbutane	1 1
10 or	Arrange the compounds of each set in order of reactivity towards S _N 2 displacement: (i) 2-Bromo-2-methylbutane, 1-Bromopentane, 2-Bromopentane (ii) 1-Bromo-3-methylbutane, 2-Bromo-2-methylbutane, 3-Bromo-2-methylbutane	1 1
11.	Gold crystallizes in a Fcc lattice. If the edge length of the unit cell is 407 pm. Calculate the density of gold as well as its atomic radius assuming it to be spherical. [Au=197 u] [density = 19.4gcm ⁻³ r = 0.159 nm]	3

3.069

12	(a) A metal oxide crystallizes in a hexagonal close packed array of oxide ions with two out of every three octahedral holes occupied by metal. Find formula of metal oxide. (b) When little phosphorous is added to silicon, name type of semiconductor obtained.	2 1
13.	Arginine vasopressin is a pituitary hormone. It helps to regulate the amount of water in the body by reducing the flow of urine from kidneys. An aqueous solution containing 21.6 mg of vasopressin in 100 mL of solution had an osmotic pressure of 3.70 mm Hg at 25°C. What is molecular weight of hormone?	3
14	19.5 g of $\text{CH}_2\text{F COOH}$ is dissolved in 500g of water. the depression in freezing point of water observed is 1.0°C. Calculate the van't Hoff's factor & dissociation constant of $\text{CH}_2\text{F COOH}$. K_f for water is 1.86K kgmol^{-1} [molar mass of $\text{CH}_2\text{F COOH} = 78\text{gmol}^{-1}$]	
15	Calculate the standard free energy change & equilibrium constant for the cell. $\text{Fe(s)} \text{Fe}^{2+}(\text{1M}) \text{Cu}^{2+}(\text{1M}) \text{Cu(s)}$ $E^\circ_{\text{Fe}^{2+}/\text{Fe}} = -0.44\text{V}$; $E^\circ_{\text{Cu}^{2+}/\text{Cu}} = 0.34\text{V}$	3
16	Explain (a) What is an adsorption isotherm? Describe Freundlich's adsorption isotherm for the adsorption of gases on solids. (b) Graphically the extent of adsorption variation with temperature at constant pressure for both type of adsorption.	1½ 1½
17	Write a short note on the following (a) Electrodialysis (b) Peptisation (c) Ultrafiltration	3
17 or	Write a short note on the following (h) Coagulation & its uses (i). Hardy Schulz rule (j) Gold number	3
18	How will you bring about the following conversions : i) Chlorobenzene to p-nitrophenol ii) Toluene to Benzyl alcohol iii) Ethanol to Propanenitrile	3
19	(i) Give one use of freon 12, DDT, carbon tetrachloride and iodoform. (ii) What are Enantiomers? Give example.	2 1
20	(i) Sulphanilic acid is soluble in dil. NaOH but not in dil. HCl. Explain. (ii) Can we prepare aniline by Gabriel - phthalimide reaction? (iii) Describe carbylamine test for primary amines.	1 1 1
21	Identify C to H in the following reactions. (i) $\text{C}_6\text{H}_5\text{-COOH} \xrightarrow{\text{PCl}_5} \text{(C)} \xrightarrow{\text{NH}_3} \text{(D)} \xrightarrow{\text{P}_2\text{O}_5} \text{C}_6\text{H}_5\text{CN} \xrightarrow{\text{H}_2/\text{Ni}} \text{(E)}$ (ii) $\text{CH}_3\text{-CH=CH-CHO} \xrightarrow{\text{NaBH}_4} \text{(F)} \xrightarrow{\text{HCl/Anhy. ZnCl}_2} \text{(G)} \xrightarrow{\text{HCN/H}^+} \text{(H)}$	1½ 1½
22	How the following pair of compounds reacts? Give proper conditions & equations. (a) Ethylamine and nitrous acid (b) Aniline & benzaldehyde (c) Ethylamine & ethyl magnesium bromide	3
23	The values of E° of some of the reactions are given below: $\text{I}_2 + 2\text{e}^- \rightarrow 2\text{I}^-$; $E^\circ = +0.54 \text{ volt}$ $\text{Cl}_2 + 2\text{e}^- \rightarrow 2\text{Cl}^-$; $E^\circ = +1.36 \text{ volt}$ $\text{Fe}^{3+} + \text{e}^- \rightarrow \text{Fe}^{2+}$; $E^\circ = +0.76 \text{ volt}$ $\text{Ce}^{4+} + \text{e}^- \rightarrow \text{Ce}^{3+}$; $E^\circ = +1.60 \text{ volt}$ $\text{Sn}^{4+} + 2\text{e}^- \rightarrow \text{Sn}^{2+}$; $E^\circ = +0.15 \text{ volt}$ On the basis of the above data, answer the following questions: (a) Whether Fe^{3+} oxidizes Ce^{3+} or not? (b) Whether I_2 displaces chlorine from KCl ?	2 2

2881

24	(a) For a first order reaction $A \rightarrow B$ $E_a = 70 \text{ kJ/mol}$. 20% of A was kept at 25°C for 20 min, 25% decomposition takes place, what will be the % decomposition in the same time in a 30% solution maintained at 40°C , assuming E_a constant in this range of temperature (b) Explain Arrhenius theory of reaction rates.	3 2
24 or	(a) The rate constant for the first order decomposition of H_2O_2 is given by the following equation: $\ln k = 14.34 - 1.25 \times 10^4 \text{ K} / T$ Calculate energy of activation for this reaction & at what temperature will its half period be 256 minutes? (b) An exothermic reaction $A \rightarrow B$ has an activation energy of 13 kcal/mol. Energy of the reaction is 44 kcal. Find out the activation energy for the reverse reaction.	3 2
25	(i) Write the following name reactions with examples a). Aldol Condensation b). Cannizzaro Reaction c). HVZ Reaction (ii) Aldehydes are more reactive than ketones. Why?	
25 or	(i) Acid and acid derivatives although contain $> \text{C} = \text{O}$ group, do not undergo the usual properties of carbonyl group explain. (ii) Complete the following reactions. (a) $\text{R}-\text{C}\equiv\text{CH} + \text{dil H}_2\text{SO}_4 / \text{HgSO}_4 \rightarrow \dots$ (b) $\text{Ca}(\text{OOCCH}_3)_2 \xrightarrow{\Delta} \dots$ (c) $\text{Cl}_3\text{CCHO} + \text{NaOH} \rightarrow \dots$	
26	(a) What happens when (Give equations only)? (i) 2-Methyl butylene-2 is treated with water in the presence of dil H_2SO_4 (ii) Sodium benzenesulphonate is fused with caustic alkali and the product is hydrolysed with dilute acid. (iii) Cumene is treated with oxygen and the product is hydrolysed with dilute acid. (b) Give the mechanism for the formation of Diethylether from Ethanol.	3 2
26 or	(a) Place the following groups of compounds in decreasing order of acidity and justify your answer. Phenol (A), o-nitrophenol (B), m-nitrophenol (C), p-nitrophenol (D); (b) Give the product of each reaction (i) $\text{CH}_3\text{CH}_2\text{CH}=\text{CHCH}_2\text{OH} + \text{PCC} / \text{CH}_2\text{Cl}_2 \rightarrow \dots$ (ii) $\text{Ph}_2\text{CO} + \text{H}_2 / \text{Pd} \rightarrow \dots$ (iii) $m\text{-O}_2\text{NC}_6\text{H}_4\text{CH}_2\text{COOH} + \text{LiAlH}_4 \rightarrow \dots$	1 3

Fe_2O_3
 $2e^- + 3^+$