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Register No. [ ]

Time : 3.00 Hrs.

Quarterly Examination - 2023
CHEMISTRY

Marks : 70

PART - I

Note : (I) Answer all the questions. II) Choose the most appropriate answer from the given four alternatives and write the option code and corresponding answer 15 x 1 = 15

1. Bauxite has the composition
   a) Al_2O_3 b) $Al_2O_3 . nH_2O$ c) $Fe_2O_3 . 2H_2O$ d) none of these
2. A chemical substance that forms an easily fusible slag with gangue is known as.....
   a) ore b) mineral c) flux d) lime water
3. Match items in Column - I with the items of Column - II and assign the correct code

Column - I	-	Column - II
A. Borazale	-	1. $B(OH)_3$
B. Boric acid	-	2. $B_3N_3H_6$
C. Quartz	-	3. $Na_2[B_4O_5(OH)_4]8H_2O$
D. Borax	-	4. SiO_2

   a) A) 2 B) 1 C) 4 D)3 b) A)1 B) 2 C) 4 D) 3 c) A) 1 B) 2 C) 3 D) 4 d) A) 2 B) 1 C) 3 D) 4
4. Assertion : bond dissociation energy of fluorine is greater than chlorine gas.
   Reason : Chlorine has more electronic repulsion than fluorine.
   a) Both assertion and reason are true and reason is the correct explanation of assertion.
   b) Both assertion and reason are true but reason is not the correct explanation of assertion.
   c) Assertion is true but reason is false d) Both assertion and reason are false
5. In acid medium, potassium permanganate oxidizes oxalic acid to
   a) oxalate b) carbon dioxide c) acetate d) acetic acid
6. Of all the known elements, ...has the highest electrical conductivity at room temperature.
   a) cadmium b) rhodium c) silver d) palladium
7. Solid CO_2 is an example of
   a) Covalent solid b) metallic solid c) molecular solid d) ionic solid
8. The vacant space in fcc lattice unit cell is
   a) 48% b) 23% c) 32% d) 26%
9. $2NO + O_2 \rightarrow 2NO_2$.In this reaction, at a particular instant, when $[O_2]$ is decreasing at 0.2 mol L^{-1} S^{-1} at what rates is $[NO_2]$ increasing at that instant?
   a) 0.4 mol LS b) 0.4 mol L^{-1} S^{-1} c) 0.14 mol L d) 0.14 mol L^{-1} S^{-1}
10. The addition of a catalyst during a chemical reaction alters which of the following quantities?
    a) Enthalpy b) Activation energy c) Entropy d) Internal energy
11. Which of the following can act as Lowry - Bronsted acid as well as base?
    a) HCl b) SO_4^{2-} c) HPO_4^{2-} d) Br^-
12. $HO-CH_2-CH_2-OH$ on heating with periodic acid gives
    a) methanoic acid b) glyoxal c) methanal d) CO_2
13. Williamson's synthesis of preparing dimethyl ether is a/an
    a) SN^1 reaction b) SN^2 reaction c) electrophilic addition d) electrophilic substitution
14. Which of the following reaction is an example of disproportion reaction.
    a) Aldol condensation b) Cannizaro reaction c) Benzoin condensation d) None of these
15. The reagent used to distinguish between acetaldehyde and benzaldehyde is
    a) Tollens reagent b) Fehling's solution c) 2, 4 - dinitrophenyl hydrazine d) semicarbazide

PART - II

Note : Answer any six questions. Question No.24 is compulsory. **6 x 2 = 12**

16. Give the limitations of Ellingam diagram.
17. What is catenation?
18. What is inert pair effects?
19. Which is more stable? Fe^{3+} or Fe^{2+} - explain.
20. What is meant by the term "Co-ordination number"? What is the co-ordination number of atoms in a bcc structure?
21. Write Arrhenius equation and explain the terms involved.
22. Write nitration of Glycerol.
23. What is Urotropine? Mention its uses.
24. Establish a relationship between the solubility product and molar solubility for the following.
    a) Ag_2CrO_4 b) $Ca_3(PO_4)_2$

PART - III

Answer any six questions. Question NO.33 is compulsory. **6 x 3 = 18**

25. What is the difference between minerals and ores?
26. How will you identify borate radical?
27. Write uses of Helium.
28. What is Lanthanide contraction write two consequences of it.
29. Explain Schottky defeat.
30. Explain pseudo first order reaction with example.
31. What is the pH of 10^{-7} M HCl?
32. Write Kolbe's reaction.
33. Ethanoic acid $\xrightarrow{SOCl_2}$ A $\xrightarrow{Pd/BaSO_4}$ B $\xrightarrow{NaOH}$ C Find A, B, C.

PART - IV

Answer all the questions. **5 x 5 = 25**

343.a) Explain zone refining with example. (5) **(OR)**
    b) (i) Explain Mond process for refining Nickel. (3) (ii) Explain acid leaching.(2)
35. a) (i) How will you prepare bleaching powder? (2)
    ii) What are interstitial compounds? Write any two properties. (3) **(OR)**
    b) (i) Write a short note on Zeolite. (3)
    (ii) Write chromyl chloride test (2)
36. a) (i) Write any 3 properties of ionic crystal. (3)
    (ii) Explain metal deficiency defect. (2) **(OR)**
    b) (i) Differentiate between order of a reaction and Molecularity of a reaction.
    (ii) Find order of the following reaction
    a) Radioactive decay of $_{92}U^{238}$ b) Photo chemical reaction between H_2 and Cl_2.
37. a) (i) Explain common ion effect with example. (3)
    (ii) Define buffer index (β) - (2) **(OR)**
    b) (i) How will you differentiate primary secondary and tertiary alcohols by Lucas test.
38. a) (i) An organic compound (A) C_6H_6O gives violet colour with neutral $FeCl_3$. Compound (A) reacts with ammonia to give compound (B) and it also reacts with Zn dust to give compound (C).
    (ii) Identify the compounds A, B and C and write down the equations. (5) **(OR)**
    b) (i) Write three tests for carboxylic acids. (3)
    (ii) Write Stephen's reaction for the preparation of aldehydes.

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I ONE MARK 15×1 = 15

1. (b) $Al_2O_3 . nH_2O$
2. (c) flux
3. (b) A-2 B-1 (C) 4 (D) 3
4. (d) Both assertion and reason are false.
5. (b) Carbon dioxide
6. (c) silver
7. (c) molecular solid
8. (d) 26%.
9. (b) 0.4 mol L^{-1} s^{-1}
10. (b) Activation Energy
11. (c) HPO_4^{-2}
12. (c) methanal
13. (b) SN_2
14. (b) Cannizaro Rxn
15. (b) Fehling's solution.

II 2 MARK 6×2 = 12

16. × Does not tell anything about rate of Rxn (1M)
    ✓ Interpretation of ΔG based on the assumption that the reactant in equilibrium with the product not always True. (1M)
17. Ability of an element to form chain of atom (2m)

18. ns have tendency to remain Inert show reluctance to take part in the bonding (2m)

19. Fe^{+3} → Half filled more stable (2m)
Fe^{+2} → partially filled

20 Nearest neighbour group — (1m)
BCC — 8 — (1m)

21. $K = Ae^{-\frac{Ea}{RT}}$ —— (2m)
Terms —— 1m

22. Correct equation — (2m)
Absence of catalyst — (1m)

23. Hexamellylene tetramine $(CH_2)_6N_4$ } — (1m)
use: (1m)

24.
a) $4s^3$ (b) $10s^5$ — (2m)

III 3 mark 6 × 3 = 18

25. Three difference — (3m)

26. $H_3BO_3 + 3C_2H_5OH \xrightarrow[H_2SO_4]{} B(OC_2H_5)_3 + 3H_2O$ (3m)
without Catalyst — (2m)

27. Any Three uses (3)

28. * Atomic Radious Regular decrease La – Lu (2m)
* Imperfection shielding of 4f orbital (1m)

29. * missing of equal number of cation and anion.
* almost similar size (3m)
* Eg: NaCl

30. correct statement — (2m)

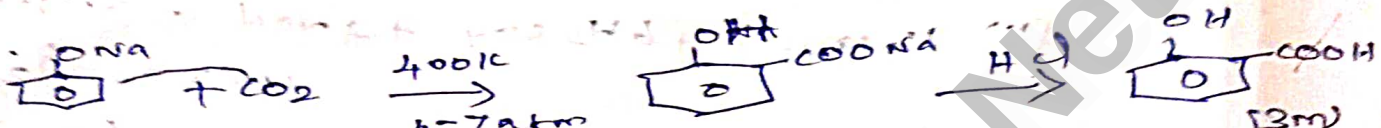
Eg: $CH_3COOCH_3 + H_2O \xrightarrow{H^+} CH_3COOH + CH_3OH$ — (1m)

Rate $= k [CH_3COOCH_3] [H_2O] [H^+]$

31. $pH = -\log [H_3O^+]$ (1m)

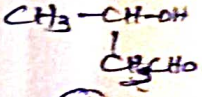
$pH = -\log (2 \times 10^{-7})$ (1m)

$pH = 6.70$ (1m)

32. 

[3m]

Explanation — (1m)

33. $CH_3COOH \xrightarrow{SOCl_2} CH_3COCl \xrightarrow[BaSO_4]{H_2} CH_3CHO \xrightarrow{NaOH}$ 

(A) (1m) (B) (1m) (C) (1m)

Otherwise name — [3m]

5 marks 5×5=25

IV

34. a) * Fractional crystallisation (1m)

* Impurity more soluble in melt than solid metal (1m)

* molten zone formed due to the movement of the heaters (1m)

* This process carried out inert atmosphere, prevent the oxidation metal (1m)

X Eg: Ge, Si, Ga (1m)

(b) (i) $Ni + 4CO \xrightarrow{350K} [Ni(CO)_4]$ (3m)

$[Ni(CO)_4] \xrightarrow{460K} Ni^0 + 4CO$

(ii) $ZnS + 2H_2SO_4 + O_2 \longrightarrow 2ZnSO_4 + 2S + 2H_2O$ (2m)

35. a) (i) $Ca(OH)_2 + Cl_2 \longrightarrow CaOCl_2 + H_2O$ (2m)

(ii) Mixing of Two halogen atom (2m)
* central Atom larger (1m)

(100)

(b) (i) * Three dimentional crystalline solid (1m)
* $Na_2O.(Al_2O_3) \times SiO_2 . y\ H_2O$ (1m)
* monovalent sodium ion
* Si and Al Tetrahedrally coordinated. (1m)

(ii) $K_2Cr_2O_7 + 6H_2SO_4 + 4NaCl \longrightarrow 2KHSO_4 + 2CrO_2Cl_2 + 3NaHSO_4 + 3H_2O$

(Red orange vapour) — (3m)

36. a) (i) Any Three properties. — (3m)

(ii) presence of Less number of cation than the anion (1m)
Ex: FeS, FeO (1m)

(b) (i) Any three difference — (3m)

(ii) (a) 1 (First) (b) (0) Zero (2m)

37. a) (i) Degree of dissociation decrease by adding Salt (2m)
Ex: CH_3COONa and CH_3COOH — (1m)

(ii) Measured in terms of Buffer capacity — (2m)

$$\beta = \frac{dB}{d(pH)}$$

(b) 1° Amine — Alcohol
2° Amine — N-nitroso Compound
3° Amine — Salt

(b) $CH_3-\underset{CH_3}{\overset{CH_3}{\underset{|}{\overset{|}{C}}}}-OH \xrightarrow{Conc.\ HCl} CH_3-\underset{CH_3}{\overset{CH_3}{\underset{|}{\overset{|}{C}}}}-Cl + H_2O$

Immediately Turbidity

2° OH

$CH_3-CH(CH_3)-OH \xrightarrow{ZnCl_2/HCl} CH_3-CH(CH_3)-Cl + H_2O$

Lucas Turbidity (5m)

1° OH

$CH_3CH_2-OH \xrightarrow{ZnCl_2/HCl}$ No Rxn

38 a (i) A — C_6H_5OH phenol

B — $C_6H_5NH_2$ Aniline —(5m)

C — C_6H_6 Benzene

(b)

(i) (1) Litmus Test (1m)

(2) Esterification (1m)

(3) Na_2CO_3 / $NaHCO_3$ Brisk effervescence (1m)

(ii) $CH_3-C\equiv N \xrightarrow{Sn/HCl} CH_3-CH=NH \xrightarrow{H_2O}$

$CH_3-CHO + NH_3$

—(2m)

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