Total number of printed pages : 4 *NB/XII/CHE/1*

2024
CHEMISTRY

Total marks : 70 Time : 3 hours

General instructions:

i) Approximately 15 minutes is allotted to read the question paper and revise the answers.
ii) The question paper consists of 34 questions. All questions are compulsory.
iii) Marks are indicated against each question.
iv) Internal choice has been provided in some questions.

N.B: Check that all pages of the question paper is complete as indicated on the top left side.

1. The values of Van't Hoff factors for KC*l*,NaC*l*,K_2SO_4 respectively are **1**
   (a) 2, 2 and 2 (b) 2,2 and 3
   (c) 1,1 and 2 (d) 1,1 and 1

2. SI unit of conductance is **1**
   (a) Sm (b) m^2 (c) Siemens (d) Sm^{-1}

3. Identify the reaction order from the value of rate constant $K = 5\times10^{-3} mol^{-1}LS^{-1}$ **1**
   (a) 1 st order (b) zero order
   c) 2^{nd} order (d) 3^{rd} order

4. Which of the following statement about transition element is not correct? **1**
   (a) They show variable oxidation states
   (b) They exhibit diamagnetic and paramagnetic properties
   (c) All ions are coloured
   (d) They exhibit catalytic property.

5. Which of the following is π - acid ligand? **1**
   (a) NH_3 (b) CO (c) F^- (d) en

6. Full form of DDT is **1**
   (a) dichlorodiphenyltrichloroethane
   (b) dichlorodiphenyltrichloromethane
   (c) diphenyldichlorotrifluoroethane
   (d) diphenyldifluorotrichloroethane

7. The IUPAC name of p-cresol is **1**
   (a) 4- methylphenol (b) 3-methylphenol
   (c) 3-chlorophenol (d) methoxybenzene

8. Which one of the following is the strongest acid? **1**

(a) ICH_2COOH (b) $ClCH_2COOH$

(c) FCH_2COOH (d) $BrCH_2COOH$

9. Treatment of phenol with benzene diazonium chloride in presence of base is known as **1**

(a) Gatterman reaction (b) Coupling reaction

(c) Sulphonation reaction (d) Acylation reaction

10. Xeropthalmia is caused due to deficiency of **1**

(a) vitamin C (b) vitamin D

(c) vitamin A (d) vitamin E

11. What is boiling point? **1**

12. Write the IUPAC name of $[Pt(NH_3)_2(H_2O)_2]^{2+}$ **1**

13. Why is tert-butylbromide more reactive towards S_N1 reaction? **1**

14. Draw the structures of the possible enantiomers of 3- methylpent-1-ene. **1**

15. What is the name of the reagent used in Friedel-Craft alkylation of anisole? **1**

16. Arrange the following in order of increasing order of their boiling points: **1**

CH_3CHO, CH_3CH_2OH, CH_3-CH_2-CH_3

17. Differentiate between solution showing positive and negative deviation from Raoult's law. **2**

18. Write the rate equation for the reaction $A_2 + 3B_2 \rightarrow 3C$, if the overall order of the reaction is zero. **2**

19. Cresol is a weaker acid than phenol. Explain. **2**

20. Convert benzene to benzaldehyde. **2**

21. **a.** Identify A and B in the reaction.

$$CH_3CH_2Cl \xrightarrow{NaCN} A \xrightarrow[Ni|H_2]{\text{Reduction}} B$$

Or **2**

b. Complete the reaction: $C_6H_5NO_2 \xrightarrow{Fe/HCl} A \xrightarrow[0-5^oC]{NaNO_2+HCl} B$

22. **a.** Why vitamin C cannot be stored in our body?

Or **2**

b. What are the products of the hydrolysis of sucrose?

23. **a.** Determine the osmotic pressure of a solution prepared by dissolving 25 mg of K_2SO_4 in 2L of water at $25^{\circ}C$ assuming that is completely dissociated. [Given R=0.0821 L atm K^{-1} mol^{-1}].

Or **3**

b. Calculate the boiling point of solution when 2g of Na_2SO_4(Molar mass=142 $gmol^{-1}$) was dissolved in 50g of water, assuming Na_2SO_4 undergoes complete ionization.[K_b for water=0.52K Kg mol^{-1}].

24. What type of battery is lead storage battery? Write the anode and cathode reaction, also the overall cell reaction occurring in the operation of a lead storage battery. **3**

25. **a.** The rate of reaction, $2NO + Cl_2 \rightarrow 2NOCl$ is doubled when concentration of Cl_2 is doubled and it becomes eight times when concentration of both NO and Cl_2 are doubled. Write the order of the reaction.

Or **3**

b. The decomposition of Cl_2O_7 at 400K in the gas phase to Cl_2 and O_2 is of 1st order reaction. After 55 seconds at 400K the pressure of Cl_2O_7 falls from 0.602 atm to 0.301 atm. Calculate the rate constant.

26. Why do transition elements show variable oxidation state? How is the variability in oxidation state of d-block differ from p-block elements? **3**

27. $[Cr(NH_3)_6]^{3+}$ is paramagnetic while $[Ni(CN_4)]^{2-}$ is diamagnetic. Explain. **3**

28. What is Fittig reaction? Write suitable reaction. **3**

29. **a.** Write the mechanism of acid catalyzed dehydration of ethanol to yield ethene.

Or **3**

b. How can primary, secondary and tertiary alcohols be prepared from Grignard reagent?

30. Explain Gabriel phthalimide synthesis with proper reaction. **3**

31. Draw the pyranose structure of glucose. **3**

32. **a.** A voltaic cell is set up at $25^{\circ}C$ with the following half cells:
$Al\,|\,Al^{3+}(0.001M)$ and $Ni\,|\,Ni^{2+}(0.50M)$
Calculate E_{cell}. [Given, $E^{\circ}_{Ni^{2+}|Ni} = -0.25V$
$E^{\circ}_{Al^{3+}/Al} = -1.66V$]

Or **5**

b. Calculate E°_{cell} for the reaction at 298 K.
$2Al(s) + 3Cu^{2+}(0.01M) \rightarrow 2Al^{3+}(0.01M) + 3Cu(s)$
Given, $E_{cell}=1.98V$.

33. i. What are inner transitional elements?
ii. Write the general electronic configuration of lanthanides and actinides.
iii. Why do $TiCl_3$ act as good reducing agent? **5**

34. **a.** i. Write the 1UPAC name of CH_3-CH=CH-CHO.
ii. What happens when ethanal reacts with Tollen's reagent ? Write a complete reaction.
iii. Chloroacetic acid is more acidic than acetic acid. Why?

Or **5**

b. Give reasons for the following;
i. Ethanal is more reactive than acetone towards nucleophilic addition reaction.
ii. $(CH_3)_3C$-CHO does not undergo aldol condensation.
iii. Carboxylic acids have higher boiling point than alcohols.

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