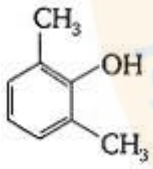
Class 12 - Chemistry

(CBSE)

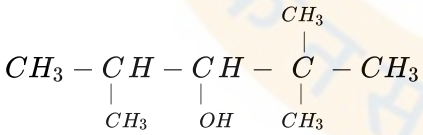
Date: 14.02.2023

Time Allowed: 3 hours **Maximum Marks: 70**

1. Give an example of solid solution in which the solute is a gas. **[1]**
2. Mention the factors that affect the rate of a chemical reaction. **[1]**
3. What are interstitial compounds? Why are such compounds well known for transition metals? **[1]**
4. Describe the oxidising action of potassium dichromate and write the ionic equations for its reaction with: **[1]**
   i. iodide
   ii. iron(II) solution and
   iii. H_2S
5. What are the different oxidation states exhibited by the lanthanoids? **[1]**
6. Name the halide according to the IUPAC system and classify it as alkyl, allyl, benzyl (primary, secondary, tertiary) vinyl or aryl halide. **[1]**
   $(CH_3)_2CHCH(Cl)CH_3$
7. Name the halide according to the IUPAC system and classify it as alkyl, allyl, benzyl (primary, secondary, tertiary) vinyl or aryl halide. **[1]**
   $CH_3CH_2CH(CH_3)CH(C_2H_5)Cl$
8. Write IUPAC name of the compound: **[1]**



9. Write IUPAC name of the compound. **[1]**



10. Define the following terms: **[2]**
    i. Mole fraction
    ii. Molality
    iii. Molarity
    iv. Mass percentage.
11. Define the term solution. How many types of solutions are formed? Write briefly about each type with an example. **[2]**
12. Discuss the nature of bonding in the following coordination entities on the basis of valence bond theory. **[2]**
    a. $[Fe(CN)_6]^{4-}$
    b. $[FeF_6]^{3-}$

c. $[Co(C_2O_4)_3]^{3-}$

d. $[CoF_6]^{3-}$

13. Write the structure of the major organic product of the reaction: **[2]**

$$CH_3CH_2CH = CH_2 + HBr \xrightarrow{Peroxide}$$

14. When 3-methylbutan-2-ol is treated with HBr, the following reaction takes place: **[2]**

$$CH_3 - \underset{CH_3}{\underset{|}{C}}H - \underset{OH}{\underset{|}{C}}H - CH_3 \xrightarrow{HBr} CH_3 - \underset{CH_3}{\overset{Br}{\overset{|}{\underset{|}{C}}}} - CH - CH_3$$

Give a mechanism for this reaction.

15. Why cannot aromatic primary amines be prepared by Gabriel phthalimide synthesis? **[2]**

16. An antifreeze solution is prepared from 222.6 g of ethylene glycol ($C_2H_6O_2$) and 200 g of water. Calculate the molality of the solution. If the density of the solution is 1.072 g mL^{-1}, then what shall be the molarity of the solution? **[3]**

17. Conductivity of 0.00241 M acetic acid is $7.896 \times 10^{-5}\ S\,cm^{-1}$. Calculate its molar conductivity. If $\Lambda^o{}_m$ for acetic acid is 390.5 S cm^2 mol^{-1}, what is its dissociation constant? **[3]**

18. Predict the products of electrolysis in each of the following: **[3]**

i. An aqueous solution of $AgNO_3$ with silver electrodes.

ii. An aqueous solution of $AgNO_3$ with platinum electrodes.

iii. A dilute solution of H_2SO_4 with platinum electrodes.

iv. An aqueous solution of $CuCl_2$ with platinum electrodes.

19. In a reaction between A and B, the initial rate of reaction (r_0) was measured for different initial concentrations of A and B as given below: **[3]**

A/molL^{-1}	0.20	0.20	0.40
B/molL^{-1}	0.30	0.10	0.05
r_0/molL^{-1}s^{-1}	5.07×10^{-5}	5.07×10^{-5}	1.43×10^{-4}

What is the order of the reaction with respect to A and B?

20. Predict which of the following will be coloured in aqueous solutions? Ti^{3+}, V^{3+}, Cu^{+}, Sc^{3+}, Mn^{2+}, Fe^{3+} and Co^{2+} give reason for each. **[3]**

21. Draw all the isomers (geometrical and optical) of : **[3]**

a. $[CoCl_2(en)_2]^{+}$

b. $[Co(NH_3)Cl(en)_2]^{2+}$

c. $[Co(NH_3)_2Cl_2(en)]^{+}$

22. Write the structures of the following organic halogen compounds. **[3]**

i. 2-Chloro-3-methylpentane

ii. p-Bromochlorobenzene

iii. 1-Chloro-4-ethylcyclohexane

iv. 2-(2-Chlorophenyl)-1-iodooctane

v. 2-Bromobutane

vi. 4-tert-Butyl-3-iodoheptane

vii. 1-Bromo-4-sec-butyl-2-methylbenzene

viii. 1,4-Dibromobut-2-ene

23. Give plausible explanation for each of the following: **[3]**

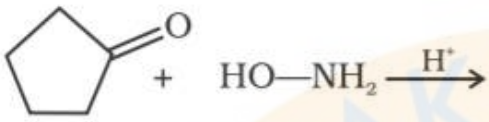
i. Why are amines less acidic than alcohols of comparable molecular masses?

ii. Why do primary amines have higher boiling point than tertiary amines?

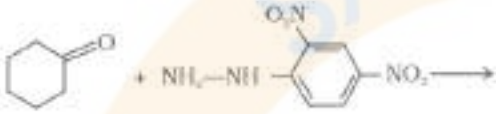
iii. Why are aliphatic amines stronger bases than aromatic amines?

24. Predict the products of the following reactions: **[3]**

i.



ii.



iii.

iv.

25. In a pseudo-first-order reaction in water, the following results were obtained: **[4]**

$\frac{t}{s}$	0	30	60	90
$\frac{[A]}{mol^{-1}}$	0.55	0.31	0.17	0.085

Calculate the average rate of reaction between the time interval 30 to 60 seconds.

26. Describe the following: **[4]**

i. Acetylation

ii. Cannizzaro reaction

iii. Cross aldol condensation

iv. Decarboxylation

27. The molar conductivity of 0.025 mol L^{-1} methanoic acid is 46.15 S cm^2mol^{-1}. Calculate the degree of dissociation and dissociation constant. Given $\lambda^0 (H^+) = 349.6\, S\, cm^2\, mol^{-1}$ and λ^0 ($HCOO^-$) = 54.6 S cm^2mol^{-1} **[4]**

28. What happens when **[5]**

i. n-butyl chloride is treated with alcoholic KOH,

ii. bromobenzene is treated with Mg in the presence of dry ether,

iii. chlorobenzene is subjected to hydrolysis,

iv. ethyl chloride is treated with aqueous KOH,

v. methyl bromide is treated with sodium in the presence of dry ether,

vi. methyl chloride is treated with KCN.

29. Preparation of ethers by acid dehydration of secondary or tertiary alcohols is not a suitable method. Give reason. **[5]**