CLASS—XII (H.P.)
CHEMISTRY

Time Allowed : 3 Hours   **Maximum Marks : 60**

Special Instructions : Same as in Model Test Paper—1.

1. In which of the following complexes the metal ion is in zero oxidation state :
   - (a) $Mn_2(CO)_{10}$
   - (b) $Zn_2[Fe(CN)_6]$
   - (c) $[Cu(NH_3)_4]Cl_2$
   - (d) $[Ag(NH_3)_2Cl]$.

2. Percentage of silver in the alloy 'German silver' is :
   - (a) 1.5
   - (b) 2.5
   - (c) 10
   - (d) zero.

3. Which one of the following metal ion is coloured ?
   - (a) Cr^{3+}
   - (b) Cu^+
   - (c) Zn^{2+}
   - (d) Sc^{3+}.

4. The highest magnetic moment is shown by the transition metal ion with the outer electronic configuration :
   - (a) $3d^2$
   - (b) $3d^3$
   - (c) $3d^7$
   - (d) $3d^9$.

5. The maximum extent of H-bonding is shown by :
   - (a) H_2O
   - (b) H_2Se
   - (c) H_2S
   - (d) HF.

6. In a mixture A and B compounds show negative deviation because :
   - (a) $\Delta V_{mix} > 0$
   - (b) $\Delta V_{mix} < 0$
   - (c) A – B interaction is weaker than A – A and B – B interactions
   - (d) None of the above reasons are correct.

7. Define radius ratio.

8. Give one example of S_N^1 reaction.

9. Calculate the half-life period of a first order reaction, whose specific rate constant is 2 min⁻¹.

10. What are condensation polymers ?

11. A solid AB has NaCl structure. If the radius of anion A^+ is 100 pm, what is the radius of anion B^- ?

   Or

   (a) NO is paramagnetic in gaseous state, but diamagnetic in solid and liquid state. Justify.

   (b) Write the structural formula of :
      (a) Phenolphthalein
      (b) Malachite green.

12. (a) Nitrogen is a gas, but phosphorus is a solid, though both belong to the same group. Why ?

(b) Molecular nitrogen is very less reactive, why ?

13. Give four characteristics of enzymes.

14. Write the Nernst equation and calculate the e.m.f. of the following cell at 298 K.

Fe (s) | Fe^{2+} (0.001 M) || H^+ (1 M) | H_2 (1 atm.)
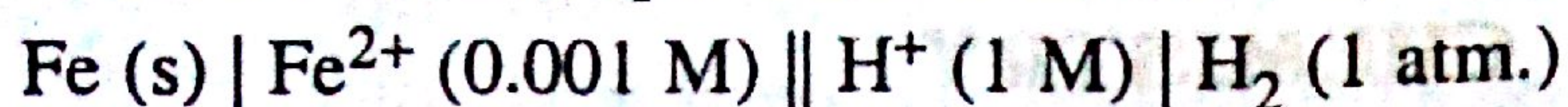
Given

$E°$ $(Fe^{2+} | Fe) = -0.44$ V ; $E°$ $(Pt, H^+ | H_2) = 0.00$ V.

15. What do you understand by lowering in vapour pressure ? Show that it is colligative property.

16. Distinguish between C_2H_5Cl and C_6H_5Cl.

17. (a) Under what conditions CO can reduce Fe_2O_3 ?

18. (a) Define the term "Velocity coefficient and temperature coefficient."

(b) What are effective collisions ?

Or

Define Kohlrausch's law. How can it be used to find the degree of dissociation of a weak electrolyte ?

19. Distinguish between DNA and RNA.

(b) Give one limitation of Ellingham diagram.

20. (a) Explain, why ClF_3 exists whereas FCl_3 does not exist.

(b) Give the shape of XeF_2Mn (III) is strongly oxidizing. Explain.

21. (a) Of the d^4 species Cr (II) is strongly reducing, but Mn (III) is strongly oxidizing. Explain.

(b) Explain cleansing action of soap.

22. Explain why :

(a) It is necessary to control the pH during the reaction of carbonyl compounds with ammonia derivatives.

(b) Give the mechanism of esterification reaction.

23. Give the brief account of the following reactions :

(a) HVZ reaction.

(b) Cannizzaro's reaction.

24. (a) Describe hydrate isomerism with an example.

(b) Aniline is less basic than NH_3, why ?

(c) How does primary, secondary and tertiary alcohols differ in terms of their dehydrogenation reaction ?

25. How will you bring about the following conversions :

(a) Ethyl iodide to *n*-Propyl iodide.

(b) Iodoform to Acetylene

(c) Isopropyl chloride to *n*-propyl chloride.

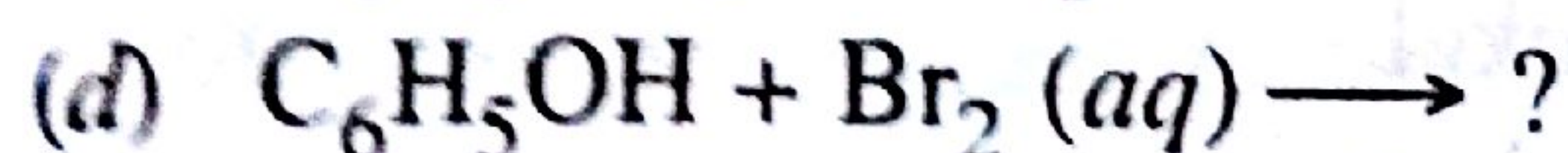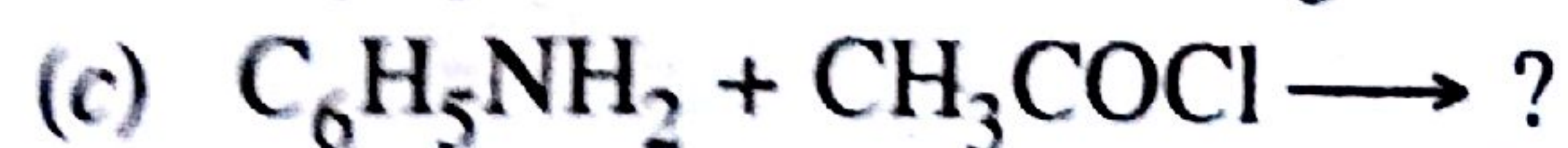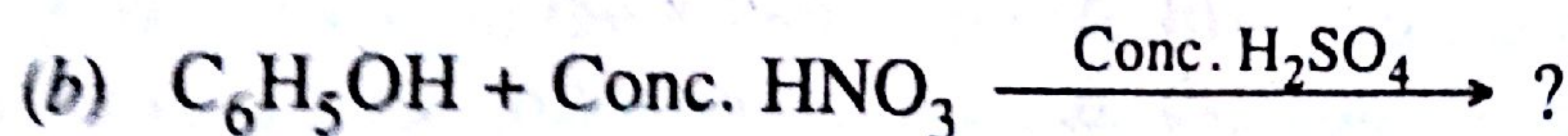26. (a) How is phenol converted to azo dye and phenolphthalein ? Write reactions.
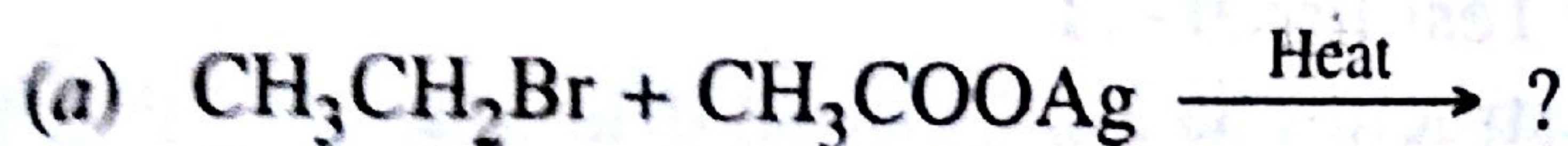
(b) How can isocyanides be prepared from :
   (i) Alkyl halides
   (ii) Primary amines ?

(c) Why do tertiary amines not undergo acylation ?

27. Complete the following reactions :

(a) $CH_3CH_2Br + CH_3COOAg \xrightarrow{Heat}$?

(b) $C_6H_5OH + Conc. \ HNO_3 \xrightarrow{Conc. \ H_2SO_4}$?

(c) $C_6H_5NH_2 + CH_3COCl \longrightarrow$?

(d) $C_6H_5OH + Br_2 \ (aq) \longrightarrow$?

28. (a) A solution containing 5% of a substance A is isotonic with a sol. containing 10 g of urea per litre. Calculate the molar mass of the substance A.

(b) The boiling point of pure water is 100°C. Calculate the boiling point of aqueous solution containing 0.6 g of urea (molar mass = 60) in 100 g of water (K_b for water = 0.52 K/m).

Or

(a) Distinguish between order and molecularity of a reaction.

(b) What is effect of temperature on the rate constant of a reaction.