

Subject : Chemistry

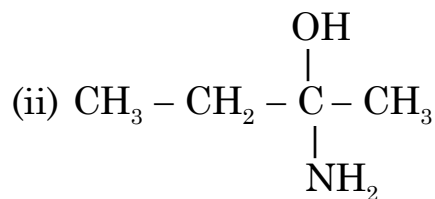
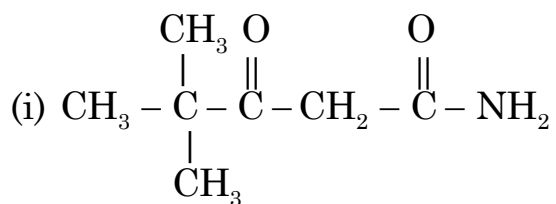
Time : 3 hrs.

M.M.70

General Instructions :

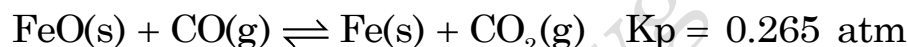
- ❖ *All questions are compulsory.*
- ❖ *Question No. 1 to 5 are very short answer type questions and carry 1 mark each.*
- ❖ *Question No. 6 to 10 are short answer questions and carry 2 marks each.*
- ❖ *Question No. 11 to 22 are long answer type questions and carry 3 marks each.*
- ❖ *Question No. 23 is a Value Based question carry 4 marks.*
- ❖ *Question No. 24 to 26 are long answer type questions and carry 5 marks each.*
- ❖ *Use log table if necessary.*
- ❖ *No. of printed pages are **two**.*

1. Under what conditions do real gases show maximum deviation from ideal behaviour?
2. Name the element of group 13 which resembles Beryllium in characteristics ?
3. Why is boric acid a very weak acid?
4. Draw resonance structure of $\text{CH}_2 = \text{CH} - \overset{\text{O}}{\underset{\parallel}{\text{C}}} - \text{H}$
5. Convert sodium pentanoate to n-Butane ?
6. Draw cis and trans structures of hex-2-ene. Which isomer will have higher boiling point and why ?
7. Write the products of ozonolysis of toluene.
8. Write the IUPAC names of the following:



9. (a) Change in internal energy is a state function while work is not, why ?
- (b) The entropy of steam is more than that of water at its boiling point. Explain.
10. A cricket ball weighing 100 g is located within 1 nm. What is the uncertainty in the velocity ?
11. Calculate the number of molecules of oxalic acid ($\text{C}_2\text{H}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$) in 100 mL of 0.2 N oxalic acid solution .
12. (a) Write one difference between orbit and orbital.
- (b) Give the values of all the four quantum numbers for 2p electrons in Nitrogen ($Z = 7$).
13. (i) Why is LiF least soluble in water among the fluorides of alkali metals ?
- (ii) Justify the given order of mobilities of alkali metal cations in aqueous medium:
- $$\text{Li}^+ < \text{Na}^+ < \text{K}^+ < \text{Rb}^+ < \text{Cs}^+$$
- (iii) Lithium is the only alkali metal which forms nitride directly. Explain.
14. (a) Balance the following equation in basic medium:
- $$\text{MnO}_4^- + \text{S}_2\text{O}_3^{2-} \rightarrow \text{MnO}_2 + \text{SO}_4^{2-}$$
- (b) Find the oxidation state of V in VO_4^{3-} ?
15. (a) How do you expect the metallic hydrides to be useful for hydrogen storage? Explain.
- (b) Give one example of coordinated water.

- (c) What do you mean by demineralised water ?
16. (a) When aqueous solution of borax is acidified with HCl , a white crystalline solid is formed which is soapy to touch. Is this solid acidic or basic nature. Explain.
- (b) Conc. HNO_3 can be transported in aluminium container. Give reason.
17. 10 g of argon is compressed isothermally and reversibly at a temperature of 27°C from 10 L to 5 L. Calculate q , w , ΔU for this process. (Given: atomic weight of Ar = 40)
18. One of the reaction that takes place in producing steel from iron follows the reaction.



What are the equilibrium partial pressures of CO and CO_2 at 1050 K if initial partial pressures are $P_{\text{CO}_2} = 0.80 \text{ atm}$, $P_{\text{CO}} = 1.4 \text{ atm}$.

19. (a) Explain the following observation:
 BF_3 is planer but NH_3 is not.
- (b) Predict the Hybridisation of each carbon in molecule of Ethanoic acid.
- (c) Predict the shape of XeO_2F_2 using VSEPR theory.
20. (a) What would have happened to the gas if the molecular collisions were not elastic ?
- (b) Calculate the total pressure in a mixture of 8 g of dioxygen and 4 g of dihydrogen confined in a vessel of 1 dm^3 at 27°C . ($R = 0.083 \text{ bar dm}^3 \text{ K}^{-1} \text{ mol}^{-1}$)
21. (a) Which of the following atoms would most likely form an anion (i) Be (ii) Al (iii) Ga (iv) I. Explain.
- (b) Arrange the following in order of increasing ionization enthalpy: B, C, N, O. Explain the trend.

22. (a) Explain the paramagnetic nature of O_2 using MOT ?
 (b) Why is AlN more covalent than Al_2O_3 ?
23. Environmental pollution is causing a serious threat on the earth. Due to combustion of fossil fuels, a number of poisonous and harmful gases enter into the atmosphere. The government of India has made strict rules for industries and for individual citizens to keep pollution under control. After reading the passage, answer the following questions:
- (a) Why is it advised not to sleep with burning coke angithi in a closed room on winter nights?
 (b) How does the combustion of motor fuels cause pollution of the atmosphere ?
 (c) What is photochemical smog ?
 (d) What are the values shown by government of India ?
24. (a) Complete the following reactions:
 (i) $CH_3CH_2Br \xrightarrow[\text{dry ether}]{Na}$
 (ii) $CH_3 - C \equiv C - CH_3 \xrightarrow[\text{liq } NH_3]{Na}$
 (iii) $CH_3CH_2COONa + H_2O \xrightarrow{\text{Electrolysis}}$
 (b) Write the mechanism of reaction:
 $CH_3CH = CH_2 + HBr \xrightarrow{\text{Peroxide}}$
25. (i) pH value of a saturated solution of $Ba(OH)_2$ is 12. Calculate solubility product for $Ba(OH)_2$.
 (ii) Derive: $pK_a + pK_b = 14$
26. (i) Define negative inductive effect.
 (ii) Write two differences between Resonance effect and Hyperconjugation.

- (iii) Draw possible isomers of molecular formula ($\text{C}_2\text{H}_6\text{O}$).
- (iv) Give two examples of neutral electrophiles ?

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