

Chemistry (Hons.) Paper-III

Answer five questions, selecting at least one from each Group, in which Q.No. 1 is compulsory.

1. Explain the following :
 - (a) Work done in reversible process is the maximum work obtainable.
 - (b) Hydrogen and helium exhibit negative Joule-Thomson effect.
 - (c) C_p is greater than C_v .
 - (d) Entropy is the measure of disorder.
 - (e) CHCl_3 is polar but CCl_4 is non-polar.

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Group-A

2. (a) Explain reversible and irreversible processes.
(b) Establish relationship of pressure with volume in adiabatic expansion of an ideal gas.
3. (a) Calculate the efficiency of a Carnot engine.
(b) Explain the term entropy and illustrate its physical significance.
4. (a) Deduce Kirchoff's equation and illustrate its significance.
(b) State and explain Hess's law of constant heat summation.
5. Write short notes on any two of the following :
 - (a) Entropy of mixing
 - (b) Molar heat capacities
 - (c) Gibb's phase rule

Group-B

6. Draw MO diagram of NO and NO^+ and compare their bond order, bond energy and magnetic behaviour.
7. Discuss the chemistry of Co or Cr with respect to the following :
 - (a) Position in the periodic table
 - (b) Occurrence and extraction
 - (c) Important oxidation states
 - (d) Analytical test
8. Discuss the preparation, properties and structure of any two of the following :
 - (a) Potassium dichromate
 - (b) Caro's acid
 - (c) Marshall's acid
9. Predict the structure and magnetic behaviour of the following :
 - (a) NiCl_4^{2-}
 - (b) $\text{Fe}[\text{CN}]_6^{4-}$
 - (c) $\text{Ni}[\text{CO}]_4$
 - (d) $\text{Ag}[\text{NH}_3]_2^+$
 - (e) $\text{Co}[\text{NH}_3]_6^{+2}$
10. Write notes on any three of the following :
 - (a) Green house effect
 - (b) N and P fertilisers
 - (c) Solvent concept of acid and base
 - (d) Valence bond theory

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