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

1. Answer the following : (a) Cr has six unpaired electrons in its ground-state. (b) Trimethylamine is weaker base than dimethylamine. (c) Electron affinity of fluorine is lower than that of chlorine. (d) Find the condition when $K_p = K_c$. (e) What is the difference between molecularity and order of reaction ?

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2. (a) Derive rate equation of first order reaction.
(b) Under what conditions, real gas deviates from ideal gas ?
3. (a) State and explain law of mass action.
(b) Derive the units of van der Waals constant 'a' and 'b'.
4. Write short notes on the following :
(a) Optical and electrical properties of colloids. (b) Coagulation and peptisation.
5. (a) Find out the relation between free energy change and equilibrium constant and discuss its importance.
(b) Discuss the condition for the spontaneity of a reaction.

Group-B

6. Write notes on the following :
(a) Heisenberg's uncertainty principle (b) de Broglie hypothesis
7. Predict the structure and shape of the following : (a) NH_3 (b) BF_3 (c) CO_2 (d) XeF_6
8. (a) Mention two important ores of lead.
(b) Discuss the principle of the extraction of lead from one of its ore.
(c) $PbCl_2$ is solid but $PbCl_4$ is liquid. Explain.
9. Explain the following : (a) Diborane has two types of B-H bonds. (b) Dipole moments of NF_3 is lower than NH_3 . (c) PH_5 is not known while PCl_5 exists.

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10. What happens when :
(a) Glycerol is heated with oxalic acid ? (b) Boric acid is added to glycerol ? (c) Glycerol is heated with nitric acid ?
11. (a) How will you distinguish between primary, secondary and tertiary amines ?
(b) How are these amines separated from their mixture ?
12. Discuss the methods of the preparation of the following :
(a) Succinic acid (b) Tartaric acid
13. Write notes on the following : (a) Hyperconjugation (b) Resonance effect