

Sr. No. of Question Paper: 9899
Unique Paper Code : 2173010038
Name of the Paper : DSE-Advanced Coordination Chemistry
Name of the Course : B.Sc. (Hons.) Chemistry
Semester : VII
Duration : 2 hrs
Maximum Marks : 60

Instructions for Candidate

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt **any four** questions in all.

1. a) Elucidate the significance of non-covalent interactions in organizing 0D, 1D, 2D components into a bulk 3D solid material.
b) Distinguish with an example the differences between a Metal-organic framework (MOF) and a coordination polymer.
c) Explain the solvothermal process of synthesis of metal-organic frameworks (MOF), focusing on the benefits and drawbacks regarding its scalability and environmental impact.
2. a) Differentiate between single metal-noded nets and metal cluster-noded nets.
b). Discuss the impact on porosity of a material when two-dimensional layers are linked by 1D pillars to create a 3D framework.
c) Explain the physical properties of metal-organic frameworks?
3. a) Explain the role and applications of metal-organic frameworks in gas storage and separation?
b) External stimuli or ligand modification in multinuclear metal arrays can be modified through spin-state and magnetic properties. Elaborate.
c) Discuss the factors that render MOFs as perfect porous materials.
4. a) Explain the process of molecular self-assembly and give the differences between intra- and intermolecular self-assembly (with examples).
b) Supramolecular self-assembly is facilitated by non-covalent interactions. Elaborate on this statement, highlighting the factor of relative strength.
c) Discuss the various applications of molecular squares and boxes.
5. a) Self-assembly of phospholipids in aqueous solutions results in the formation of liposome membranes. Discuss.
b) Describe the concept of Secondary building units (SBU) and metal nodes. Explain how their geometric configuration influences the topology of the framework.
c) Explain why it is an advantage to use metal-organic frameworks as catalysts in comparison to homo or heterogeneous catalysts.
6. Write down a short note on **any three** of the following.
 - (a) Self-Assembly of Metal Arrays
 - (b) Hydrogen storage by MOFs
 - (c) Coordination polymers
 - (d) Pillared layer nets