

6. (a) What are fuel cells? Discuss their advantages and disadvantages. Provide schematic representation of Solid Oxide Fuel Cell (SOFC).

(b) Explain topotactic and epitactic reactions in the context of nucleation of MgAl_2O_4 Spinel on: (a) MgO and (b) Al_2O_3 .

(c) Explain co-precipitation method using examples. Also, discuss the advantages and disadvantages associated with it. (5,5,5)

7. (a) Discuss ion-exchange resins, their types, and applications in detail.

(b) How are inorganic pigments classified? Explain giving example.

(c) Explain the principle of dynamic light Scattering and state its application. (5,5,5)

8. Write short notes on any **three** of the following :

(a) Environmental effects of nanocomposites

(b) One-dimensional metals

(c) Intercalation

(d) X-ray Diffraction (5,5,5)

(1000)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1188

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Unique Paper Code : 2173010008

Name of the Paper : DSE: NOVEL INORGANIC
SOLIDS

Name of the Course : B.Sc. (H)

Semester : V

Duration : 3 Hours

Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **SIX** QUESTIONS in all.
3. **All** Questions carry equal marks.

1. (a) Discuss in detail the steps involved in the synthesis of silica using alkoxide sol gel method. Also, state the advantages and disadvantages associated with sol gel method.

P.T.O.

- (b) Define Refractories. What are the criteria for good refractory? Give the classification of Refractories (a) based on chemical composition and with suitable examples and (b) based on chemical properties of their constituent substances.
- (c) What are nematic liquid crystals? Describe the various applications of inorganic liquid crystals.
(5,5,5)
2. (a) What are the ceramics? Give their classifications and applications in daily life.
- (b) Discuss conduction mechanism of polyaniline. Also, give its preparation and applications.
- (c) Discuss the general classification of composites with special emphasis on polymer-polymer composites.
(5,5,5)
3. (a) Explain why solids state reactions are difficult? Discuss Tamman's Rule.
- (b) Give the classification of matrix used in composites. What are the properties of matrix which influence its performance?

- (c) What are the types of difficulties associated with the use of ion exchange resins and how are they overcome?
(5,5,5)
4. (a) Provide a brief overview of SEM and TEM and on the basis of this, highlight the key differences between them.
- (b) What are molecular magnets? How are they different from conventional magnets? Explain their slow relaxation process.
- (c) Explain bio-composites and their significance in medical field.
(5,5,5)
5. (a) What are solid electrolytes? How are they classified? Explain using examples.
- (b) What is the principle of UV-vis spectroscopy? What are the main components of a UV-Visible spectrophotometer? Explain.
- (c) Differentiate between organic dyes and pigments. What are the properties of an ideal inorganic pigment.
(5,5,5)