SEAT No._____

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Sardar Patel University Examination, January-2021

M.Sc. (Inorganic Chemistry) Semester-III

Selected Topics in Advanced Inorganic Chemistry (PS03EINC22)

5th January 2021 (Tuesday)

Time: 10.00 am to 12.00 noon

Note: Numbers at the right show full marks. **Total Marks: 70**

Q.1 [A]. Answer the followings: **[8]**

1) Phase-transfer catalysis refers to the _____ of the reaction upon the addition of the phase-transfer catalyst.
   (a) acceleration (b) dissociation
   (c) ionization (d) decelaration
2) _____ are generally monolithic in nature.
   (a) Hydrogels (b) Xerogels
   (c) Cryogels (d) Aerogels
3) Which of the following is an example of microporous materials?
   (a) Carbon membrane (b) Monolithic column
   (c) Surface of chicken egg shell (d) Clothing
4) Which conditions are generally used for the conventional synthesis of MOF?
   (a) Hydrothermal synthesis (b) Solvothermal synthesis
   (c) Reflux (d) Ambient
5) _____ is not used for the preparation of POM.
   (a) Niobium (b) Tantalum
   (c) Chromium (d) Zirconium
6) Which of the following structures of POM does not have hetero atom?
   (a) Lindqvist (b) Paratungstate
   (c) Strandberg (d) Keggin
7) Bond angle in graphite is _____ °.
   (a) 90 (b) 120
   (c) 108 (d) 60
8) Which of the following methods is an example of top down approach for the synthesis of nanoparticles?
   (a) Evaporation (b) CVD
   (c) Ball milling (d) Laser ablation

Q.1 [B]. Answer the followings: **[16]**

1) The presence of a solvent, which needs to dissolve the catalyst, might limit the _____ of the reaction.
2) The adsorption energy in Chemisorption is less than the adsorption energy in Physisorption. State true or false.

[P.T.O.]

3) The _____ quantifies the mass of waste generated per mass of product.
4) The reaction conditions for photo catalysis are mild, the reaction time is modest and less chemical input is required. State true or false.
5) In Metal Organic Frameworks, the pores are always stable during elimination of the guest molecules and could be refilled with other compounds. State true or false.
6) Understanding the principles of _____ may give scientists a route towards reaction conditions and chemical parameters, which allow for the synthesis of new MOFs.
7) Systematic variation of pore volume and polarity generates a series of isoreticular MOFs for evaluation. State true or false.
8) As a general concept in MOF chemistry, _____ can refer to any change of a MOF structure following its synthesis.
9) The polyoxometalate is a _____.
10) The negative charge density in POMs is widely variable depending on the elemental composition and the molecular structure. State true or false.
11) The very important MO_6 units in POMs are packed to form countless_____.
12) The most stable unions between two octahedra in POMs are the corner- sharing models. State true or false.
13) Only physical properties of nanoparticles can be different from those of larger particles of the same substance. State true or false.
14) _____ is a smallest object in nano scale.
15) Who has given "There's plenty of rooms at the bottom?
16) _____ is used in sunscreens to block the harmful UV rays.

Q.2. Answer any <u>SEVEN</u> of the followings: **[14]**

1) Explain the difference in operative temperature in homogeneous and heterogeneous catalysis.
2) How does TiO_2 work in photocatalysis?
3) How can catalysis address many aspects of Green Chemistry?
4) Give the example of isoreticular synthesis of MOF with suitable equation.
5) List out the purification and activation techniques of MOF.
6) Why POMs are gaining much more attention?
7) Write a note on first example of POM.
8) What is so special about Nanotechnology?
9) Write a short note on Nano machines.

Q.3.[A] Explain Intermolecular and Intramolecular catalysis with suitable example. **[4]**
[B] What is ZSM-5 catalyst? What are the properties of it? **[4]**

Or

Q.3.[A] Give examples of chemoselectivity and regioselectivity with suitable catalysts. **[4]**
[B] What is bifunctional catalyst? Give types and examples of it. **[4]**

Q.4.[A] Explain High Throughput method with advantages and disadvantages. [4]

[B] Explain Precursor approach in MOF. [4]

Or

[A] What are the scopes of Post Synthetic Modification of MOF. [4]

[B] Write a note on Photochemical activity of MOF. [4]

Q.5. Explain the POM based supramolecular structures. [8]

Or

Q.5.[A] Write a note on synthesis of MW_5 hexametalates. [4]

[B] Explain the advantages of POM as catalyst. [4]

Q.6.[A] Which properties are affected at nanoscale? How? [4]

[B] Write a note on synthesis and properties of Aerogels. [4]

Or

Q.6. Write a note on Applications of Nanotechnology. [8]

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