2016

M.Sc. 2nd Seme. Examination

CHEMISTRY

PAPER—CEM-204

Full Marks : 40

Time : 2 Hours

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

(*Nano Technology*)

Answer *four* questions, taking *two* from each group.

Group—A

1. (a) Why does a lycar gus cup show different color on reflection and transmission respectively ?

   (b) Schematically show the variation in the size dependence property as a function of the number of atoms in a nano-particle.

(c) How are the nano particles stabilized electrosterically ?

(d) What would be the number percentage of surface exposed atoms in a metallic cluster of 150 nm size ?

2+3+3+2

2. (a) Describe the borohydride reduction in the preparation of silver nano particles.

(b) Define magnetic coercivity.

(c) Graphically show the I-V profile for a nano material.

(d) How can you determine the band gap of a metal nanopasticle from its electronic spectra ?

3+2+2+3

3. (a) Why do we observed a non-systematic variation in the ionisation potential of sodium cluster in the nanodimension ?

(b) How does AFM/STM help in finding out the morphology of nanoparticles ?

(c) Write down Scherrer equation. How can it help in determining the size of a nanoparticle ?

(d) What are surface plasmon resonance bands ?

3+3+2+2

Group—B

4. (a) What is the relation between the fraction of atoms on the surface of a particle and its nuclearity ?

(b) Why are the XRD spectra less featured in case of nanoparticles/nanocrystals ?

(c) Schematically show the variation of change in coercivity of a ferromagnetic material with its diameter.

(d) Why does the conductivity of a metal decrease with its size ?

2+2+3+3

5. (a) Describe the citrate reduction method is the preparation of metal nano-particles.

(b) How would you expect the ionization potential and electron affinity to be related with the diameter of a nanoparticle ?

(c) What do you mean by the term "dampening of electronic spectra' in case of nanoparticles ?

(d) Why there could be a change in the standard redox potential of Ag-electrode with the variation in its size ?

3+3+2+2

6. (a) What are the advantages of water-ion-oil microemulsion templates in the synthesis of nanoparticles ?

   (b) How can the gold nanoparticles be used in the treatment of cancer ?

   (c) What is the role of capping agents in the nanoparticle preparation ?

   (d) Why are the metal nanclusters preferred over the organic fluorescent dyes ?

   (e) How would you correlate the absorption maxima of nanomaterials with its size ?

2+2+2+2+2
