2018

M.Sc. 2nd Semester Examination

CHEMISTRY

PAPER—CEM-204

Subject Code—24

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.

(*CBCS*)

1. Answer any *four* questions : 4×2
(choose the right answer)

(i) What are the advantages and disadvantages of w/o micromulsion technique in the synthesis of otherwise water insoluble inorganic material ?

(a) Method is simple

(b) Method is complex

(c) Specials conditions are required

(d) All of the above

(ii) What is critical size after which a material behaves like perfect metal ?

(a) 100 nm

(b) 20 nm

(c) 50 nm

(d) > 100 nm

(iii) I-V plot of the nanopartiles

(a) Is linear

(b) Like a staircase

(c) Is exponential

(d) Is parabolic

(iv) Nanoparticles can be used

(a) For waste water treatment

(b) For dye removal

(c) Both a and b

(d) None of the above

(v) Why are thiols considering as better capping agent ?

(a) They can act as better electron donating agent

(b) They can act as better electron withdrawing agent

(c) Depending on the nature of the nanoparticles they can both act as donor or withdrawer of electrons

(d) None of the above

(vi) What is the minimum number of atoms required to complete a 1st shell in a metallic cluster ?

(a) 10

(b) 15

(c) 13

(d) 20

(vii) Which nanopartice is used for Gene Detection ?

(a) Gold nanopartice

(b) Siheer nanoparticle

(c) Carbon nanowires

(d) Silicon nanowires

(viii) Which nanoparticle is used for Cancer/virus detection ?

(a) Gold nanoparticle and nanodots

(b) Silver nanoparticles and nanodots

(c) Carbon nanoparticles and nanodots

(d) Silicon nanoparticles and nanodots

2. Answer any *four* questions : 4×4
(short descriptive type)

(i) Graphically show the variation of coercivity with the size of nanoparticle. Write notes on the reduction method for the synthesis of a noparticle by borohydride reduction. 2+2

(ii) Give some usefulness of nanomaterial in the field of environmental applications with suitable example. 4

(iii) What is smart packaging ? How it can help to understand fresh or not ? 1+3

(iv) Discuss the applications of nanotechnology in medicine. 4

(v) What are nano-fertilizers ? How it can be prepared ? 2+2

(vi) Give two examples of foods that contain nanoparticles with name of the constituent. 2+2

(vii) What are Smart drugs ? Explain its action mechanism. 2+2

(viii) Discuss how magnetic nanoparticles are used for drug delivery system. 4

3. Answer any *two* questions : 8×2

(i) What do you mean by surface plasmon resonance band for Ag/Au nanoparticles ? How does it vary with the size of nanoparticle ? How does the ionization energy of Na cluster vary with its nuclearity in the nano dimension ? 3+2+3

(ii) What are the roles of surfactant in the synthesis of nanoparticle in aqueous medium and in origanic medium ? Write notes on the electrochemical reduction of the metal nano crystals. 4+4

(iii) Write down environmental applications of nanotechnology with special emphasis on water purification. Define the antibacterial mode of action of silver nanoparticle. What are the advantages of nanoscience in molecular and cell biology ?

(iv) (a) How nanoparticles are being used to deliver vitamins or other nutrients in food and drinks without affecting the taste or appearence ? 4

(b) Discuss about how new developments in nanoscience and nanotechnology will allow more control and have the potential of increased benifits in food technology. 4

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