2. Nanochemistry

1. *What are nonoparticles?*

Nanoparticles are the particles, the size of which ranges from 1-100 nm.

2. *What are nano-materials?*

Nanomaterials are the materials having components with size less than 100 nm at least in one dimension.

3. *What is nano-chemistry?* *(A.U.T. (Coim) May 2011)*

Nano-chemistry is the branch of nano-science, which deals with the chemical applications of nanomaterials. It also includes the study of synthesis and characterisation of nanomaterials.

4. *Distinguish between bulk particles and nano-particles.*

(A.U. (CEG) Dec. 2012 June 2013)

Nano-particles	Bulk particles
1. Size is less than 100 nm	Size is larger in micron size
2. Collection of few molecules	Collection of thousands of molecules.
3. Surface area is more	Surface area is less
4. Strength, hardness are more	Strength, hardness are less

5. *Name some important physical methods of synthesising nano-materials.*

1. Laser ablation
2. Chemical Vapour Deposition (CVD)
3. Electro-deposition

6. What is CVD?

CVD is Chemical Vapour Deposition. It is a process of chemically reacting a volatile compound of a material with other gases, to produce a non-volatile solid that deposits automatically on a suitably placed substrate.

7. What is the basic principle involved in solvothermal synthesis of nano-materials.

Solvothermal synthesis involves the use of solvent under high temperature (between 100°C to 1000°C) and moderate to high pressure (1 atm to 10,000 atm) that facilitate the interaction of precursors during synthesis.

8. Define nano-wires.

Nano-wire is a material having an aspect ratio ie., length to width ratio greater than 20. Nano-wires are also referred to as "quantum wires".

9. What are the characteristics of nano-wires.

1. Nano-wires are two-dimensional material.
2. Conductivity of a nano-wire is less than that of the corresponding bulk materials.
3. It exhibits distinct optical, chemical, thermal and electrical properties due to this large surface area.

10. Mention some important applications of nano-wires.

1. Nanowires are used for enhancing mechanical properties of composites.
2. It is also used to prepare active electronic components such as *p–n* junction and logic gates.
3. Semiconductor nanowire crossings are expected to play a important role in future of digital computing.

11. What is nano-Rod?

Nanorod is two dimensional cylindrical solid material having an aspect ratio i.e., length to width ratio less than 20.

12. What are nanoclusters? *(A.U. (CEG) Dec 2012)*

Nanoclusters are fine aggregates of atoms or molecules. The size of which ranges from 0.1 to 10 nm. Of all the nano materials, nanoclusters are the smallest sized nano materials because of their close packing arrangement of atoms.

13. What is magic number

It is the number of atoms in the clusters of criticle sizes with higher stability.

14. What are carbon nano-tubes.

Carbon nanotube is a tubular form of carbon with 1-3 nm diameter and a length of few nm to microns.

15. Mentin some uses of CNTs.

1. It is used in battery technology and in industries as catalyst.
2. It is also used as light weight shielding materials for protecting electronic equipments.
3. CNTs are used effectively inside the body for drug delivery.
4. It is used in composites, ICs.

16. Mention some characteristic properties of nanomaterials. *(Chen. A.U Jan 2010)*

1. Nanomaterials are very strong and withstand extreme strain and tension.
2. It possesses very good electrical properties and thermal conductivity.

17. List any four nano-materials. *(Coim. A.U Feb 2010)*

1. Carbon nanotubes.
2. Nanowire.
3. Qauntum dots.
4. Dendrimers.