SYNTHESIS OF NANOMATERIALS

Chemical Vapour Deposition (CVD)

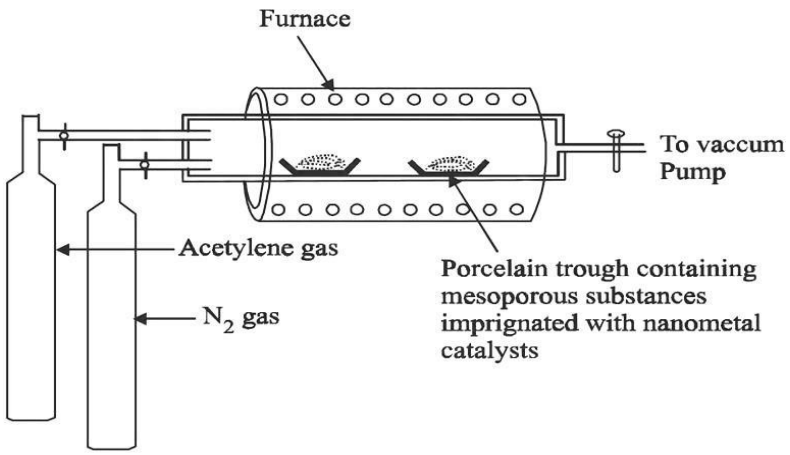


Fig 7.4 chemical vapour deposition

- It is a process of chemically taking a volatile compound of a material with other gases, to produce a non-volatile solid that deposits automatically on a suitably placed substrate.
- CVD reaction requires activation energy to proceed. This energy can be provided by several methods

(a) Thermal CVD

- In thermal CVD, the reaction is activated by high temperature above 900^0C.
- Typical apparatus comprises of gas supply system, deposition chamber and an exhaust system.

(b) Plasma CVD

- In plasma CVD, the reaction is activated by plasma at temperature lies in between 300^0 - 700^0C.

(c) Laser CVD

- In laser CVD, pyrolysis occurs when laser thermal energy of laser heats falls on an absorbing substrate.

(d) Photo-laser CVD

- In photo-laser CVD, the chemical reaction is induced by ultra violet radiation, which has sufficient photon energy, to break the chemical bond in the reactant molecules.

Various steps involved in synthesis of CVD

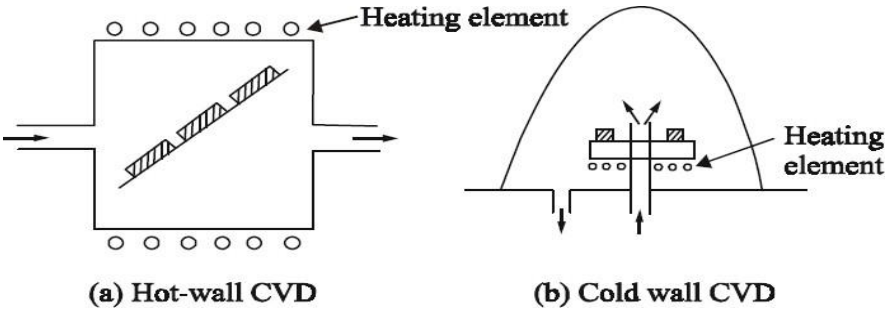
- Catalysed reaction occurs on the surface.
- Product diffuses to the growth sites.
- Nucleation and growth occurs on the growth site.
- Desorption of reaction products away from the surface.

CVD Reactor

The CVD reactors are of generally two types

1. Hot-wall CVD
2. Cold-wall CVD

1. Hot-wall CVD reactors are usually tubular in form, and heating is accomplished by
   surrounding the reactor with resistance elements.
2. But in cold-wall CVD reactors, substrates are directly heated inductively by graphite
   subsectors, while chamber walls are air (or) water-cooled.



CVD Reactors