

Assignment - III (Module - V)

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Q) Explain the working concept, source and utilization of Scanning Electron Microscope (SEM) with a neat sketch.

Ans:- Scanning Electron Microscope (SEM)

The Principle

The Scanning Electron Microscope works on the principle of applying kinetic energy to produce signals on the interaction of electrons. These electrons are secondary electrons, backscattered electrons and diffracted backscattered electrons which are used to view crystallized elements and photons. The secondary electrons, scattered electrons play the primary role of detecting the morphology and topography of the specimen and show contrast in the composition of the elements of the specimen respectively. Unlike Transmission Electron Microscope (TEM), SEM uses emitted electrons.

Working Concept

- SEM allows surfaces of objects to be seen in their natural state without staining.
- The specimen is put into the vacuum chamber and covered in a thin coating of gold to increase electrical conductivity and thus forms a less blurred image.
- The electron beam then sweeps across the object building an image line by line.
- As electrons strike the object, they knock loose showers of electrons that are captured by a detector to form the image.

Application

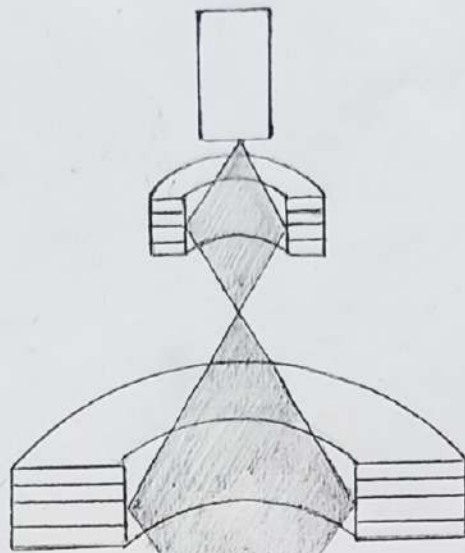
1. SEM is used in chemical analysis in Energy Dispersive X-ray Spectroscopy.
2. It is used to study the topography of elements used in industries.

3. It is used to study the filament structures of micro-organisms.

4. It is used in the analysis of cosmetic components which are very tiny in size.

Thus SEM is used in a variety of fields including Industrial uses, Nanoscience studies, biomedical studies, Microbiology and more.

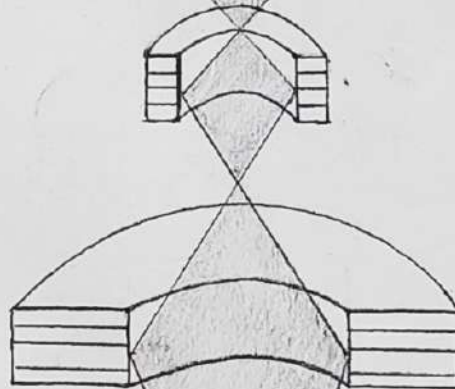
Electron gun



Condenser lens

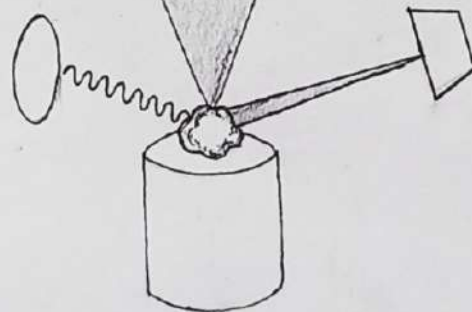


Scan coils



Objective lens

X-ray detector



Secondary electron detector

Specimen stub

Scanning Electron Microscope (SEM)

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