SCIENTIFIC INVESTIGATION OF MEDICINAL PLANTS

I : CHEMICAL ASPECTS

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Separation

Chromatographic methods occupy a unique position among separation methods. It is an analytical and a separatory procedure based upon adsorption of the crude material containing a mixture of compounds.

Thin Layer Chromatography (TLC)

Stationary phase (on which the crude material is adsorped) is a solid. Mobile phase is a liquid (organic solvent). Silica and alumina are popular solid supports. Migration of the substances relative to that of the solvent is a useful parameter (R_f value). TLC is mainly an exploratory technique. An extension of TLC is column chromatography where the crude extract is placed on the solid support placed in a glass tube. Solvent is sent down the tube when separation of individual components takes place. This is a preparatory procedure.

Identification

Once a pure compound is isolated from a plant extract, the main task at hand is to correctly identify structure. Many techniques are available for this purpose. No single procedure gives complete results except x-ray analysis.

Spectroscopy

This is the interaction of light with matter. The spectra thus produced provide an important means of identifying materials and study of atomic and molecular structures.

Ultraviolet spectroscopy

A molecule when exposed to UV radiation yields a spectrum consisting of sharp peaks, each corresponding to the transfer of an electron from one energy level to another. Useful for detection of functional groups.

Infrared Spectroscopy

IR radiation causes vibrational changes in molecules which give rise to IR spectra. Thus the spectra produced from 'movements' of bonds due to IR radiation also gives useful information about functional groups of molecules.

Nuclear Magnetic Resonance Spectroscopy

Radio frequency interacts with nuclei of certain atoms exposed to a strong magnetic field. eg. Proton Magnetic resonance (PMR) gives information regarding different protons attached to a molecule.

Mass Spectroscopy

Substances in the gaseous or vapour state when subjected to a high voltage electric current will loose electrons and form positively charged ions which can be detected by a mass spectrometer. Useful in the determination of the structural formula of a molecule.