

Drug deterioration

**Pharmacognosy
Lecture(4)**

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**Drug
deterioration**

Drug deterioration

The crude drugs are prone to deterioration on storage. The shelf-life of crude drugs are influenced by many factors which include not only the quality of storage conditions but also the stability of the secondary metabolites present therein. These factors included:-

1- primary factors

2- secondary factors

The primary factors are:



1) Moisture content



2) Temperature



3) light



4) The presence of oxygen.

Secondary factors

Living organisms usually develop in stored drugs where the conditions are satisfactory for them. The more common of such organisms belongs to the groups of:



Moulds



Bacteria



Coleoptera or beetles



Arachnida

Effects of Primary factors:

1) **Moisture** in combination with **temperature** lead to **Chemical instability problem** for Phyto formulations often suffer degradation during storage by oxidation, hydrolysis, crystallization, emulsion breakdown, enzymatic breakdown.



Air-dried drugs contain about 10-12 % of **moisture** & in some cases (such as **digitalis**) this may be sufficient to **activate** the **enzymes** present in the **leaves** & this will lead to **decomposition** of the **glycoside**.

2) Light: Light is also a prominent factor affecting phytoformulations by generation of free radicals cause **decomposition** of certain constituents (e.g. vitamins in cod liver oil) as well as **bleaching** of leaves & flowers.



Oxygen: Large molecule are degrade in the presence of oxygen. Besides a loss of efficacy (activity) and reduction in shelf life, exposure of such products to oxygen can result in product discoloration, changes in dissolution rate, and even toxicity or other



Effects of Secondary factors

Growth of the microorganisms and insect feeding affect the secondary metabolites and chemical composition of plants lead to Physical instability problems due to the presence of impurities and reaction with the container

Different techniques to deal with instability problems related to natural medicines

1. Nanoparticle coating



Nanoparticle coating of active components of herbal formulation is effective in protecting the active drug molecule from oxidative, hydrolytic and environmental degradation processes and hence enhances the shelf-life of the herbal products

2. Antioxidants and liquid formulations

Use of the antioxidants such as the polyphenols, esters of flavanol and fatty acids is important to reduce the oxidation. Generation of the free radicals damages the formulation. Antioxidants act as free radical scavengers and hence increase the stability of liquid herbal formulations and other products.

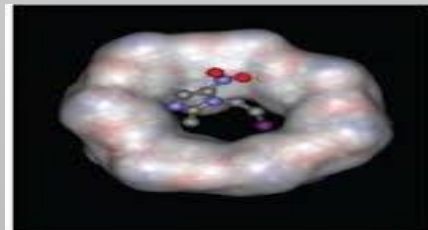


3. Plant pigments

Light sensitive insoluble drugs are stabilized in solid formulations by the use of the plant pigments such as chlorophyll, caramel and red beet pigment. The pigments reduce the light dependent degradation of the herbal products.

4. Preventing precipitation with improved storage stability by β -cyclodextrin in the compound

To inhibit the precipitation of the herbal liquid compound and improve the storage stability, by adding β -cyclodextrin to the compound. This molecule with a hydrophilic outside, which can dissolve in water, and a polar cavity, which provides a hydrophobic matrix. As a result of this cavity, cyclodextrins are able to form complexes with a wide variety of hydrophobic molecules. One or two molecules can be entrapped by one, two or three cyclodextrins.



5. Use of colloidal silicon dioxide in the enhancement of the drying of herbal preparations



Several problems arise during the drying of herbal extracts, such as instability, product accumulation and agglomeration. The addition of drying carriers, like colloidal silicon dioxide, to the extractive solution can minimize these unwanted effects, allow powder to flow freely.



FINISHED



**See you
next week**