

As mentioned earlier, evaluation of drug basically needs its identification and can be done by morphological or microscopic characters. Many a times, the drug identified by its diagnostic characters, is of substandard quality due to either faulty collection or incorrect storage. Thus, to prove its acceptability as a drug, the following tests can be applied to it, wherever possible

- (a) Ash content
- (b) Extractives
- (c) Volatile oil content

**(a) Ash content:**

- The residue remaining after incineration of the drug is called as ash content of the drug, which simply represents the inorganic salts naturally occurring in drug or adhering to it or deliberately added to it as a form of adulteration. Therefore, it is a criterion to judge the identity or purity of crude drugs (Table 9). Total ash usually consists of Carbonates, phosphates, silicates and silica.

**Table 9: Crude drugs with their ash content**

<b>Drugs</b>	<b>Total ash</b>
Aloes	5.00
Ashoka	11.00
Bael	3.5
Black catech	6.00
Cannabis	15.00
Cardamom	6.00
Clove	7.00

Acid insoluble ash, which is a part of total ash insoluble in dilute hydrochloric, is also recommended for certain drugs. Adhering dirt and sand may be determined by acid-insoluble ash content.

**Table 10: Crude drugs with their acid-insoluble ash content**

<b>Drugs</b>	<b>Acid insoluble ash (% w/w) not more than</b>
Agar	1.0
Belladonna	3.0
Cannabis	5.0
Cardamom	3.5
Clove	0.75

**(b) Extractives:**

- Many a times, the extracts obtained by exhausting crude drugs are indicative of approximate measures of certain chemical constituents they contain. Taking into consideration the diversity in chemical nature and properties of contents of the drugs, various solvents are used for the determination of extractives.
- The solvent used for extraction is in a position to dissolve appreciable quantities of substances desired. The following are various methods used to find out the extractive values.

**Water soluble extractives:** This method is applied to drugs which contain water soluble active constituents of crude drugs, such as tannins, sugars, plant acids, mucilage, glycosides etc.

**Table 11: Water soluble extractive value of some crude drugs**

<b>Drugs</b>	<b>Water soluble extractive (% w/w) Not less than</b>
Aloes	25.00
Glycyrrhiza	20.00
Linseed	15.0
Senna leaves	30.00
Senna pods	28.00
Ginger	10.00

**Alcohol-soluble extractives:**

- Alcohol is an ideal solvent for extraction of various chemicals like tannins, resins etc. Therefore, this method is frequently employed to determine the approximate resin content of drug. It is also an official method for assay in case of myrrh and asafoetida.
- Generally, 95% ethyl alcohol is used for determination of alcohol-soluble extractive. In some cases, diluted alcohol may also be used, depending upon solubility of constituents in a crude drug.
- The limit for alcohol soluble extractive is applicable to following few drugs.

**Table 12: Alcohol soluble extractive values of some crude drug**

<b>Drugs</b>	<b>Alcohol soluble extractives (% w/w)</b>
Aloes	Not more than 10.0
Benzoin (95 % alcohol)	Not more than 90.00 (siam benzoin) Not more than 75.00 (Sumatra benzoin)
Rhubarb (50 % alcohol)	Not more than 30.00
Asafoetida (90 % alcohol)	Not more than 50.00
Ginger (90 % alcohol)	Not more than 4.5
Valerian (60 % alcohol)	Not more than 30.00
Vanilla (45 % alcohol)	Not more than 12.00

**Alcohol insoluble extractives:** Alcohol insoluble extractive values as applicable to some resinous drugs.

**Table 13: Alcohol insoluble extractives of some crude drugs**

<b>Drugs</b>	<b>Alcohol insoluble extractive (% w/w)</b>
Myrrh	Not more than 70.0
Benzoin	Not more than 24.0

**Ether-soluble extractives:** Two types of ether-soluble extractive values are determined for evaluation of crude drugs. They are volatile and non-volatile ether soluble fractions.

- The volatile ether-soluble extractive represents volatile oil content of the drug,

- Whilst non-volatile ether-soluble extractives represent resin, fixed oils or colouring matter present in drugs.
- The limit for these extractives is applicable to the following drugs (Table 14).

**Table 14: Non volatile ether soluble extractive values of some drugs**

<b>Drugs</b>	<b>Limit for non-volatile ether soluble extractive (% w/w)</b>
Capsicum	12.0
Male fern	1.5
Linseed	25.00
Myristica	25.00
Cocoa	22.00

**Volatile oil content:** Efficacy of several crude drug is due to their odorous principles (volatile oil). Such crude drugs are standardized on the basis of their volatile oil contents. A few examples are quoted here.

**Table 15: Volatile content of some crude drugs**

<b>Drugs</b>	<b>Volatile oil content (% w/w) Not less than</b>
Caraway	2.5
Fresh lemon peel	2.5
Clove	15.0
Fennel	1.4
Dill	2.4
Cardamom seed	4.0

Different chromatographic techniques such as:

- Thin layer chromatography (TLC),
- High performance liquid chromatography (HPLC),
- Gas chromatography,
- Column chromatography,

- Gel permeation chromatography,
- Affinity chromatography,

Spectrophotometric method:

- IR (Infrared spectroscopy)
- NMR (Nuclear Magnetic Resonance spectroscopy)
- And radio-immunoassays are used very frequently for physical evaluation of crude drugs.

**Foreign Organic Matter:**

- The parts of the organ or organs other than those named in the definition and description of the drug are defined as foreign organic matter.
- The maximum limit for the foreign organic matter is defined in the monograph of crude drugs. If it exceeds the limits, deterioration in quality of the drug takes place. The limit for foreign organic matter is specially mentioned for natural drugs of vegetable origin.