

SOME BASIC DEFINITIONS

1. **Calcination:** The heating of limestone to redness in contact with air is known as the calcination.
2. **Hydraulicity:** It is the property of lime by which it sets or hardens in damp places, water or thick masonry walls where there is no free circulation of air.
3. **Quick Lime:** The lime which is obtained by the calcination of comparatively pure limestone is known as the quick lime or caustic lime. It is capable of slaking with water and has no affinity for carbonic acid.
 - Its chemical composition is (CaO) oxide of calcium and it has great affinity for moisture.
 - The quick lime as it comes out from kilns is known as the lump lime.
4. **Setting:** The process of hardening of lime after it has been converted into paste form is known as the setting. It is quite different from mere drying.
5. **Slaked Lime:** The product obtained by slaking of quick lime is known as the slaked lime or hydrate of lime. It is in the form of white powder and its chemical composition is Ca(OH)_2 or hydrated oxide of calcium.

$$\begin{array}{ccccccc} \text{CaO} & + & \text{H}_2\text{O} & \longrightarrow & \text{Ca(OH)}_2 & + & \text{Heat} \\ \text{Quick Lime} & & \text{Water} & & \text{(Hydrated Lime)} & & \end{array}$$
6. **Slaking:** When water is added to the quick lime in sufficient quantity a chemical reaction takes place.
 - Due to this chemical reaction the quick lime cracks, swell and falls into a powder form which is the calcium hydrate Ca(OH)_2 and it is known as the hydrated lime.
 - This process is known as the slaking.

CLASSIFICATION OF LIMES

- (i) Fat Lime (ii) Hydraulic lime (iii) Poor lime or lean lime
1. **Fat Lime:** This lime is also known as the high calcium lime. Pure Lime, rich lime or white lime. It is popularly known as the fat lime as it slakes vigorously and its volume is increased to about 2-2.5 times the volume

that of quick lime. The percentage of impurities in such limestone is less than 5%.

2. **Hydraulic Lime:** This lime is also known as the water lime as it sets under water. It contains clay and some amount of ferrous oxide. Depending upon the percentage of clay present the hydraulic lime is divided into following three types.

- Feebly hydraulic lime
- Moderately hydraulic lime
- Eminently hydraulic lime

The Hydraulic lime can set under water and in thick walls where there is no free circulation of air.

3. **Poor Lime:** This lime is also known as the impure or lean lime. It contains more than 30% of clay. It slakes very slowly.

IMPURITIES IN LIMESTONES

1. **Magnesium carbonate**
 - The magnesium limestones are hard, heavy and compact in texture.
 - The magnesium limestones display irregular properties of calcination, slaking and hardening.
 - Upto 5% of magnesium oxide imparts excellent hydraulic properties to the lime.
2. **Clay**
 - It is mainly responsible for the hydraulic properties of lime.
 - The percentage of clay to produce hydraulicity in lime stone usually varies from 10 to 30.
 - Limes containing 3-5 per cent of clay do not display any hydraulic property and do not set and harden under water.
3. **Silica:** In its free form it has a detrimental effect of the properties of lime.
4. **Iron compounds**
 - Iron occurs in small proportions as oxides, carbonates and sulphides.
 - Pyrite or iron sulphide is regarded to be highly undesirable.
 - For hydraulic limes 2-5 per cent of iron oxide is necessary.
5. **Sulphates:** Sulphates if present slow down the slaking action and increase the setting rate of limes.
6. **Alkalis:** When pure lime is required the alkalis are undesirable. However, up to 5 per cent of alkalis in hydraulic lime do not have any ill effect.