



SNS COLLEGE OF TECHNOLOGY



AN AUTONOMOUS INSTITUTION

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COIMBATORE

DEPARTMENT OF CIVIL ENGINEERING

19CEB201– CONSTRUCTION MATERIALS

II YEAR / III SEMESTER

Unit 2 : Lime – Cement – Aggregates

Topic 2 : Cement Ingredients



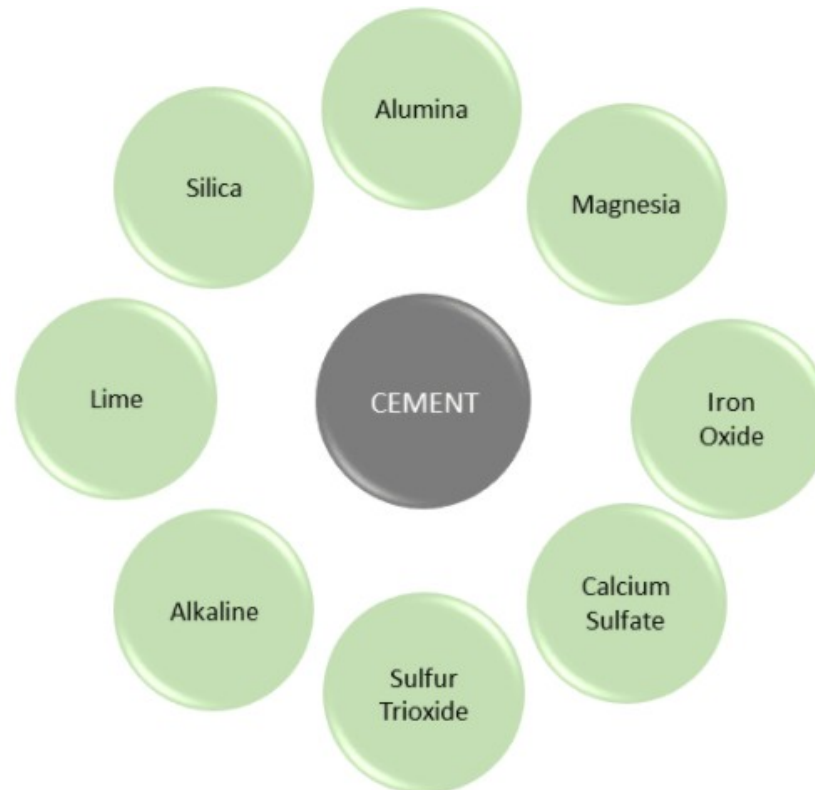
Cement

- Cement, as a binding material, is a very important building material.
- Almost every construction work requires cement.
- Therefore, the composition of cement is a matter of great interest to engineers.
- For understanding cement composition, one must know the functionality of Cement ingredients.
- By altering the amount of an ingredient during **cement production**, one can achieve the desired **cement quality**.



Composition of Cement

- There are eight major ingredients of cement. The following image is showing the ingredients of cement:





Cement Ingredients

- The general percentage of these ingredients in cement is given below:

Ingredient	Percentage in cement
Lime	60-65
Silica	17-25
Alumina	3-8
Magnesia	1-3
Iron oxide	0.5-6
Calcium Sulfate	0.1-0.5
Sulfur Trioxide	1-3
Alkaline	0-1



Functions of Cement Ingredients

Lime:

- Lime is calcium oxide or calcium hydroxide.
- The presence of lime in a sufficient quantity is required to form silicates and aluminates of calcium.
- Deficiency in lime reduces the strength of property to the cement.
- Deficiency in lime causes the cement to set quickly.
- Excess lime makes cement unsound.
- The excessive presence of lime causes the cement to expand and disintegrate.



Functions of Cement Ingredients

Silica:

- Silicon dioxide is known as silica, chemical formula SiO_2 .
- The sufficient quantity of silica should be present in cement to dicalcium and tricalcium silicate.
- Silica imparts strength to cement.
- Silica usually presents to the extent of about 30 percent cement.



Functions of Cement Ingredients

Alumina:

- Alumina is Aluminium oxide.
- The chemical formula is Al_2O_3 .
- Alumina imparts quick setting property to the cement.
- Clinkering temperature is lowered by the presence of the requisite quantity of alumina.
- Excess alumina weakens the cement.



Functions of Cement Ingredients

Magnesia:

- Magnesium Oxide.
- The chemical formula is MgO .
- Magnesia should not be present more than 2% in cement.
- Excess magnesia will reduce the strength of the cement.



Functions of Cement Ingredients

Iron oxide:

- Chemical formula is Fe_2O_3 .
- Iron oxide imparts color to cement.
- It acts as a flux.
- At a very high temperature, it imparts into the chemical reaction with calcium and aluminum to form tricalcium alumino-ferrite.
- Tricalcium alumino-ferrite imparts hardness and strength to cement.



Functions of Cement Ingredients

Calcium Sulfate:

- Chemical formula is CaSO_4
- This is present in cement in the form of gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$)
- It slows down or retards the setting action of cement.



Functions of Cement Ingredients

Sulfur Trioxide:

- Chemical formula is SO_3
- It should not be present for more than 2%.
- Excess Sulfur Trioxide causes the cement to unsound.



Functions of Cement Ingredients

Alkaline:

- It should not be present more than 1%.
- Excess Alkaline matter causes efflorescence.



Thank You!!