

4.7 DURABILITY OF CONCRETE

- The durability of concrete is one of its most important properties because it is essential that concrete should be capable of withstanding the conditions for which it has been designed throughout the life of a structure.
- The durability of cement concrete is defined as its ability to resist weathering action, chemical attack, abrasion, or any other process of deterioration.
- Durable concrete will retain its original form, quality, and serviceability when exposed to its environment.

Factors affecting Durability

Lack of durability can be caused by external agents arising from the environment or by internal agents within the concrete.

Causes can be categorized as

- Physical,
- Mechanical
- Chemical.

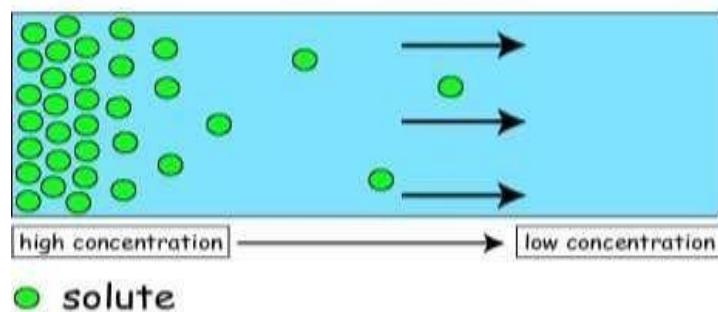
Physical causes

Physical causes arise from the action of frost and from differences between the thermal properties of aggregate and of the cement paste mechanical causes are associated mainly with abrasion.

Chemical causes

- Attack by sulfates, acids, sea water, and also by chlorides, which induce electrochemical corrosion of steel reinforcement.
- Since this attack takes place within the concrete mass, the attacking agent must be able to penetrate throughout the concrete, which therefore has to be permeable.

- Permeability is, therefore, of critical interest.
- The attack is aided by the internal transport of agents by diffusion due to internal gradients of moisture and temperature and by osmosis.



Solute transport is from the left to the right; movement of the solutes is due to the concentration gradient (dC/dx).

