

Introduction to Infrastructural Engineering

Construction Materials1

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Composition of concrete

- a) Water
- b) Aggregates
- c) Reinforcement
- d) Chemical admixtures
- e) Cement



Concrete production

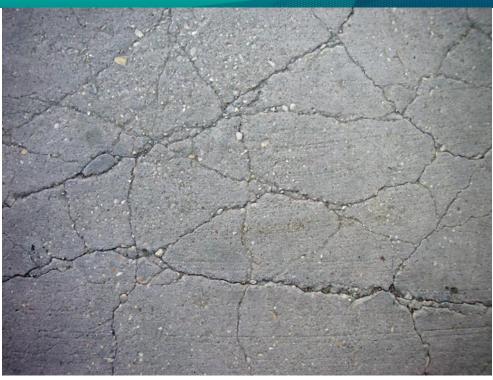
a) Mixing Concrete

- b) Workability
- c) Curing



Composition of concrete

- Water
- Aggregates
- Chemical admixtures
- Cement



http://www.bu.edu/sjmag/scimag2008/images/Texture__Concrete _Cracked_by_ivelt_resources.jpg



Water

- Good water is essential for quality concrete.
- Should be good enough to drink--free of trash, organic matter and excessive chemicals and/or minerals.
- The strength and other properties of concrete are highly dependent on the amount of water and the water-cement ratio.



 Materials in the form of powder or fluids that are added to the concrete to give it certain characteristics not obtainable with plain concrete mixes.

In normal use, admixture dosages are less than 5% by mass of cement, and are added to the concrete at the time of batching/mixing.



Aggregates

 Aggregates occupy 60 to 80 percent of the volume of concrete.

- Sand, gravel and crushed stone are the primary aggregates used.
- All aggregates must be essentially free of silt and/or organic matter.



The most common types of admixtures are:

Accelerators :

- Speed up the hydration (hardening) of the concrete. - Typical materials used are $CaCl_2$ and NaCl.

Acrylic retarders :

-Slow the hydration of concrete, and are used in large or difficult pours.

- Typical retarder is table sugar, or sucrose $(C_{12}H_{22}O_{11})$.

Air Entraining agents:

-The most commonly used admixtures for agricultural concrete.

-Produce microscopic air bubbles throughout the concrete.

-Entrained air bubbles:

- Improve the durability of concrete exposed to moisture and freeze/thaw action.
- Improve resistance to scaling from deicers and corrosive agents such as manure or silage.



Water-reducing admixtures

-Increase the workability of plastic or "fresh" concrete, allowing it be placed more easily, with less consolidating effort.

-High-range water-reducing admixtures are a class of water-reducing admixtures

- Increase workability
- Reduce the water content of a concrete.
- Improves its strength and durability characteristics.

