

THE COMPONENTS OF CONCRETE

1. DEFINITION OF TECHNOLOGY : The word **technology** is made up of two elements: **techno** and logic. The concept of "**technique**" is introduced in the first section. Greek in origin, tkhno is derived from tekhne, which signifies art. The second component of a term that designates certain sciences is the word "logie." Thus, technology refers to the study of methods and tools employed in a specific subject.

Other concept is that technology is the application of scientific knowledge to the practical aims of human life or, as it is sometimes phrased, to the change and manipulation of the human [environment](#).

Generally , technology means the use of scientific knowledge to solve practical problems, especially in industry, construction and commerce by using the specific methods, procedures , materials, and devices .

2. Definition of concrete: The word concrete comes from the Latin word "concretus" (meaning compact or condensed .

In the civil engineering dictionary ,Concrete is a composite material composed of aggregate bonded together with a fluid cement that cures to a solid over time. Concrete is the second-most-used substance in the world after water, and is the most widely used building material.

So, concrete technology deals with study of properties of concrete and its practical applications.

3. WHAT IS THE COMPOSITION OF CONCRETE?

Concrete is made up of cement, aggregates (**sand and gravel**), water, possibly with added minerals, one or more additives, colouring agents and fibres. In all cases, a certain amount of air is present in the concrete. Its composition varies according to the different constituents used and their proportion in the mix.

The terms should not be confused:

- Grout or pure paste = cement (+ addition) + water
- Mortar = grout + sand
- Concrete = mortar + gravel

Here are the dosage ranges for the various constituents of concrete

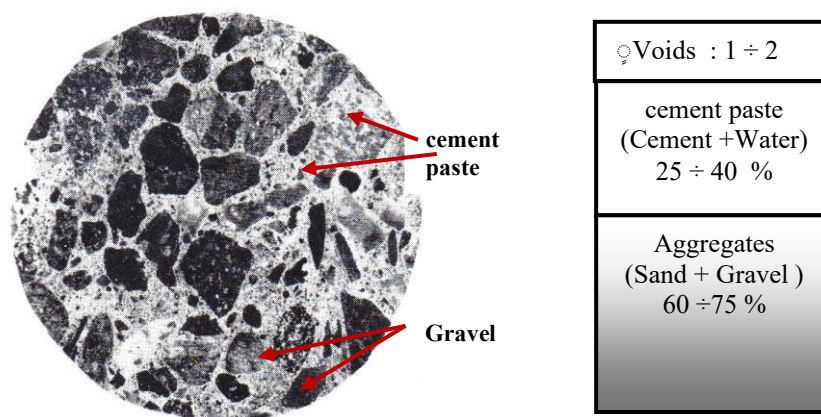
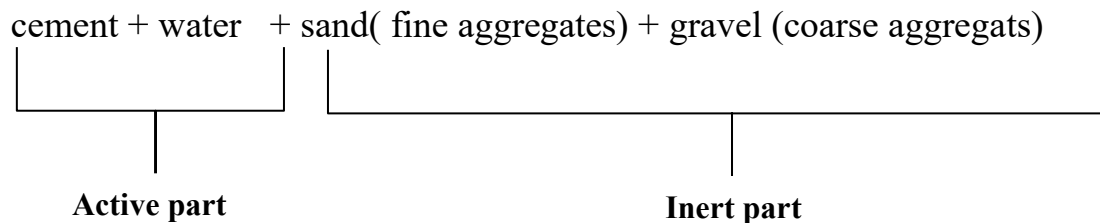


Fig.1 A cross-section of concrete

CONSTITUANTS	VOLUME (%)
cement & additions	7 – 14
Aggregates	60 – 70
Water	14 – 22
Admixtyre	0 – 2
Voids	1 – 6

The mixture of cement and water creates a paste or glue that hardens. This paste is the **active element** in the concrete as it coats each aggregate (**inert element**) , acting as a lubricant and glue to ensure that the concrete hardens. The aggregates (gravel and sand) form the skeleton of the concrete. Concrete is an economical material because aggregates are utilized as much as possible.



4. The importance of concrete: Concrete has been the most widely used building material for a long time. It will certainly remain the most widely used material in the construction of various structures in the upcoming decades.

In 1961, J. Kelly, an American specialist, wrote: ‘**No one would think of using wood for dams, steel for roads or bitumen for buildings, but concrete can be used for all of these and more**’.

Concrete is not limited to a single application. Its application must follow strict rules, otherwise serious problems can arise. It is therefore clear that the correct design of a structure, regardless of its requirements, must be based on the following principles.

- ▶ Knowledge of the properties of the used materials (the subject of this unit).
- ▶ Calculating the dimensions of the parts

Concrete has become widely used because **of several advantages** that we list below.

- Ingredients of concrete are readily available in most places.

- Unlike natural stones, concrete is free from defects and flaws.
- Concrete can be manufactured to the desired strength with an economy.
- The durability of concrete is very high.
- It can be cast to any desired shape.
- The casting of concrete can be done on the working site which makes it economical.
- The maintenance cost of concrete is almost negligible.
- The deterioration of concrete is not appreciable with age.
- Concrete makes a building fire-safe due to its non-combustible nature.
- Concrete can withstand high temperatures.

However , the concrete has also many disadvantages such as:

- Compared to other binding materials, the tensile strength of concrete is relatively low.
- Concrete is less ductile.
- The weight of concrete is high compared to its strength.
- Concrete may contain soluble salts. Soluble salts cause concrete degradation