Concrete

Introduction:

Concrete can be defined as the composite material composed of the binding medium such as the mixture of cement, water and different fine and coarse aggregates. Many people do consider the cement as the concrete, but cement is just a part of concrete. Concrete structures have been built around the world are subject to a wide range of different conditions of use and acquaintance to environmental conditions comprising erosion, weather, and pollution. All environmental conditions found concrete as the long lasting and the best binding material. Beside of whatever the conditions might be, concrete is expected to provide satisfactory performance for the wholeness of their service life with very little care.

Ingredients:

What makes the monster so much rigid, long-lasting and powerful enough to support every condition? To answer this, one has to look into the ingredients of concrete. This composite material is composed of varies ingredients. The properties and functions of this binding material depend upon its constituents. If the constituents have more strength, then concrete will be more sustainable. Have a look at concrete ingredients:

1. Binding materials:

In concrete, Portland cement is generally used. It gives the strength and its selection is a function of concrete durability and functioning. As according to the American Society for Testing and Materials (ASTM) there are five types of cement, but in manufacturing of concrete Type I. Type III cement is used.

2. Aggregate:

The aggregates usually comprise 75% volume of the concrete. This percentage might give you the importance of these aggregates. One must be very careful in the selection of aggregates because the property of aggregates is basically the property of concrete. These are the

granular material such as the sand, gravel, crushed stone or iron-blast furnace slag**. Fine aggregate** is usually the send and all other materials that pass through sieve #4 [0.187 in. (4.75 mm). On the other hand, **coarse aggregate** are the stones, gravel and all other material that is retained on the #4 sieve.

3. Admixtures:

Admixtures are added to give extra power and increase toughness, resistance, rigidness of the concrete. There are admixtures that reduce the viscosity, increase the resistance. Some have the ability to delay the setting time where necessary.

Strength of concrete:

Strength of concrete can be known by knowing the compressive strength of this material. Compressive strength of any material is the property of a material to withstand against the provided load without any blows or crushes.

Concrete compressive strength varies from 15Mpa to 35Mpa and it depends upon several factors like water-cement ratio, types of admixtures used, type of aggregate uses, and type of cement used. Test on strengths revealed that concrete by using good materials have 69Mpa strength at 28 days.

Curing time of concrete:

Curing of concrete is defined as the process of preserving the wetness and temperature circumstances of concrete for hydration response to normally so that **concrete** develops hardened properties over time. The main components which need to be taken care in curing are moisture, heat and time during **curing** the process.

If curing is not done, there is the chance of building cracks in the concrete. However, **28 days are considered to be the best curing time for the 100% strength of concrete.** Concrete develops 69Mpa strength on its 28 days after manufacturing.

Curing Time	Strength (%)
1Day	16%
2Days	40%
7 Days	60%
14Days	89%
28Days	99.9%

Types of concrete:

There is various type of concrete available in the market based on its functionality, strength and structure. For the construction purposes, if someone go to the market to buy the concrete for his/her building-it is available in the two forms:

1- Normal mix concrete
2- Design mix concrete.

However, on the base of material used and the construction required there are also further two types of concrete.

1- Plane concrete construction.
2- Reinforced concrete construction.

1- Normal mix concrete:

It is a concrete which is prepared according to the specific considerations of design. Common ingredients used here is cement, water, and aggregate. Setting time could be varied from 20 to 80 minute. If one looks at 28 days formula for concrete, it provides more than 80% strength to concrete which should be more than 95%.

2- Design mix concrete:

Concrete is not prepared on hit and trial basis. Ingredients' ratio is carefully selected after doing a lab test. After performing a different test on different proportion of material, the best design is selected. Design mix or simply mix designs are prepared according to the strength required for the structure.

3- Plane concrete construction:

In plane concrete there will be no reinforcement. Most common ingredients; cement, aggregate and water is mixed with proportion 1:2:4 respectively. In an area where less tensile strength is required like pavement and the other small building, plane concrete construction is usually used.

4- Reinforced concrete construction:

A Mixture of cement, send, coarse aggregate and water with reinforcement is known as Reinforced concrete construction. Here the tensile strength of the structure increases. It is used as a building substantial for nearly all types of buildings such as inhabited concrete buildings, engineering structures, dams, roads, tunnels, multi-story buildings, towers, channels, sidewalks, and superhighways.

Cost of concrete depends upon several factors like quality of material used in concrete, local prices of binding material like cement, and the area for which concrete required. But the thumb rule is that the cost of concrete is **$108 per cubic yard**. Pouring concrete ranges in price from **$8 to $18 per square foot**.

Weight of concrete

Unit weight of the concrete varies depending upon the basic constituents used in the manufacturing of concrete. Quantity and thickness of the aggregate, the water and **cement** content matters the most in determining the unit weight of concrete. Apart from this, 1 cubic meter of concrete weighs 2400 kg.

Advantages and disadvantages of concrete:

No.#	**Advantages**	**Disadvantages**
1	Ingredients are easily available	Concrete is less ductile
2	Unlike natural stones, concrete is free from defects and flaws	Concrete may contains soluble salts, which causes efflorescence
3	Maintenance cost is less and very durable	Weight is high
4	Withstand high temperature and pressure.	Tensile strength is low as compare to other binding materials.

Bottom Line:

Concrete proves to be a very good binding material. Its strength can be increased by adding proper ratio of admixtures. 28 days are the best curing time for the concrete where it gives the optimum strength i-e 100%. Its variability in types depending upon its use in the construction makes it versatile and usable.

Note: I collected the data from my old notes, I performed varies test in my Uni-life on making concrete by adding some admixtures like ash. I used some reading from that data. Advantages and disadvantages are common I knew it. I was well aware about types and its ingredients.

Other data like weigh and its price of concrete is collected from:

https://www.homeadvisor.com/cost/outdoor-living/deliver-concrete/