What do Admixtures do

Admixtures are materials other than cement, aggregate and water that are added to concrete either before or during its mixing to alter its properties, such as workability, curing temperature range, set time or color. Some admixtures have been in use for a very long time, others are more recent and represent an area of expanding possibilities for increased performance. Not all admixtures are economical to employ on a particular project. Also, some characteristics of concrete, such as shrinkage, can be overcome simply by consistently adhering to high quality concreting practices.

The chemistry of concrete admixtures is a complex topic. A general understanding of the options available for concrete admixtures is necessary for acquiring the right product for the job, based on climatic conditions and job requirements. Based on their functions, admixtures can be classified into the following five major categories:

- Water reducing admixtures
- Super plasticizers
- Air-entraining admixtures
- Retarding Admixtures
- Accelerating Admixtures
- Other Admixtures

Water reducing admixtures

Water reducing admixtures require less water to make a concrete of equal slump, or increase the slump of concrete at the same water content. They are primarily used for water and corresponding cement reduction which reduces both cost and market price. They can also enhance certain properties of concrete such as cohesion and pumpability

Super plasticizers

Super plasticizers are "high-range water reducers" that allow large water reduction or greater flowability (as defined by the manufacturers, concrete suppliers and industry standards) without substantially slowing set time or increasing air entrainment.

There are several applications which they can be used for such as early strength gain, flowability, durability requirements etc

Each type of super plasticizer has defined ranges for the required quantities of concrete mix ingredients, along with the corresponding effects. They can maintain a specific consistency and workability at a greatly reduced amount of water. Dosages needed vary by the particular concrete mix and type of super plasticizer used. They can also produce a high strength concrete. As with most types of admixtures, super plasticizers can affect other concrete properties as well. The specific effects, however should be found from the admixture producer

Air-entraining admixtures

Air-entraining agents entrain small air bubbles in the concrete. The major benefit of this is enhanced durability in freeze-thaw cycles, especially relevant in winter months.

Retarding admixtures

Retarding admixtures slow down the hydration of cement, lengthening set time. Retarders are generally used to overcome accelerating effects of higher temperatures and large masses of concrete on concrete setting time.Very much a specialist application and quite difficult to dose to give specific open life

Accelerating admixtures

Accelerators shorten the set time of concrete. They are generally used in situations where there is a requirement for the initial set of the concrete to be within a set time frame, for example in a tidal location where a set must be achieved early to prevent wash out from the returning tide. Proper care must be taken while choosing the type and proportion of accelerators, as under most conditions, commonly used accelerators cause an increase in the drying shrinkage of concrete. As with Retarding admixtures this is very much a specialist application

Other admixtures

There are numerous other specialist applications and admixtures available to cover these applications such as pumping aids, pigments for coloured concrete, expansion aides, anti shrinkage aids, water proofing(anti wash out) admixtures, water tight admixtures etc.

Bonding admixtures, including addition of compounds and materials such as polyvinyl chlorides and acetates, acrylics and butadiene-styrene co-polymers, can be used to assist in bonding new / fresh concrete with old / set concrete..

Cement substitutes also change concrete properties, but typically are not classified as admixtures.

Most organic chemical-type admixtures are affected by cement type and brand, water-cement ratio, aggregate grading, and temperature.

The use of specialist admixtures like retarders, accelerators, superplasticisers can have unexpected side effects on setting and placement characteristics. Choosing an admixture for a specialist task therefore, is something which should always be done on the basis of experience in order that the supplier can meet the requirements of all parties including designer, builder and concrete placer

Finally, admixtures cannot compensate for bad practice and low quality materials.