UNIT II

CHEMICAL AND MINERAL ADMIXTURES

2.1 ADMIXTURES

Admixtures are ingredients other than cement, fine aggregate and coarse aggregate to improve the quality of concrete. The addition of an admixture may improve the concrete with respect to its strength, hardness, workability, water resisting power etc.,

Purposes:

- Some chemical are mixed with concrete ingredients and spread throughout the body of concrete to favorably modify the moulding and setting properties of the concrete mix. Such chemical are generally known as chemical admixtures.
- Some chemicals are applied on the surface of concrete mix. Such chemical are generally known as chemical admixtures.
- Some chemicals are applied on the surface of concrete to protect it during or after its setting.
- Some chemical are applied to bond or repair broken or chipped concrete.

Types:

- Chemical Admixture
- Mineral Admixture

Chemical Admixture

Chemicals added to the concrete immediately or during mixing to modify its properties in the fresh hardened state.

Chemicals mixed with concrete ingredients and spread throughout the body of concrete to favourably modify the molding and setting properties of concrete mix is known as chemical admixtures.

Types:

Accelerators – speed up the initial set of concrete.

Retarders – delay the setting time of concrete mix.

Plasticizers and Super-plasticizers - water reducers.

Air entraining admixtures
Waterproofers Pigments
Corrosion - inhibiters
chemicals Anti-fungal admixtures

2.1.1 Accelerators.

Accelerators reduce the setting time and produce early removal of forms and speed up hardening. They are helpful in cold weather concreting.

Accelerating admixtures are added to concrete to increase the rate of early strength development in concrete to

- Permit earlier removal of form work;
- reduce the required period of curing;
- advance the time that a structure can be placed in service;
- partially compensate for the retarding effect of low temperature during cold weather concreting;
- in the emergency repair work.

Commonly used materials as an accelerator:

- Calcium chloride (Not used now)
- Some of the soluble carbonates
- Silicates fluosilicates (Expensive)
- Some of the organic compounds such as triethenolamine (Expensive)

In the past one of the commonly used materials as an accelerator was calcium chloride. But, now a days it is not used. Instead, some of the soluble carbonates, silicates flu silicates and some of the organic compounds such as triethenolamine are used.

Accelerators such as fluosilicates and triethenolamine are comparatively expensive. The recent studies have shown that calcium chloride is harmful for reinforced concrete and prestressed concrete. It may be used for

plain cement concrete in comparatively high dose.

Some of the accelerators produced these days are so powerful that it is possible to make the cement set into stone hard in a matter of five minutes are less. With the availability of such powerful accelerator, the under water concreting has become easy. Similarly, the repair work that would be carried out to the waterfront structures in the region of tidal variations has become easy. The use of such powerful accelerators have facilitated, the basement waterproofing operations. In the field of prefabrication also it has become an invaluable material. As these materials could be used upto 10°C, they find an unquestionable use in cold weather concreting.

Some of the modern commercial accelerating materials are Mc-Schnell OC, Mc-Schnell SDS, Mc-Torkrethilfe BE, manufactured by Mc-Bauchemic (Ind) Pvt. Ltd. MC-Torkrethilfe BE is a material specially formulated to meet the demand for efficient and multifold properties desired for sprayed concrete and shotcreting operations. A field trial is essential to determine the dose fora given job and temperature conditions when the above materials are used.

Accelerating Plasticizers :

Certain ingredients are added to accelerate the strength development of concrete to plasticizers or super plasticizers. Such accelerating superplasticizers, when added to concrete result in faster development of strength. The accelerating materials added to plasticizers or super plasticizers are triethenolamine chlorides, calcium nitrite, nitrates and flousilicates etc. The accelerating plasticizers or accelerating super plasticizers manufactured by well known companies are chloride free.

Advantages / Effects of accelerator on concrete properties:

- Reduced bleeding,
- Earlier finishing

- Improved protection against early exposure to freezing and thawing,
- Earlier use of structure
- Reduction of protection time to achieve a given quality,
- Early removal of form, and early load application.
- Increases the rate of gain of strength.
- Enables earlier release from precast moulds thus speeding production.
- Reduces segregation and increase density and compressive strength.
- Cures concrete faster and therefore uniform curing in winter and summer can be achieved.
- Early use of concrete floors by accelerating the setting of concrete.
- Reduces water requirements, bleeding, shrinkage and time required for initial set.