

## ∴ Admixtures :-

Anything added in concrete other than water, cement, sand, and coarse aggs. in order to modify its property, is termed as admixture.

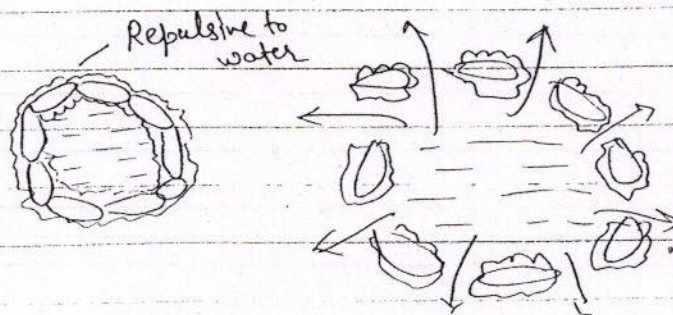
(i) Admixtures are generally of following type :-

- (A) Plasticizer - (Increases Workability)
- (B) Super Plasticizer.
- (C) Retarders
- (D) Accelerators
- (E) Air Entraining Admixture.

(A) Plasticizer :- These are organic substances or mixture of Organic and Inorganic substance that allows the reduction in water for the formation of concrete having same workability. Or at the same water cement ratio helps in the formation of highly workable concrete.

(i) In the former case high strength concrete is obtained and in the later case highly workable concrete is obtained.

(ii) Their normal dose varies b/w "0.1 to 0.4"% that allow the reduction of the water content by 10 to 15%. or increases the workability such that slump of min<sup>m</sup> 30mm increased.





## Plasticizers :-

Lingosulphate, Poly glycol Esters, Hydroxylated carboxylic Acid, can act as plasticizers.

Ex:- (i) When pumping is to be done  
(ii) Highly Reinforced Structure.

These admixtures are generally added in preparat<sup>n</sup> of concrete to be used in Heavily Reinforced structure.

(B) Super Plasticizers:- These are the modified version of plasticizers that allow the reduction of water upto 30% unlike plasticizer in which it can be only reduced upto 15%.

Super Plasticizers:-  
Modified Lingosulphate  
Sulphonated malanic Formaldehyde  
Sulphonated Naphthalene Formaldehyde

(C) Retarders:- These are the type of admixtures which are added in order to delay the chemical process of hydration so that concrete may remain plastic and workable for longer duration in comparison to that concrete in which retarder is not added. { air wells }

(D) (i) These are used to overcome the accelerating effect of temperature on the setting of concrete in hot weather cond<sup>n</sup>s.  
(ii) Their normal dose varies varies b/w 0.05 to 0.1 %.

(iii)



Retarders :- (1) Calcium sulphate

(2) Sugar

(3) Starch

(4) Cellulose.

(iii) These retarder are added in preparat<sup>n</sup> of conc. to be used in construct<sup>n</sup> of the "oil well" or to be used in Remote Site Conditions. req<sup>d</sup> long transportat<sup>n</sup> period.

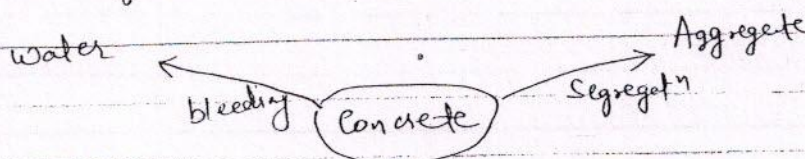
(D) Accelerators :- These are the type of admixtures which are added in order to increase the rate of development of the strength in concrete.

→ These are generally used in preparation of concrete for prefabricated construction, Emergency Road repair work, Cold weather concreting, Where formwork is to be reused for speedy construct<sup>n</sup>.

Accelerators :- Calcium Chloride, Silicates, Fluosilicates, Triethanol - Amine

(E) Air Entraining Admixtures :- These are the type of admixtures that entraps million of air bubbles in b/w the voids of cement particle that act as flexible "ball-bearing" slipping pass one over each other thereby helps in ~~modifying~~ <sup>modifying</sup> the property of concrete w.r.t.

the plasticity, workability, bleeding, segregation, permeability and frost action.





Air Entraining Admixt<sup>rs</sup> :-  $\rightarrow$  Natural wood Resins  
 $\rightarrow$  Animal and Plant oils & fats  
 $\rightarrow$  Hydrogen peroxide ( $H_2O_2$ )  
 $\rightarrow$  Aluminium Powder

Q. Using a mix design procedure mix proportion for desired wt. of concrete have been obtained as 1:2.1:3.5 by mass with water cement ratio of 0.5, and Air Content of 3%. Calculate the wt. of individual ingredients Req<sup>d</sup> to make at  $0.25 \text{ m}^3$  of concrete. Sp. Guty. of cement, sand and Aggregates are 3.15, 2.65, 2.7 respectively.

Soln:-

$$V_{\text{conc}} = V_{\text{void}} + V_{\text{solid}}$$

$$0.25 = (V_a + V_w) + (V_c + V_s + V_{agg})$$

$$0.25 = \frac{3 \times 0.25}{100} + \frac{0.5 w_c}{1000} + \frac{w_c}{G_c \cdot \rho} + \frac{2.1 w_c}{G_s \cdot \rho} + \frac{3.5 w_c}{G_{agg} \cdot \rho}$$

$$0.25 = \frac{3 \times 0.25}{100} + 5 \times 10^{-4} w_c + (0.31 \times 10^{-3} + 7.9 \times 10^{-3} + 1.29 \times 10^{-3}) w_c$$

$$w_c = \frac{0.24}{1}$$

$$w_c = 25.52$$

$$\begin{aligned} \text{As } \frac{w_w}{w_c} &= 0.5 \\ w_w &= 0.5 w_c \\ V_{\text{adm}} &= \frac{w_i}{\text{density}} \\ V_w &= \frac{w_w}{\rho_w} \end{aligned}$$