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Paper = Concrete Technology

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Q1:- Which step is taken to prevent flash setting of time? Also, write steps to prevent false setting of concrete?

Ans: Flash setting: Flash set is an early loss of workability in paste, mortar, usually accompanied by the evolution of considerable heat resulting primarily from the rapid aluminates. If the proper amount of or form of calcium sulfate is not available to control the Ca hydration, rapid stiffening takes place.

Steps To prevent setting Time:

Gypsum prevents Flash setting of cement during manufacturing. It retards the setting time of cement. Allows a longer working time for mixing, transporting and placing.

When water is mixed to cement Aluminates and sulfate get react and evolve some heat but gypsum acts as coolant and brings down the heat of hydration.

### False setting:-

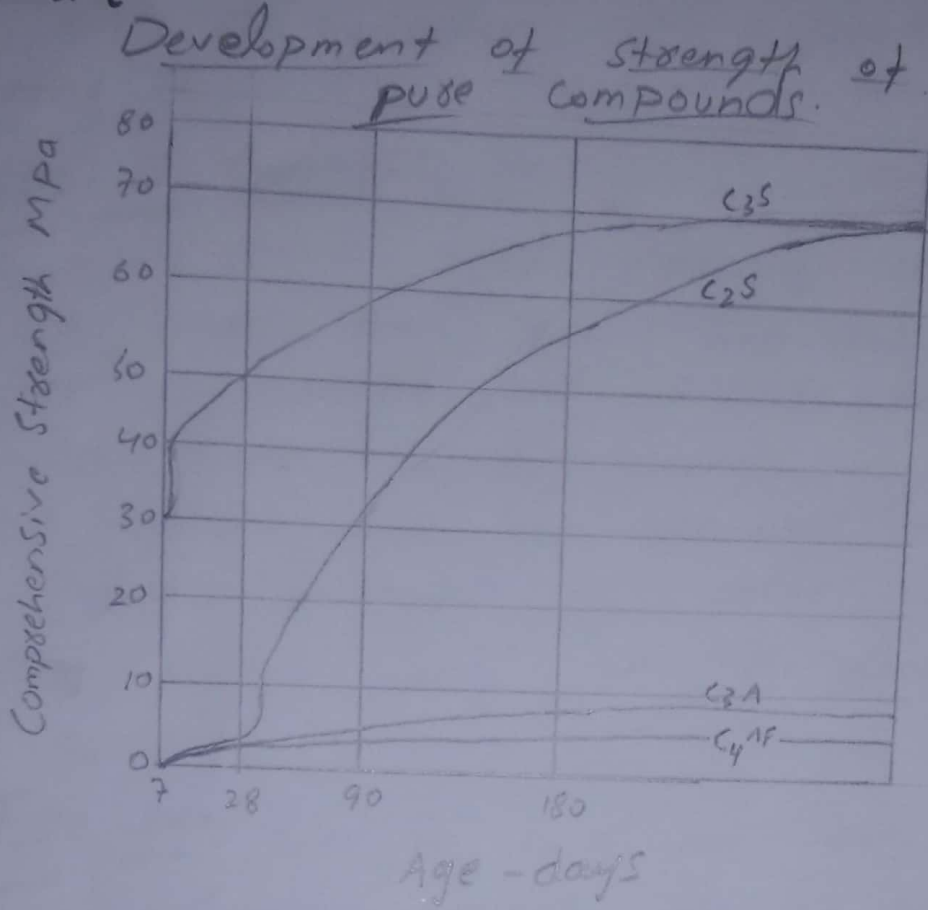
False setting occurs when too much of gypsum dehydrates in the cement manufacturing plant. This leads to stiffening due to the rapid reformation of gypsum with interlocking needle-like crystals.

### Steps to prevent false setting:-

To prevent this from happening, gypsum is added to cement during grinding.

x ————— x ————— x

Q2:- Draw a graph showing the strength development of pure compounds of Cement.



x \_\_\_\_\_ x \_\_\_\_\_ x  
x \_\_\_\_\_ x \_\_\_\_\_ x

Q③

Why Type III cement is Rapid hardening and Type IV low Heat producing? Draw a graph showing the development of heat of hydration of different Cement Types.

Ans

Type III Cement:-

Type III cement classified as a rapid hardening cement, it is finer than Type I and has a higher  $C_3S$  content and sulphite level. it also gains "28 day strength in 7 days. Useful where the formwork must be quickly stripped or areas that allow traffic early on the road surfaces.

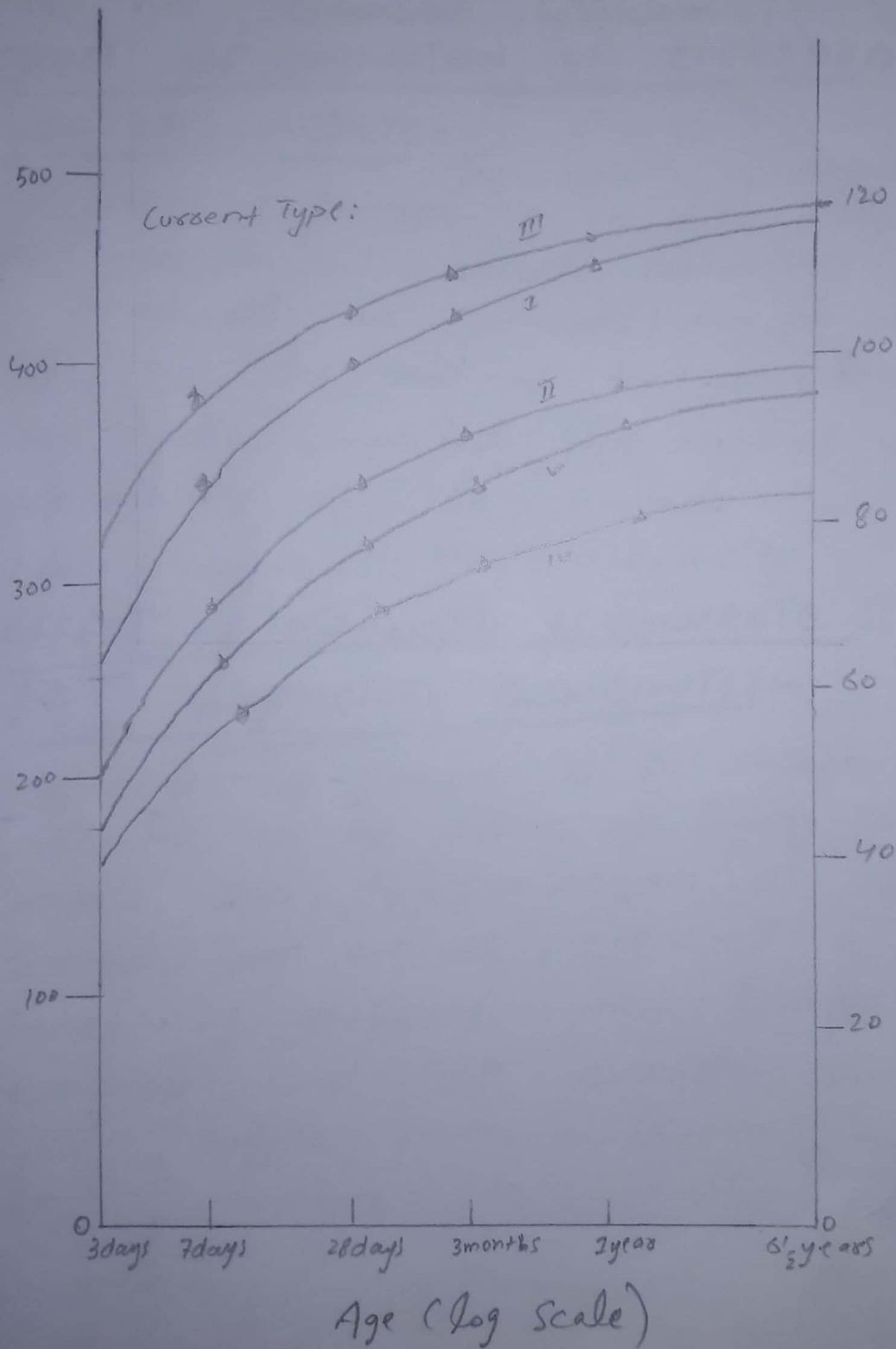
Type IV:-

Type IV is a low heat of hydration cement for use where the rate amount of heat generated must be minimized. it develops strength at a slower rate than type cement.

P-T-O



# Development of heat of Hydration of different cement Types



Q4: What is the effect of compaction on entrapped air of concrete? what will be the effect of strength if concrete is not compacted sufficiently?

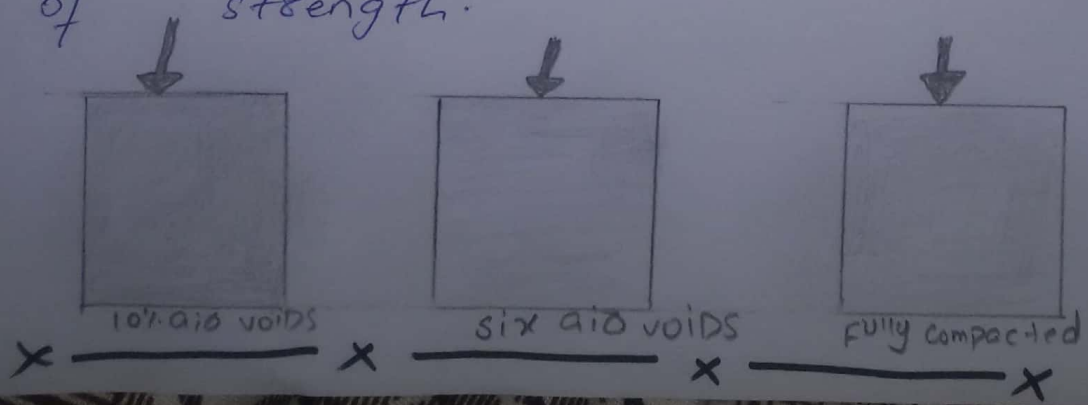
Ans:

EFFECT OF COMPACTION ON ENTRAPPED AIR OF CONCRETE:

The effect of compaction on compressive strength is dramatic. For example, the strength of concrete containing 20% of entrapped air (air voids) may be as little as 50% that of the concrete when fully compacted. This reduces the permeability of the concrete and hence improves its durability.

EFFECT OF STRENGTH IF CONCRETE IS NOT COMPACTED SUFFICIENTLY:-

⇒ Compaction of concrete is an important component in the process of laying a concrete slab. If compaction is not carried out as required a series of defects may become apparent and the concrete slab will suffer from sufficient loss of strength.



Q5:- Why is the percentage of gypsum added to cement limited only to 5%?

Ans: Gypsum is a mineral and is hydrated Calcium sulfate in chemical form. Gypsum plays a very important role in controlling the rate of hardening of the cement. Generally gypsum is added in the range of 3% - 5% to cement for delaying the setting time of cement. If gypsum is added in excess it accelerates the setting time of cement because gypsum generates its own clotting agent resulting in quick setting of cement. It also results in weaker strength.



Q6:- What is the effect of following on the bond strength of concrete?

Answer:-

SHAPE OF AGGREGATE:-

The shape of aggregate is an important characteristics since it affects the workability of concrete.

Size of AGGREGATE:-

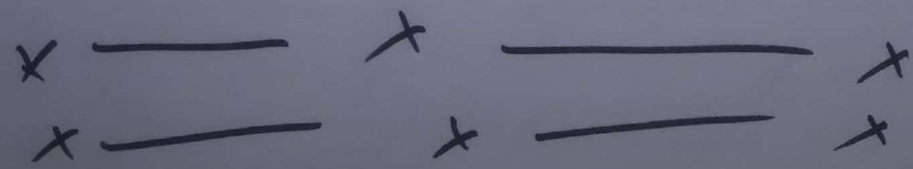
On the basis of size it is divided into two parts  
\* coarse aggregate.  
\* Fine aggregate.

=> 80mm size is the maximum size that could be conveniently used for concrete making.

Texture of AGGREGATE

Surface texture depends upon the hardness, grain size and pore characteristics of the parent rock.

Bleeding:- In the process of bleeding the accumulation of water creates a water voids and reduces bond b/w the aggregate and cement paste.





Q 7: What is the effect of following on workability of aggregate?

Ans: Porosity and absorption:-

⇒ The porosity of an aggregate affects the workability of concrete. If the aggregate can also absorb a great deal of water, less will be available to provide workability.

⇒ Some of the aggregates are porous and absorptive. Porosity and absorption of aggregate will affect the water/cement ratio and hence the workability of concrete as well as the bond b/w it.

GRADING OF AGGREGATE:- it is determining the average grain size of the aggregates before they are used in construction.

This applied to both coarse and fine aggregates.

⇒ Aggregates comprises about 55% percent of the volume of mortar and about 85% percent volume of mass concrete. Thus it is not that the way particles of aggregate fit together in the mix, as influenced by the gradation, shape, and surface texture as an important

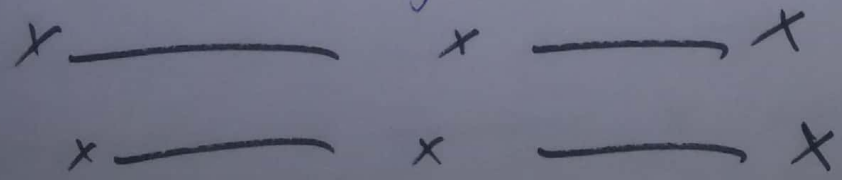
Effect on the workability and finishing characteristics of fresh concrete.

AIR ENTRAINING AGENT:-

Air entrainment affects compressive strength of concrete and its workability. It increases the workability of concrete without much increase in water cement ratio. In this case, air entraining admixture is added to increase workability without adding water.

Course aggregate to FINE AGGREGATE RATIO:-

=> The effect of course to fine aggregate ratio on the fresh and hardened properties of roller compacted concrete pavement. The test result demonstrate that uncreasing the C/F ratio from 0.6 to 1.8 increased the cure time three fold while increasing the cement content from 9% to 12% decreased the cure time by 12%.



Q8:- What is the effect of fineness of Cement on the following?

Ans

STRENGTH OF Concrete:-

The compressive strength of concrete, with or without entrained air, increase with an increase in cement fineness.

RATE OF HEAT EVOLUTION DURING Hydration:-

The peak rate of heat evolution increases as the fineness of the cement increases.

TOTAL HEAT OF HYDRATION:-

The fineness of ~~fineness~~ cement affects hydration rate, and in turn, the strength. increasing fineness causes an increased rate of hydration. Bleeding can be reduced by increasing fineness.

WORKABILITY OF CONCRETE:-

The workability of non air-entrained concrete is increased by increasing the cement fineness. In air-entrained concrete the effect of fineness of cement on workability is very much less pronounced.





Q9:- What steps can be taken during transportation and placement of concrete to prevent segregation of concrete?

Ans:-

Segregation of concrete can be prevented by correctly proportioning mix and using the recommended water cement ratio so as to prevent using excess water. Care should be taken while handling placing, transporting, compacting and also its finishing stages.

