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Q Which step is taken to prevent flash setting of cement? Also, write step to prevent false setting of concrete.

Step to prevent Flash setting of cement:-

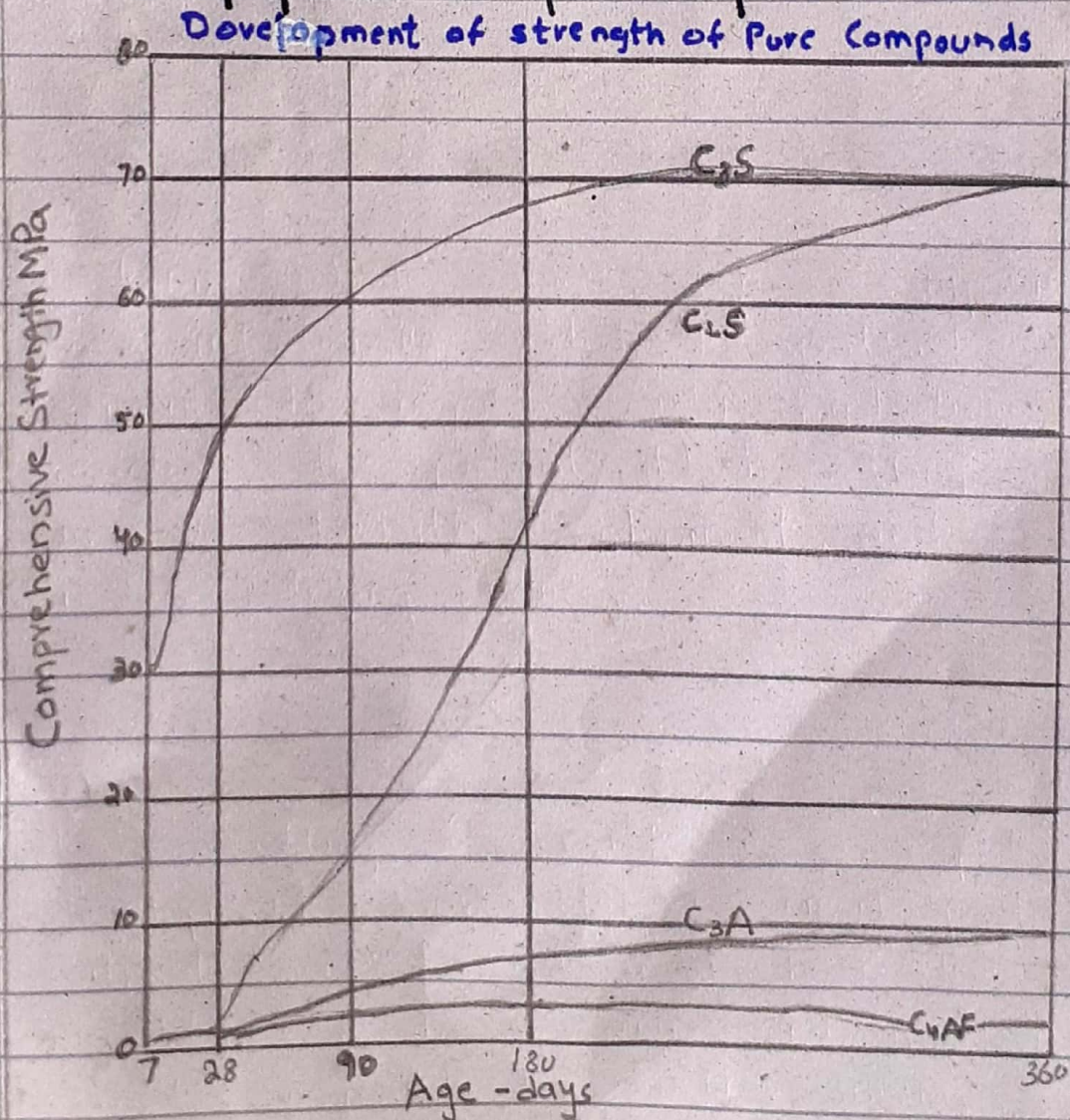
Calcium sulfate sources, such as gypsum, are intentionally added to portland cement to regulate early hydration reactions to prevent flash setting, improve strength development, and reduce drying shrinkage.

Step to prevent False setting of concrete:-

False setting of concrete is a rapid development of rigidity of cement paste without generation of much heat. This rigidity can be overcome and plasticity can be regained by further mixing.

without addition of water. In this way cement paste restores its plasticity & sets in a normal manner without any loss of strength. It may be due to dehydration of gypsum as a result of contacting hot clinker or due to activation of C₃S by aeration in high humidity.

2 Draw a graph showing the strength development of pure compounds of cement.



3 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.

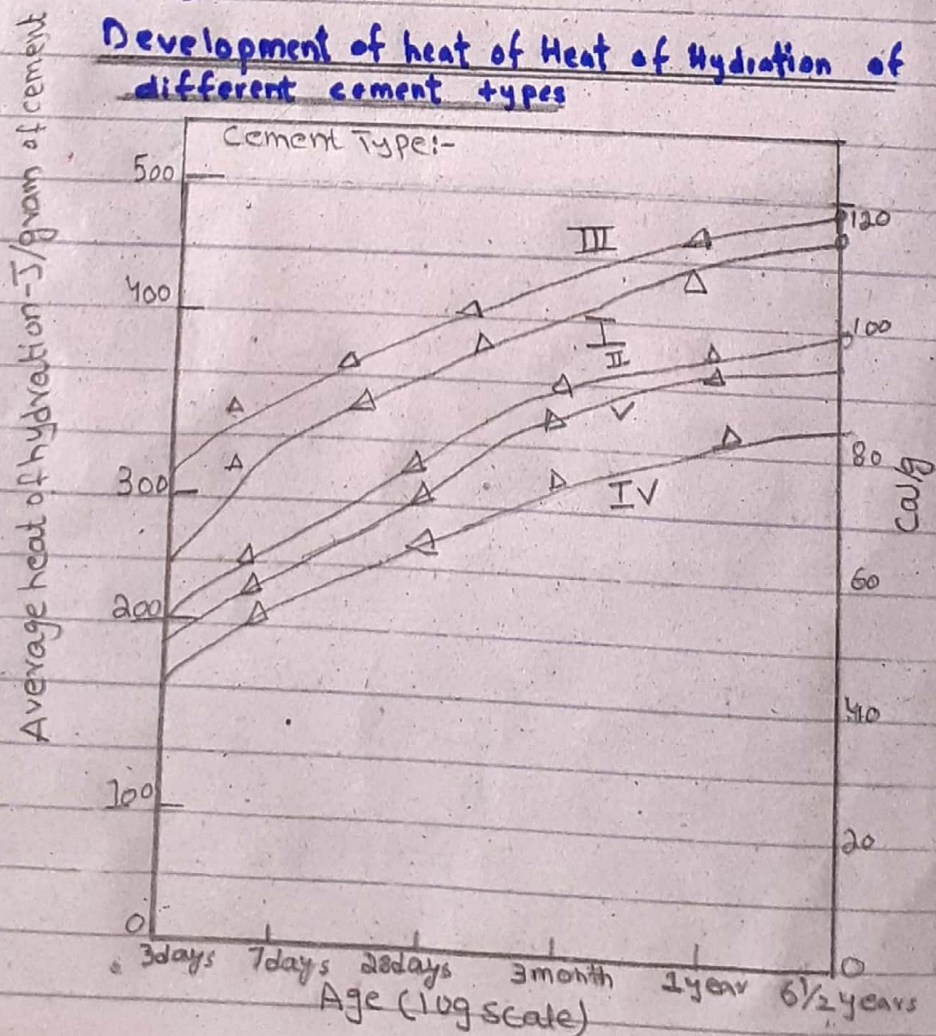
Type III :-

The rapid Hardening of type III cement is due to increase of C_3S compound, and due to finer grinding of the cement clinker.

Type IV :-

Low heat producing of type IV cement is due to low content of C_3S ($< 50\%$) and C_3A .

Development of heat of Heat of Hydration of different cement types



5. Why is the percentage of gypsum added to cement limited only to 5%?

Answer:-

Gypsum is added to concrete because it helps to control setting, drying shrinkage properties, and strength development and if we add extra amount of gypsum in the cement it will affect the setting time (delay the expected setting time). It also results in weaker strength and inevitable expansion.

6. What is the effect of following on bond strength of concrete?

i. Shape of Aggregate:-

From the standpoint of economy in cement requirement for a given water/cement ratio, rounded aggregates are preferable to angular aggregates. On the other hand, the additional cement required for angular aggregate is offset to some extent by the higher strengths and sometimes by greater durability.

ii. Size of Aggregate:-

The size of aggregate in concrete if bigger than the spacing of the reinforcement will cause voids thus adversely affecting the strength.

iii. Texture of Aggregate:-

The texture of the aggregate, if rough will increase its strength. If the texture

is smooth, it might decrease the strength of concrete.

Bleeding:-

Due to high bleeding concrete will lose its bond strength. Bleeding is responsible for causing permeability in concrete.

8 What is the effect fineness of cement on the following?

i Strength of concrete:-

Fineness of cement will increase the strength of concrete. More the fineness of the cement is, more rapid is the development of strength.

ii Rate of heat evolution during hydration:-

Fineness of cement will generate high rate of heat evolution during hydration. Also lead to the requirement of more water for workability, resulting in a higher possibility of dry shrinkage.

iii Total heat of hydration:-

Fineness of cement also influences the rate of development of heat but not the total heat. The total quantity of heat generated in the complete hydration will depend upon the relative quantities of the major compounds present in a cement.

iv Workability of Concrete:-

Increasing the fineness of cement the workability of concrete increases and the workability of non air-entrained concrete is increased.

9. What steps can be taken during placement and transportation of concrete to prevent segregation of concrete?

To Avoid Segregation:-

- ★ Check the concrete is not 'too wet' or 'too dry'.
- ★ Make sure the concrete is properly mixed. It is important that the concrete is mixed at the correct speed in a transit mixer for at least two minutes immediately prior to discharge.
- ★ Concrete should be placed as soon as possible.
- ★ When transporting the mix, load carefully.
- ★ Always pour new concrete into the face of concrete already in place.
- ★ Use of Certain Workability agents, Pozzolanic material and air entraining agents can significantly reduce segregation.
- ★ Avoid Excessive compaction by vibration of too wet mix.
- ★ If placing concrete straight from a truck, pour vertically and never let the concrete fall

more than one-and-a-half meters.

7 What is the effect of following on workability of concrete?

i Porosity and absorption:-

Porosity and absorption of aggregate will affect the water/cement ratio and hence the workability of concrete as well as the bond between it and cement paste. The porosity of aggregate will also affect the durability of concrete when the concrete is subjected to freezing and thawing.

ii Air Entraining agent:-

Air Entraining agent affects compressive strength of concrete and its workability. It increase the workability of concrete with much increase in water cement ration.

iii Coarse aggregate to fine aggregate ratio:-

Fine aggregate require more water for a large surface, hence aggregate with finer particles need more water to make it workable. On the other hand, bigger particles have less surface area, demand less water for wetting surface and require less amount of paste for lubricating.

iv Grading of Aggregate:-

Graddings of Aggregate have the

maximum effect on the workability of concrete. A well graded aggregates have all size in required percentage. This helps in reducing the voids in a given volume of aggregates. The less volume of voids make the cement paste available for aggregate surface to provide better lubrication to the aggregates.

4. What is effect of compaction on entrapped air of concrete? what will be the effect on strength if concrete is not compacted sufficiently? Explain with graph?

Answer:- Compaction is the process which expels entrapped air from freshly placed concrete & packs the aggregate particles together so as to increase the density of concrete. It increases significantly the ultimate strength of concrete & enhances the bond with reinforcement.

