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Subject	Concrete technology
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Semester	2nd

Q1. Which step is taken to prevent flash setting of cement? Also, write steps to prevent false setting of concrete?

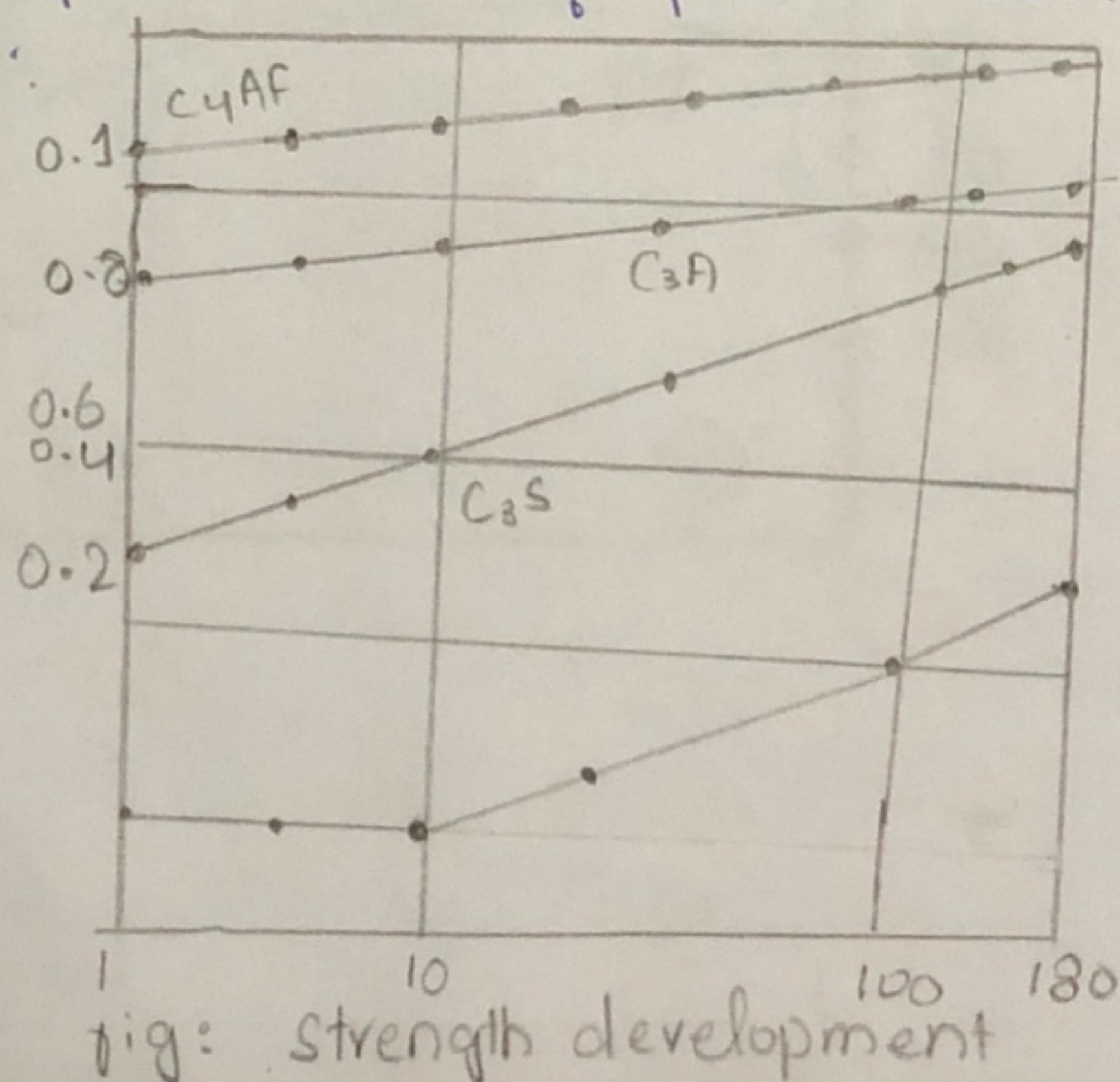
Ans There are lots of fancy words in the cement field, so I will elaborate on the most common acceptations of these phrases.

**Flash Setting:** This is due to a lack (or absence) of calcium sulfate (gypsum / anhydrite) addition to clinker. This addition is useful to divert, the natural route of aluminate phases from hydrogarnets and other hydroaluminates towards ettringite. Hydroaluminates induce flash setting, a rapid and exothermic hardening in a matter of minutes. Ettringite and counterparts induce a much softer hydration route, easier to manage in terms of workability.

False Setting:- this is usually due to the nature of calcium sulfates added, specifically too much calcium sulfate hemihydrate (bassanite, or more commonly plaster). Calcium sulfates come in various degrees of hydration: dihydrate (gypsum), hemihydrate (bassanite), anhydrous (anyhydrite). When too high an amount of hemihydrates is present, it simply follows its own hydration route towards gypsum precipitation, leading to an early setting of cement. Hemihydrate may form in hot spots of the mill during clinker-gypsum co-grinding  $120-140^{\circ}\text{C}$  is enough

Q2:- Draw a graph showing the strength development of pure compounds of cement?

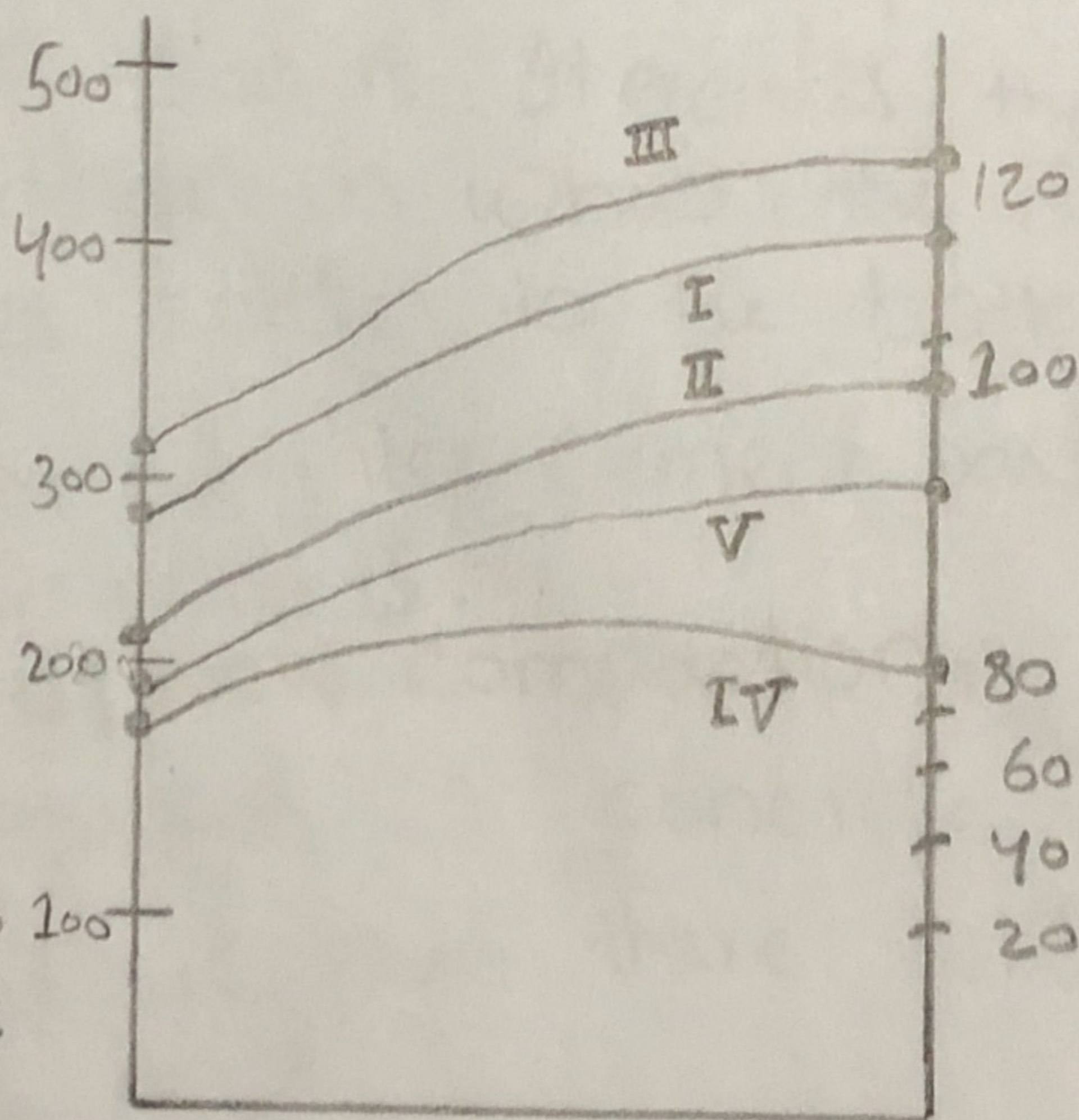
{Ans} The following graph shows the strength development of pure compound of cement.



Q3 why type III (three) cement is rapid hardening and type II low heat producing  
 Draw a graph showing the development of heat of hydration of different cement types?

Ans:- Type III Cement is rapid hardening because the component of type III is more finely ground with roller and grounds and addition of more  $C_3A$  as compare to type IV. While the low heat the low content of  $C_3A$  and  $C_3S$ . The produce of type IV are less finely ground therefore the content react slowly and produce low heat of hydration.

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 on strength if concrete is not compacted sufficiently?

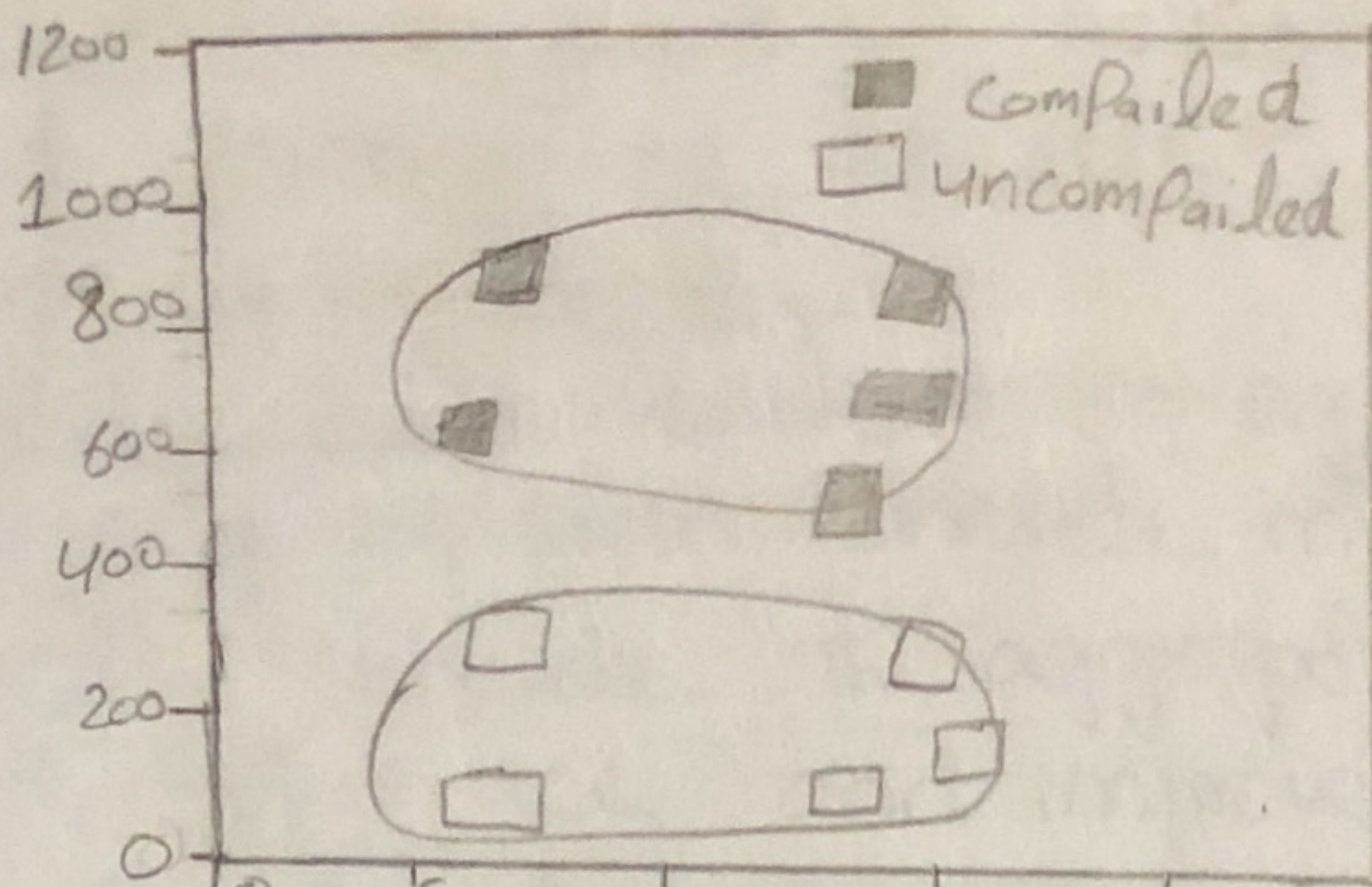
Ans: => Effect of compaction on entrapped air of concrete:

Compaction is the process which expels entrapped air from freshly placed concrete and packs the aggregate particles together. So is to measure the density of concrete. It increases significantly the ultimate strength of concrete and enhances the bond with reinforcement.

Due to compaction of concrete segregation occurs. It creates the problem of segregation in which the denser aggregates settle to the bottom while the lighter cement paste tends to move forward.

=> Effect of non compaction: The effect of on strength if concrete is not compacted is that there will be no segregation.

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Question NO: 5:- Why we add only 5% gypsum to cement?

Ans: Gypsum is a naturally occurring mineral mined from deposits formed by ancient seabeds as a raw material. Gypsum is called a retarding agent of cement which is mainly used for regulating the setting time of cement and is an indispensable component.

Gypsum (2 to 3%) is added to cement in powder form to slow down the setting of cement. We add 5% of gypsum to slow down the setting of cement. About 3 to 5% gypsum is added to cement to slow down the setting.

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

i) Shape of aggregate:-

The shape and texture of aggregate affect the property of fresh concrete more than hardened concrete. The aggregate have smooth surface and improve workability and the rough surface generates a stronger bond between the paste and aggregate creating a higher strength.

ii) Size of aggregate:- Several factors including chemical, roughness and reinforcement with concrete. Therefore for bond strength when smaller size aggregates are used.

iii) Texture of aggregate:- The texture also affect the properties of fresh concrete. A smooth surface can improve workability thus a rough surface aggregate create a strong bond between the paste and aggregate.

Bleeding:- Bleeding in concrete may be considered as the physical movement of water towards the top surface of it is not always favorable as it increases finishing time, decrease strength where resistance and bond strength and causes poor bonds between

## Successive Diffs.

{Question # 7} What is the effect of following on workability of aggregate?

- i) Porosity and absorption → Porosity and absorption will effect water/cement ratio and hence workability of concrete as well as bond between it and cement paste.
- ii) Air entraining agent: Air entraining agent effects compressive strength of concrete and its workability.
- iii) Coarse aggregate to fine aggregate ratio. Fines particles require more water for a longer surface, hence aggregate with fines particles needs more water make it workable on the less surface area, demands less water for wetting surface and requires less amount of paste for lubricating.
- iv) Grading of aggregate. Graded aggregates tends to fill up voids and easily workability smaller amount of water can make it workable.

{Question # 8} What is the effect of fineness of cement on the following:-

- i) Strength of concrete → Increasing fineness causes an increased rate of hydration high strength and high heat generation blending can be reduce by increasing

fineness.

ii) Rate of heat evolution during hydration

The fineness of cement has an important bearing on the rate of hydration and hence on the rate of gain of the strength and also on the rate of evolution of heat.

iii) Total heat of hydration - The size of cement particles directly affects the hydration setting and hardening strength and heat of hydration. The finer the cement particles are, the longer the total surface area.

iv) workability of ~~cement~~ concrete - The workability of non air entrained concrete is increased by measuring the cement. The 28 days compressive strength of concrete with or without air entrained air, increases with an increase in cement fineness.

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Q=9 what step can be taken during transporting and placement of concrete to prevent segregation?

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

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