

SUBMITTED TO ⇒ OSAMA ZEB "SB"

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SECTION ⇒ "A"

ID NO# ⇒ 16066

DEPARTMENT ⇒ Civil Engineering

SEMISTER ⇒ "2nd"

IQRA NATIONAL UNIVERSITY

PESHAWAR

APRIL

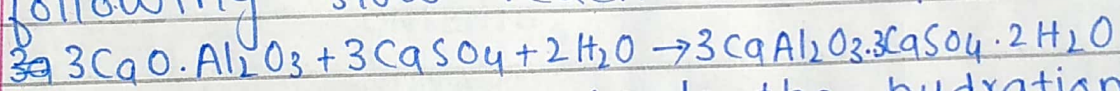
QUESTION NO# "01"

Q:- Which steps is taken to prevent flash setting of cement? Also write steps to prevent false setting of concrete.

Ans:- Flash set \Rightarrow • The rapid setting of cement paste after mixing with water, making it useless for normal work is called flash setting.

• Gypsum is added to portland cement, which slows down the setting reaction.

• In presence of gypsum the following slow reaction takes place:



• The gypsum retards the hydration reaction.

• Sulphates and alluminates are also present in supplementary cementitious materials and admixtures.

Steps to prevent false setting of concrete \Rightarrow

• False set is the abnormal premature stiffening of cement paste due to presence of excessive calcium-sulfate hemihydrate.

• The rigidity can be overcome by further mixing of the paste without adding of more water.

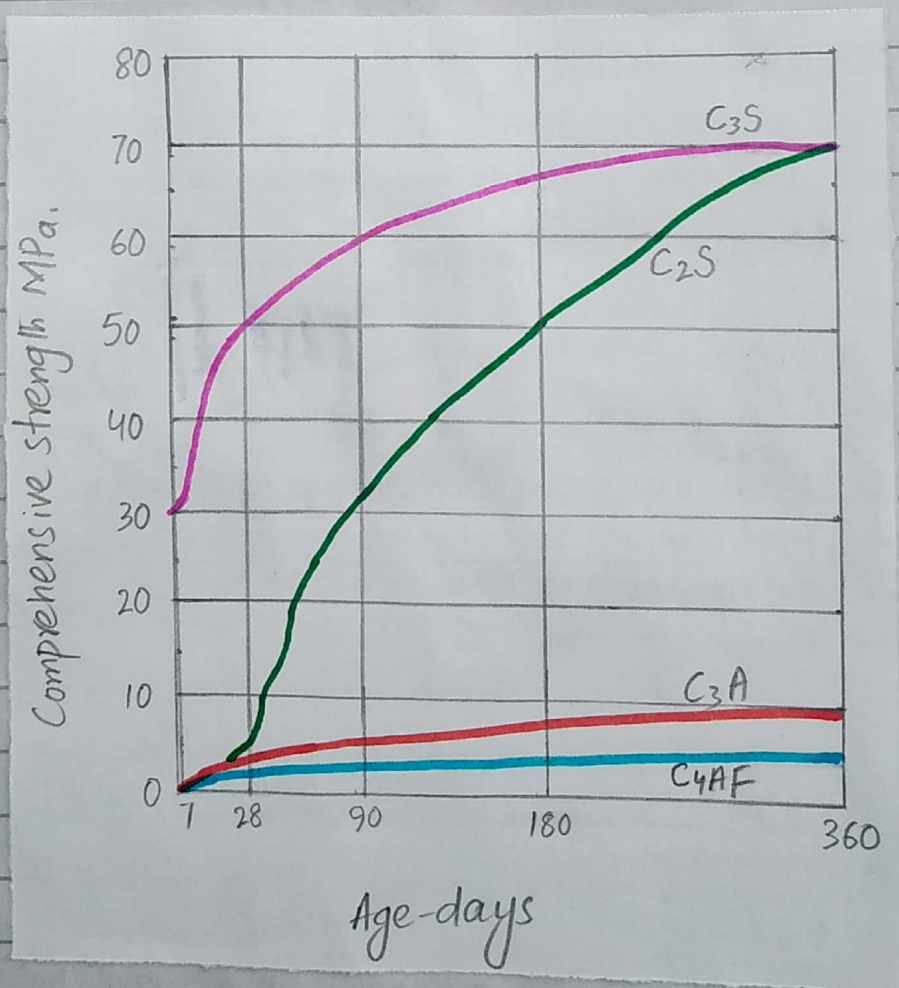
• In this way the plasticity is regained.

• Admixtures containing weak electrolytes are organic molecules with

the nucleation of gypsum crystals and reduce the tendency to false set.

QUESTION NO# "02"

Q:- Draw a graph showing the strength development of pure compounds of cement.



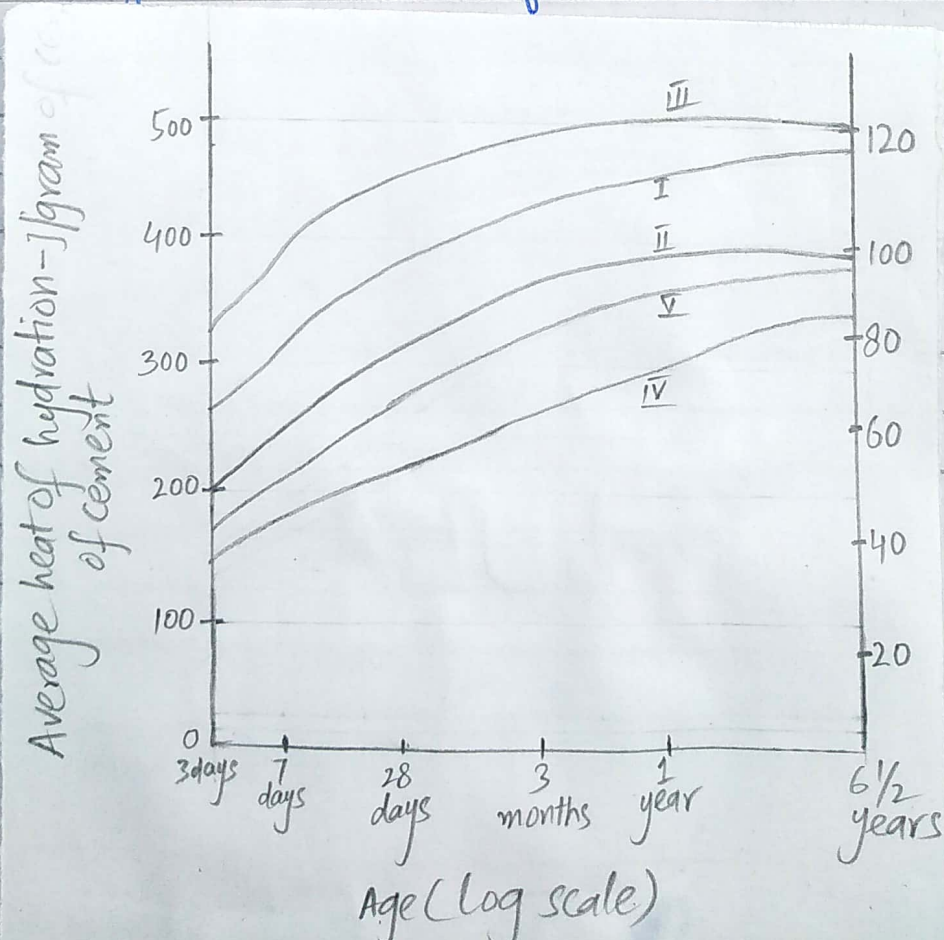
Q:- Why type III cement is Rapid Hardening and type IV Low heat producing? Draw graph showing the development of heat of hydration of different cement types.

Ans: Type III cement has a rapid increase in strength because of the following reasons:

- Presence of slightly more amount of C3S (Calcium Aluminium silicate) and C3A.
- Due to fine grinding of cement clinker.
- Due to its higher fineness.

→ Type IV cement is low heat producing because:

- lower amount of C3S (< 50%)
- lower amount of C3A.
- higher amount of C2S (46%)



QUESTION NO# "04"

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

Ans:- The compaction process expels the entrapped air from the freshly placed concrete, thus increasing the overall density.

- It is done in two steps stages and takes 10-20 seconds.

Effect on strength if concrete is not compacted sufficiently \Rightarrow

- If compaction is not done sufficiently there will be:
 - i- voids
 - ii- Heavier rocks will sink
 - iii- reinforcement (steel) will not be covered
 - iv- you will need more water for the concrete to flow into the molds.

These factors will decrease the overall strength. 100% air present in the concrete will decrease its strength upto 50%.



QUESTION NO# "05"

Q:- What is the percentage of gypsum added to cement limited only to 5% ?

Ans:-

- Gypsum is only added to 5% to keep the setting time adequate and provide great strength development.

- If the gypsum quantity is increased it will effect the quality of cement and increase its setting time.

- The cement will set slow and its strength will be decreased.

- If gypsum is more than 5% in the cement, it may react with extra sulfates to form ettringite.

- The ettringite expands in volume later causing an explosion that manifests through cracks.

- To avoid these complactions, it's percentage should not exceed more than 5%.

QUESTION NO# "06"

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

i- shape of aggregate

ii- size of aggregate

iii- Texture of aggregate

iv- Bleeding

Ans:- 1- Shape of aggregate \Rightarrow

- If the shape of aggregate is coarse it will result in poor workability and poor placement.

- Due to poor placements work spots or voids maybe left in concrete mass thus affecting its strength.

2- Size of aggregate \Rightarrow

- If the size of aggregate is increased, homogeneity of the concrete deteriorates.

- on increasing the grain size to 120-180mm, the tensile strength decreases 30-50% compared with maximum aggregate size 20mm. The elongation limit also decrease.

3- Texture of aggregate \Rightarrow

- The texture of aggregate affects the properties of fresh concrete more than hardened concrete.

- Smooth surface texture can improve workability, yet a rougher surface generates a stronger bond, creating higher strength.

4- Bleeding \Rightarrow

- Due to bleeding process, water accumulates below the reinforcing bars which reduces the bond strength between the aggregate and cement paste.

- During bleeding water voids are created which reduces the overall strength.

QUESTION NO# "07"

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

- i- Porosity and absorption
- ii- Air entraining agent
- iii- Coarse aggregate to fine aggregate
- iv- Grading of aggregate

Ans:- 1- Porosity and absorption \Rightarrow

- The porosity effect the workability of the concrete. If aggregate absorb a great deal of water, less will be available for workability.

- If equivalent water is not added, the aggregate become dry and become unworkable.

2- Air entraining agent \Rightarrow

- Adding air will increase the slump of the concrete which means higher workability.

- These air pebbles in the concrete will lower the compression of the concrete which must be considered in design of the concrete.

3- Coarse aggregate to fine aggregate ratio \Rightarrow

- Aggregate with smooth surface are more workable than roughly texture aggregates.

- Rough texture aggregate show higher friction and requires more water while smooth surface aggregate require

less water.

4- Grading of aggregate \Rightarrow

• well graded aggregates tend upto fill voids and easily get workability.

• If grading is better there will fewer voids and excessive paste will give better lubricating effect thus increasing workability.

QUESTION NO # "08"

Q:- What is the effect of fineness of cement on the following?

- i- strength of concrete
- ii- Rate of heat evolution during hydration
- iii- Total heat of hydration
- iv- workability of concrete

strength of concrete \Rightarrow

• Fitness of cement affects hydration hence the strength of concrete.

• Finer cement reacts faster with water than coarse particles and thus increases the rate of development of strength.

2- Rate of heat evolution during hydration \Rightarrow

• Increasing the cement fineness increases the rate

of heat evolution during hydration.

- cement with high rate of heat evolution will lose workability and in hot dry conditions will lead to thermal cracking.

3- Total heat of hydration \Rightarrow

- Increasing cement fineness or decreasing its mean particle size increases the total heat of hydration.

- Finer cement hydrates more quickly and the hydration temperature increases more rapidly thus increasing the total heat of hydration.

Workability of concrete \Rightarrow .

- Fineness of cement increases the workability of concrete.

- When the fineness of cement increases a certain particle size the particles of cement itself start acting as lubricants thus water demand decreases increasing the workability of concrete.

QUESTION NO# "09"

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

Ans:-

- It should be mixed properly

- Admixtures or air entraining agents should be used to avoid segregation.

- Avoids jerks and jolts during transporting concrete.

- Try to transport RMC as soon as possible to the site.

- Transportation of the concrete should be done via shortest route.

During Placement \Rightarrow

- The framework should be sufficiently rigid during placement.

- Provide soft blows using iron hammer at the edges and corners soon after finishing.

- Height of fall should not be more than 1.5 meters.

- Distance between the mixing and pouring should be maximum.

- Do ~~not~~ the compaction properly before placing concrete.

- Angle of inclination should be kept between 1:3 and 1:2.