

Concrete Technology Live Session 4

21 Feb 2022

Session starts at 6 pm

NPTEL

Concrete Technology

Live Session 4

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Solving Practice Questions

Question 1

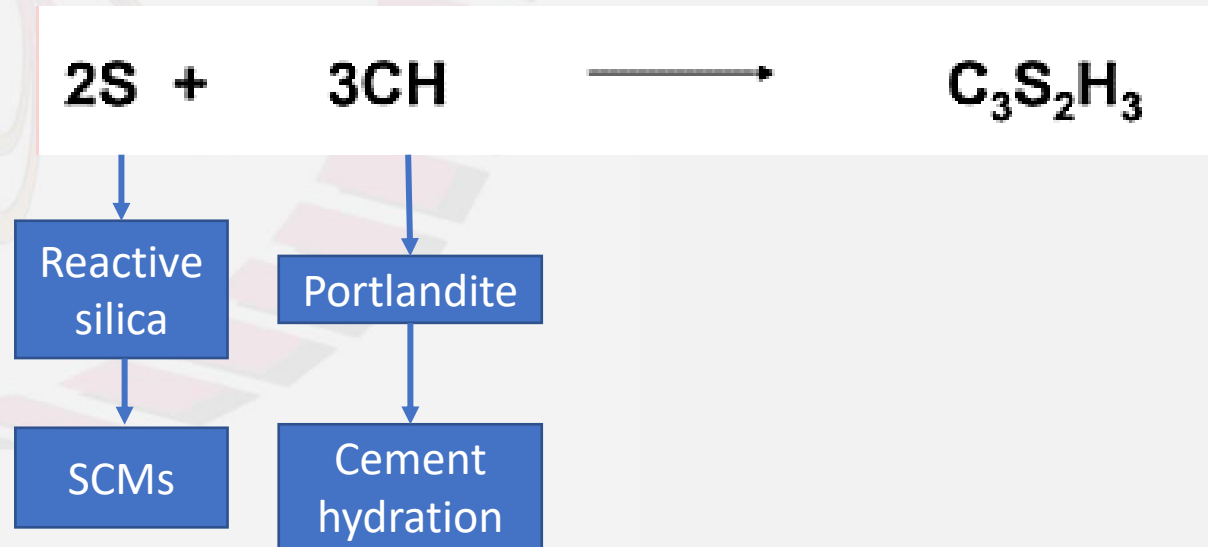
What is pozzolanic reaction?

- a) Reactive silica from mineral admixtures/SCMs reacts with C-S-H, resulted from cement hydration, to form additional C-S-H
- b) Reactive silica from mineral admixtures/SCMs reacts with portlandite, resulted from cement hydration, to form additional C-S-H
- c) Reactive silica from cement reacts with portlandite from mineral admixtures/SCMs to form additional C-S-H
- d) None of the above

Question 1

What is pozzolanic reaction?

- ❑ *The materials therefore are relatively reactive (less stable) and amorphous.*
- *As discussed earlier the oxides are similar in Fly ash, GGBFS, Silica fume etc.*
- *Oxide content varies from material to material.*
- *Pozzolanic materials contain reactive silica & can react with lime in presence of water to yield C-S-H.*



Question 1

What is pozzolanic reaction?

C-A-S-H

- a) Reactive silica from mineral admixtures/SCMs reacts with C-S-H, resulted from cement hydration, to form additional C-S-H
- b) Reactive silica from mineral admixtures/SCMs reacts with portlandite, resulted from cement hydration, to form additional C-S-H
- c) Reactive silica from cement reacts with portlandite from mineral admixtures/SCMs to form additional C-S-H
- d) None of the above

Question 2

Which of the following has the highest amount of silica?

- a) Type C Fly Ash
- b) Type F Fly Ash
- c) Silica fume
- d) Ground granulated blast furnace slag

Question 2

Which of the following has the highest amount of silica?

Chemical Composition

Composition (%)	Type C FA	Type F FA	GGBFS	SF
SiO ₂	25-50	35-60	20-40	>80
Al ₂ O ₃			5-35	0.1-0.5
Fe ₂ O ₃			1	0.1-5
CaO			30-50	<1
shape			Sharp	sphere
Glass content			>80	>95

IS 3812 specification of FA,

Question 2

Which of the following has the highest amount of silica?

- a) Type C Fly Ash
- b) Type F Fly Ash
- c) Silica fume
- d) Ground granulated blast furnace slag

Question 3

Which of the following statement is correct?

- a) Type F fly ash has more calcium oxide than Type C fly ash
- b) Type C fly ash has more calcium oxide than Type F fly ash
- c) Both Type C and Type F fly ash have less calcium oxide
- d) Calcium oxide is absent in both Type C and Type F fly ash

Question 3

Which of the following statement is correct?

Chemical Composition

Composition (%)	Type C FA	Type F FA	GGBFS	SF
SiO ₂	25-50	35-60	20-40	>80
Al ₂ O ₃	5-15	15-35	5-35	0.1-0.5
Fe ₂ O ₃	5-10	2-25	1	0.1-5
CaO	10-40	0.5-10	30-50	<1
shape		spherical	Sharp	sphere
Glass content	10-40	10-40	>80	>95

IS 3812 specification of FA,

GGBFS

$$\frac{C}{S} = \frac{50}{40} \sim 1$$

Question 3

Which of the following statement is correct?

- a) Type F fly ash has more calcium oxide than Type C fly ash
- b) Type C fly ash has more calcium oxide than Type F fly ash
- c) Both Type C and Type F fly ash have less calcium oxide
- d) Calcium oxide is absent in both Type C and Type F fly ash

Question 4

Which of the following mineral admixtures lower the heat of hydration (this question has more than one correct answer)?

- a) Fly ash
- b) GGBFS
- c) Silica fume
- d) All of the above

Question 4

Which of the following mineral admixtures lower the heat of hydration?

PHYSICAL CHARACTERISTICS

Material	Type F & C FA	Rice Husk Ash	GGBFS	SF	Metakaolin
Mean size μm	10-15	10-20		0.1-0.3	1-2
Sp. Surface m^2/g	1.5-3	50-100	2-4	15-25	15
Particle Shape	spherical	Cellular	Angular	Spherical	Platy
Specific gravity	2.2-2.4	<2.0	2.9	2.25	2.4

Question 4

Which of the following mineral admixtures lower the heat of hydration (this question has more than one correct answer)?

- a) Fly ash
- b) GGBFS
- c) Silica fume
- d) All of the above

Question 5

Which of the following mineral admixture results in reduction of water demand?

- a) Fly ash
- b) GGBFS
- c) Silica fume
- d) Rice husk Ash

① ②

$$Vol_1 = Vol_2$$

SSA?

Question 5

Which of the following mineral admixture results in reduction of water demand?

PHYSICAL CHARACTERISTICS

Material	Type F & C FA	Rice Husk Ash	GGBFS	SF	Metakaolin
Mean size μm	10-15	10-20		0.1-0.3	1-2
Sp. Surface m^2/g	1.5-3	50-100	2-4	15-25	15
Particle Shape	spherical	Cellular	Angular	Spherical	Platy
Specific gravity	2.2-2.4	<2.0	2.9	2.25	2.4

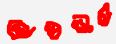

Question 5

Which of the following mineral admixture results in reduction of water demand?

- a) Fly ash
- b) GGBFS
- c) Silica fume
- d) Rice husk Ash

Question 6

Which of the following mineral admixtures result in increase in early strength gain of cement (this question has more than one correct answer)?

- a) Fly ash
- b) GGBFS
- c) Silica fume 
- d) Rice husk ash 

Question 6

Which of the following mineral admixtures result in increase in early strength gain of cement (this question has more than one correct answer)?

- a) Fly ash
- b) GGBFS
- c) Silica fume
- d) Rice husk ash

Question 7

Which of the following is used for obtaining high strength concrete?

a) Fly ash

b) GGBFS

c) Silica fume



d) Rice husk ash



Question 7

Which of the following is used for obtaining high strength concrete?

- a) Fly ash
- b) GGBFS
- c) Silica fume**
- d) Rice husk ash

Question 8

Which of the following test/index is not used to measure the reactivity of mineral admixtures/SCMs?

- a) Pozzolanic activity index
- b) Lime reactivity test
- c) Soundness test
- d) Both (a) and (b)

Question 8

Which of the following test/index is not used to measure the reactivity of mineral admixtures/SCMs?

- a) Pozzolanic activity index
- b) Lime reactivity test
- c) Soundness test
- d) Both (a) and (b)

Question 9

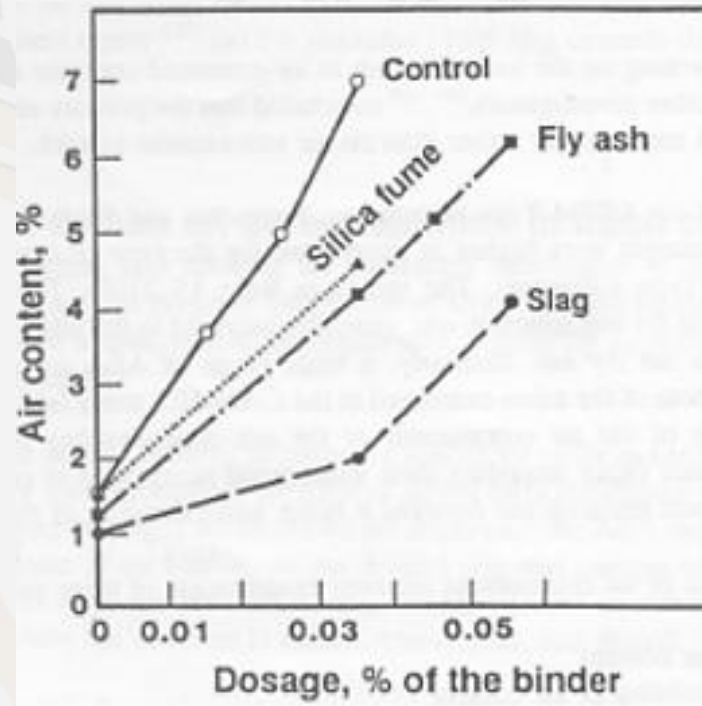
State True or False:

Addition of mineral admixtures to cement can affect the air entrainment in cement paste/mortar/concrete.

- a) True
- b) False

Question 9

Addition of mineral admixtures to cement can affect the air entrainment in cement paste/mortar/concrete.



Question 9

State True or False:

Addition of mineral admixtures to cement can affect the air entrainment in cement paste/mortar/concrete.

a) True

b) False

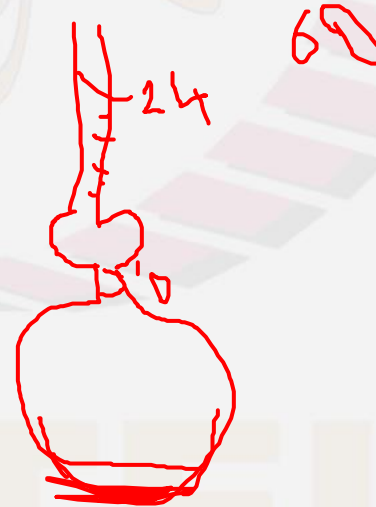
Question 10

State True or False:

GGBFS can be activated in presence of cement. However, it can react (slow) on its own.

- a) True
- b) False

Hydroxamic, Latent H., N-H
 $C/S \gg 1$ ≈ 1 $\ll 1 \approx 0$



Question 10

State True or False:

GGBFS can be activated in presence of cement. However, it can react (slow) on its own.

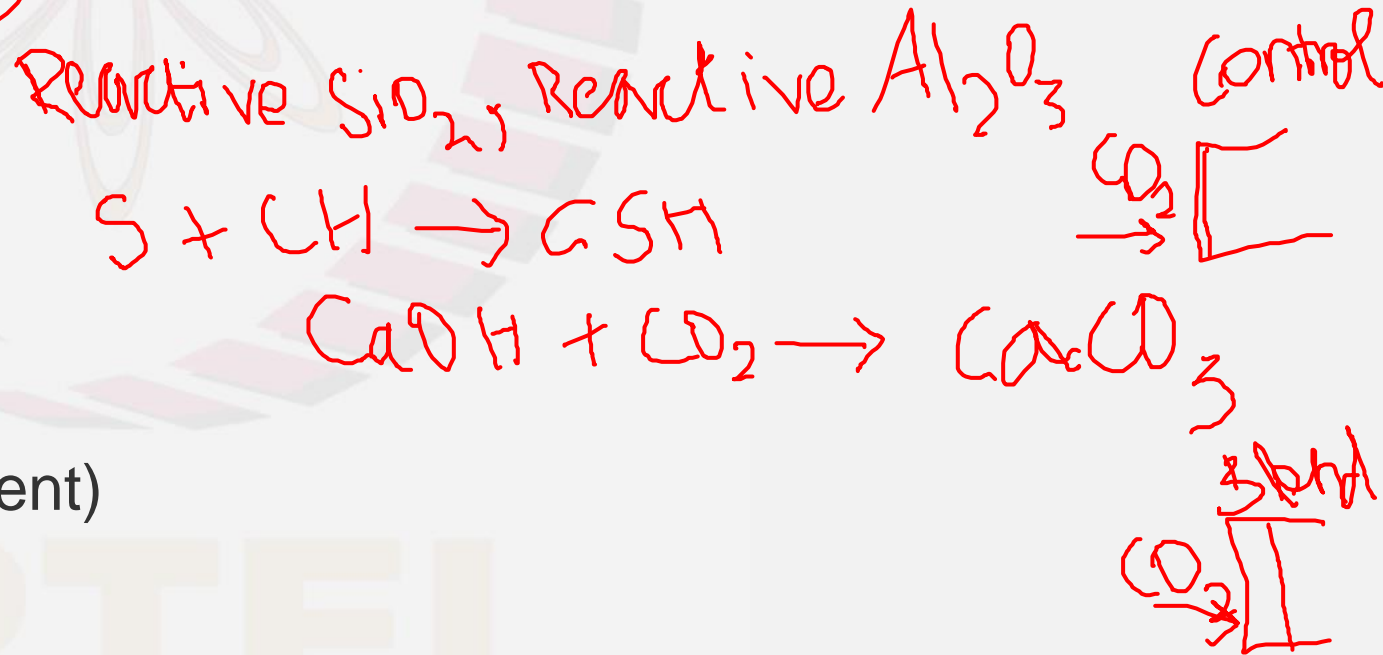
a) True

b) False

Question 11

Which of the following statement is not true with respect to addition of mineral admixtures to cement concrete?

- a) Reduction in chloride ingress
- b) Better carbonation resistance
- c) Better corrosion resistance
- d) Pore filling effect (pore refinement)



Question 11

Which of the following statement is not true with respect to addition of mineral admixtures to cement concrete?

- a) Reduction in chloride ingress ✓
- b) Better carbonation resistance ✗
- c) Better corrosion resistance ✓
- d) Pore filling effect (pore refinement) ✓

Thank You