

**CHEMISTRY**  
**INVESTIGATORY**  
**PROJECT**  
**2018-19**

**SETTING OF CEMENT**



**BY**  
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**CLASS- XII-B**  
**2018-19**



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### CERTIFICATE

THIS IS TO CERTIFY THAT DIVYANSHU KUMAR OF CLASS XII-A HAS SUCESSFULLY COMPLETED THE RESEARCH ON THE MENTIONED TOPIC UNDER THE GUIDANCE OF MR.B.SREEDHAR [SUBJECT TEACHER] DURING THE YEAR 2018-19 IN PARTIAL FULFILMENT OF PRACTICAL EXAMINATION.

SIGNATURE OF EXTERNAL EXAMINER

SIGNATURE OF CHEMISTRY TEACHER

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# ACKNOWLEDGEMENT

I would like to express my special thanks of gratitude to my chemistry teacher **MR.B.SREEDHAR** as well as our school principal **MR.NISHIKANT AGGARWAL** who gave the golden opportunity to do this wonderful project on the topic "**SETTING OF CEMENT**" which also helped me in doing a lot of research work and I came to know about so many new things. I am really thankful to them.

# AIM OF THE EXPERIMENT



*To study the setting of mixture of cement with sand time and fly ash with respect to time and strength.*

# INTRODUCTION

In the most general sense of the word, CEMENT is a binder, a substance that sets and hardens independently, and can bind other materials together.

The word "cement" traces to the Romans, who used the term *opus caementicium* to describe masonry resembling modern concrete that was made from crushed rock with burnt lime as binder. The volcanic ash and a pulverized brick additive that were added to the burnt lime to obtain a hydraulic binder were later referred to as *cementum*, *cimentum*, *cament* and *cement*.

The most important use of cement is the production of mortar and concrete.

The bonding of natural or artificial aggregates to form a strong building materials that is durable n the face of normal environment effects.

# THEORY

## EFFECT OF QUALITY OF SAND ON SETTING OF CEMENT MORTAR

*Sand obtained from different sources has different qualities. For examples, sea sand obtained from sea contains unwanted salts and retards setting of cement and is not suitable for making mortar.*

*On the other hand, Pit sand is obtained from pits in the soil and the River sand obtained from riverbed is considered excellent for preparing mortar and concrete.*



# CONSTRUCTION OF BUILDING USING CEMENT

*Cement used in construction is characterized as hydraulic or non-hydraulic Hydraulic cement (e.g. Portland cement) harden because of hydration chemical reactions that occur independently of the mixture's water content; they can harden even underwater or when constantly exposed to wet weather. The chemical reaction that results when the anhydrous cement powder is mixed with water produces hydrates that are not water soluble. Non-hydraulic cements (e.g. Lime and Gypsum plaster) must be kept dry in order to retain their strength.*





# PORTLAND CEMENT

*Cement is made by heating limestone (calcium carbonate), with small quantities of other materials (such as clay) to  $1450^{\circ}\text{C}$  in a kiln, in a process known as calcination, whereby a molecule of carbon dioxide is liberated from the calcium carbonate to form calcium oxide, or quicklime, which is then blended with the other materials that have been in the mix. The resulting hard substance, called 'clinker', is then ground with a small amount of gypsum in a powder to make 'Ordinary Portland Cement', the most commonly used type of cement (often referred to as OPC). Portland cement is a basic ingredient of concrete, mortar and non specialty grout. The most common use for Portland cement is in the production of concrete. Concrete is a composite material consisting of aggregate (gravel and sand), cement and water.*



# EFFECT OF TIME ON SETTING OF CEMENT MORTAR

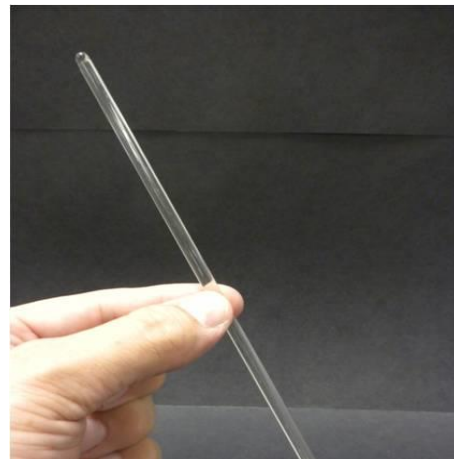
*Time has an important role on strength of developed cement mortar. When a cement mixture in the ratio of 1:3 with water is allowed to dry, the strength of solid mass keeps on increasing with the time given for setting. It acquires a nearly full strength in 28 days.*



# APPARATUS REQUIRED



**BEAKERS**



**BEAKERS**



**WEIGHT BOX**



**MATCH BOX**



**LIMESTONE**



**CEMENT**



**FLY ASH**

# PROCEDURE



1. Prepare mixtures of various compositions as given in Observation table.
2. Take each of the given mixtures in different beakers and prepare their pastes by adding minimum amount of water.
3. Take nine cases of empty match boxes and mark from 1 to 9.
4. Fill the three cases with the paste of each composition.
5. Spray water from time to time over the paste, so that they remain moist all the time.
6. After three days, take out one slab of each composition and test their strengths.
7. Similarly, take out a set of three slabs after 7 days after 30 days respectively and test their strengths.

# OBSERVATION



S NO.	COMPOSITION OF MIXTURE AND RATIO	MINIMUM WEIGHT TO BREAK THE SLAB AFTER		
		3 DAYS	7 DAYS	10 DAYS
01.	CEMENT:RIVER SAND (1:3)	18g	20g	30g
02.	CEMENT:RIVER SAND:FLY ASH (2:9:1)	16g	18g	26g
03.	CEMENT:RIVER SAND:LIME (1:3:1)	10g	15g	20g

# CONCLUSION






THE STRENGTH OF THE SLAB  
INCREASES WITH INCREASE IN THE  
SETTING TIME ALLOWED.

# PRECAUTIONS



**Safety**matters

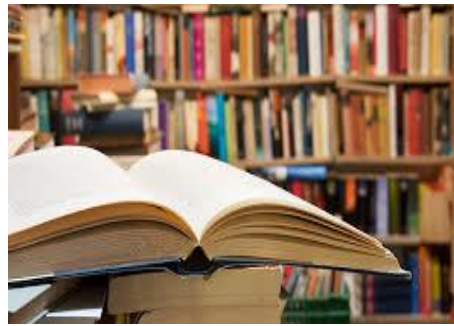
-  Handle the glass wares carefully
-  Allow the time required to set
-  Spray only required amount of water



# BIBLIOGRAPHY



*HELP FROM  
INTERNET*



*HELP FROM  
LIBRARY*



*HELP FROM  
TEACHERS*



Thank  
you