



# Effect Of Temperature On Early Age Of Concrete

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**Abstract:** A total of thirty cube specim of Grade 40 concrete. A total of thirty cube specimens were specimens were ens were cast, cured in water at ambient temperature in the cast, cured in water at ambient temperature in the laboratory and subjected to various temperature laboratory and subjected to various temperature various temperature regimes before testing. . The CEMs were prepared at temperatures ranging from 8 to 36°C. Superplasticizer(SP) and air-entraining agent(AEA) demand were evaluated forthe CEM mixturesmade with differentsupplementary cementingmaterial (SCM) and limestone filler types. Test results showed that the ambient temperature can significantly affect the SP and AEA demand, hydration kinetics, and compressive strength at 1 day.

## INTRODUCTION

At times the environmental temperature may increase extremely or fluctuate periodically, and often the design strength of the structure is significantly affected . It has become imperative for engineers to be interested in the residual design strength of concrete subjected to high temperatures in order to form data base for performance at these elevated temperatures for practical research applications. the limitation of this study in terms of temperature range is between 100oC to 300oC due to available temperature equipment and the concrete grade is of 40N/mm2 as lower grades of 25N/mm2 and 30N/mm2 have been investigated and reported elsewhere. The influence of temperature on concrete at the fresh state is mainly attributed to the intertwining effect of temperature on hydration kinetics of the binder and performance of the chemical admixtures. Temperature affects cement hydration through mechanisms that govern kinetics,such as dissolution, nucleation, or precipitation rates, as well as diffusion through the hydrates assemblage around unreactedcement grains. Thematerialtemperature can accelerate/decelerate cement hydration, which influences the quantity of C-S-H and portlandite and other hydration products during the first hours of hydration. According to the report of India Risk Survey 2017, out of top twelve risks from the business perception and functioning in the country, from the past three years, fire risk has been incorporated in the top five risks. Industry-wise risk of fire was observed to be greater in education, hospitality, and infrastructure.

## LITERATURE SURVEY

Sr.no	Paper	Author	Description
1	Effects of elevated Temperature On Compressive Strength Of Concrete: A Case Study Of Grade 40 Concrete	S. O. Osuji1,* and U. Ukeme U. Ukeme2	Elastic modulus and compressive strength decreases with increased deformation of the concrete material. Cracking and spelling effects are accelerated there by reducing the strength of the concrete at high temperatures.



2	Effect of temperature on early-age properties of self-consolidating concrete equivalent mortar.	Nima Farzadnia <sup>1</sup> , Jing Pan <sup>2,3</sup> , Kamal Khayat <sup>1*</sup> , Eric Wirquin <sup>3</sup>	The effect of temperature on the hydration kinetics of three CEM mixtures made with different SCM and SP types.
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**METHODOLOGY**

This knowledge gap is one of the justifications for this study made from fine and coarse aggregates sourced from Benin City, Edo State, Nigeria. Materials applied to this study included the Ordinary Portland Cement (OPC) as aggregate binder, fine and coarse aggregate (granite), 12.5mm maximum size, as well as portable water. Testing Machine after the samples had been placed in a heating oven for an hour and according to the specifications of In this study maximum nominal size of aggregates was restricted to 10 mm and it is smaller than the one-fourth of the minimum thickness of the specimen and satisfying the IS 456: 2000 (Plain and Reinforced Concrete - Code of Practice) requirement. The density of materials used in this experiment like fine aggregate and coarse aggregate in SSD condition was 2500 kg/m<sup>3</sup> and 2600 kg/m<sup>3</sup> respectively. Most of the civil engineering projects in India are constructed in concrete with 28 days design compressive strength of 30 MPa.

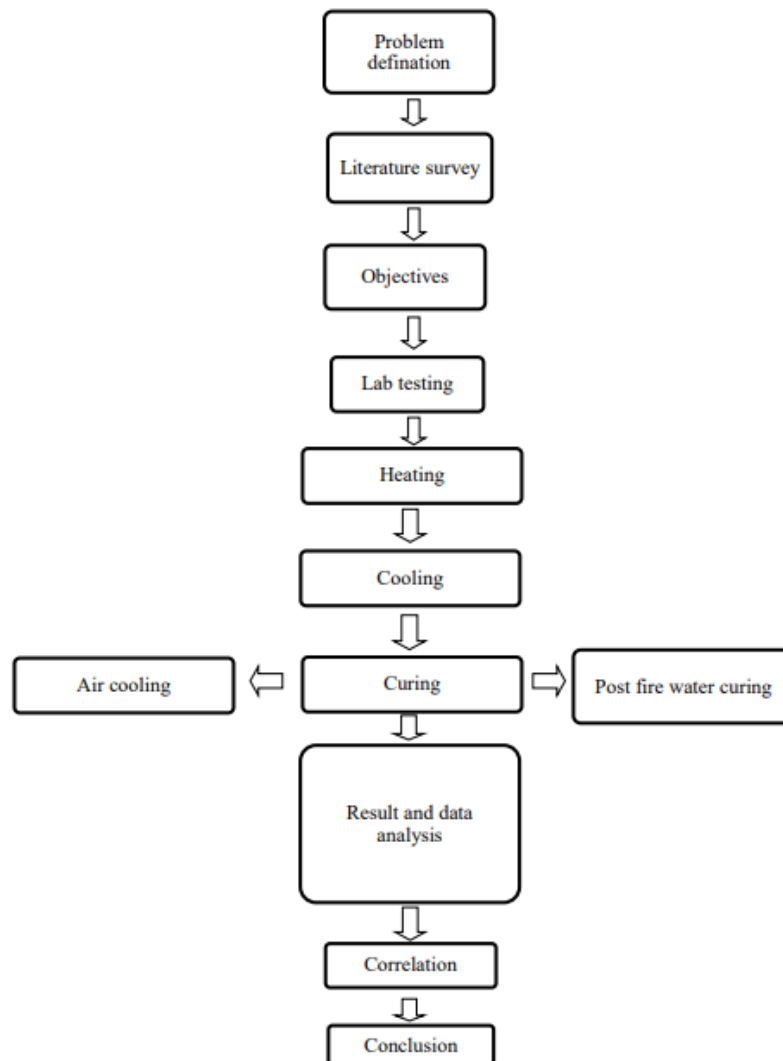


Fig. Methodology Of Flow Chart



### RESULT

The reasons for these results may be from the rapid loss of moisture which prevents long term hydration leading to increased strength. Other possible rational for loss of strength is the destruction of active strength generating ingredients such as the cement and aggregates. The result of the experimental investigation on sugar cane bagasse ash concrete where Sugar cane bagasse ash has been used as partial replacement of cement in concrete mix. Keeping in mind the gap in the research area, the To study the behaviour of concrete at elevated temperature the result which are increasing durability and good performance under elevated temperature.

### CONCLUSION

The essence of this study is to have a numerical database for Grade 40 concrete which did not form part of the earlier referred works so as to guide the design of concrete elements for this grade. For instance at the recommended design age of 28 days for a concrete grade of 40 investigated loss of strength at 30oC of 53.47% and weight loss of 4.67% are significant. The change in material temperature affected the heat evolution of the mixtures prepared with PCE significantly. Also, the type of SCM changed the performance of PCE differently at elevated temperatures compared to those prepared with PNS. Due to post fire water curing for 3 days there is increase of strength up to certain limit which create new opportunity to investigate properties for concrete for more days of water curing.

### REFERENCES

- [1] Effect Of Temperature On Early Age Of Concrete, Shelar Pratik\*1, Thakur Nachiket\*2, Kakad Sharda\*3, Palve Surekha.\*4, Sayyad Simaan\*5 Students of S.N.D College Of Engineering & Research Center, Yeola 2022.
- [2] Effects of elevated Temperature On Compressive Strength Of Concrete: A Concrete: A Case Study Of Grade 40 Concrete, S. O. Osuji1,\* and U. Ukeme U. Ukeme2, 1, 2 Department Of Civil Engineering, University Of Benin, Benin City, Edo State. Nigeria.
- [3] Effect of temperature on early-age properties of self-consolidating concrete equivalent mortar Nima Farzadnia1 , Jing Pan2,3, Kamal Khayat1 \*, Eric Wirquin3 1 Missouri University of Science & Technology, Rolla, MO, USA 2 Université de Sherbrooke, Sherbrooke, Qc, Canada 3 Université de Lille Nord de France, Laboratory of Civil and geo Environmental Engineering (LGCgE), France.