

**OPTIMIZATION AND CHARACTERIZATION OF
ALUMINO-SILICATE REFRACTORIES BASED ON
LIGNITE FLY ASH**



**Thesis Submitted in partial fulfillment
For the Award of the Degree**

Doctor of philosophy

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March 2022



The present chapter outlines the conclusion extracted from the research work. From the research work conducted, to fabricate of alumino-silicate refractory from lignite fly ash the following conclusion can be drawn:

1. Lignite fly ash successfully incorporated for the fabrication of alumino-silicate refractory.
2. The lignite fly ash characterization showed that it contains mullite phase which is itself a refractory material.
3. The total linear shrinkage (firing) was observed less than 5.38% due to incorporation of lignite fly ash for low duty alumino-silicate refractory, making it appropriate for refractory material.
4. The highest bulk density estimated to 2.10 gm/cc were achieved at 1200 °C for 50% of lignite fly ash content for low duty alumino-silicate refractories.
5. The highest cold crushing strength value was achieved, estimated at 52.50 MPa at 1200 °C for 50% of lignite fly ash content for low duty alumino-silicate refractories.
6. The lowest thermal conductivity for 60 % of lignite fly ash content were found to 0.38 W/mK (measured at 1000 °C) for the semi-silica insulation refractory.
7. The mullite whisker and interlocking grain structure increases the

strength of the alumino-silicate refractories.

8. The use of lignite fly ash in refractory application is beneficial because it will reduce the cost for special remedy those are needed for the dumping of lignite fly ash.
9. The waste utilization creates an alternative source of raw materials for alumino-silicate refractories as well as reduce the detrimental effect on the environmental eco-system.

Future scope of work

On the basis of results obtained from the present work the scope of future work is as mentioned below:

1. Field trials to be carried out with the fabricated alumino-silicate refractory samples.
2. Different sources of alumina can be added into lignite fly ash to fabricate high alumina refractory.
3. Mullite aggregate can be produced from fly ash and alumina mixture.
4. The effect of milling on fly ash for the preparation alumino-silicate refractory can be studied.