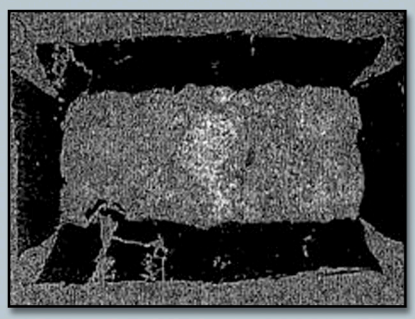
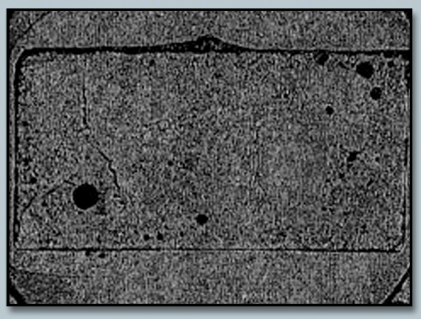
Calcium Hexa Aluminate Linings for Alkaline Environments

UT-B ID 200701977



Mullite-based composition (50 h, 1000°C)



CA6 composition (100 h, 1000°C)

Technology Summary

A new composition of calcium hexa aluminate developed at ORNL is a highly effective chemical barrier against corrosive materials inside storage, process, and transport vessel containers. The CA6 composition protects containers from the critical temperatures and chemical environments created by alkali and/or high alkaline salts or salt forming compounds.

The CA6 aggregate CaO-6(Al_2O_3) is also effective as a chemical barrier and lining for burners, rolls, boiler tubes, ash hoppers, super heaters, steam heaters or headers, pipes, and kilns. It resists container wall penetration by corrosives such as potassium hydroxide, potassium carbonate, sodium hydroxide, sodium carbonate, lime, limestone, magnesium hydroxide, magnesium carbonate, potassium phosphate, and sodium aluminate.

Researchers improved the insulating character and penetration resistance of the CA6, achieving greater than 98 percent by weight for particle sizes ranging from ~20 microns to ~3 millimeters. Distributions of particular particle sizes are required to achieve the right formation and flow for a given application. A typical vessel lining is composed of calcium aluminate cement, phenolic resin, hydratable alumina, and an organic polymer binder.

Advantages

- Chemical resistance to temperature and vessel penetration in highly corrosive alkali/alkaline environments

Potential Applications

- As an aggregate material in shapes and castables
- Chemical barrier and/or a refractory lining in corrosive environments
- Boilers and gasifiers, lime kilns, magnesium hydroxide roasting kilns, thermal oxidizers, and fluidized bed reactors

Patent

Kenneth A. McGowan, Robert M. Cullen, James R. Keiser, James G. Hemrick, and Roberta A. Meisner, *Methods of Use of Calcium Hexa Aluminate Refractory Linings and/or Chemical Barriers in High Alkali or Alkaline Environments,* U.S. Patent Application 11/901,909, filed September 19, 2007.

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