

# A sorbent for alkali metals and HCl removal from high temperature industrial gas

## Overview

The industrial gas produced from thermal conversion of solid waste and biomass can be utilized in steam turbines for power generation. However, alkali metals and hydrogen chloride (HCl) containing in the flue gas can cause corrosion of boiler tube bundles at high temperatures. An aluminum and calcium oxide-based sorbent was developed to address this issue. The sorbent purifies syngas from NaCl, KCl and HCl at high temperatures.

## Key features

- 1.5-3 times higher adsorption capacity compared to kaolin minerals and activated  $\text{Al}_2\text{O}_3$ .
- Simultaneous alkali metal and HCl removal processes at high temperatures.
- Nanoflake structure of material with high surface area providing superior contact between the gas stream and the sorbents for excellent performance during chemisorption of pollutants.

## Applications

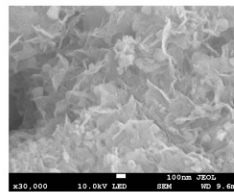
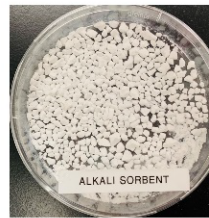
- Alkali metal and HCl removal from high temperature syngas/flue gas produced from coal, biomass, municipal solid waste, etc.

## Market opportunities

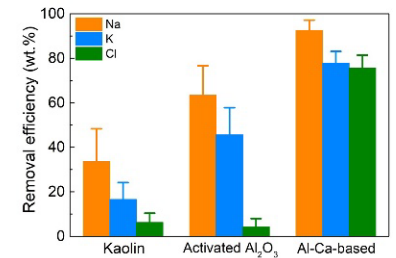
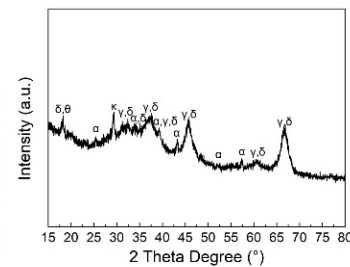
- Flue gas purification for power generation.
- Syngas purification for chemical synthesis.

## Advantages and benefits

- Operation at high temperature (730-870 °C).
- High alkali metal and HCl removal efficiency.
- No sintering at operating temperature.



Name	Particle size (diameter)	Surface area	Pore volume	Composition
Al-Ca-based sorbent	0.05-3.0 mm	120-180 $\text{m}^2/\text{g}$	0.5-0.8 $\text{mL/g}$	$\text{Al}_2\text{O}_3$ 58-85%, CaO 15-42%, $\text{Na}_2\text{O}$ 1-5%, $\text{MgO}$ , $\text{K}_2\text{O}$ < 1%



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