

# Soda Ash

## Sodium carbonate

### APPLICATIONS

- Reduce soluble calcium in water-based muds
- Increase pH
- Flocculate spud muds

### ADVANTAGES

- Widely available and economical source of carbonate ions to precipitate calcium while increasing pH
- Concentrate chemical; effectively removes calcium in most drilling fluids at small treatment levels

### LIMITATIONS

- Increases pH and should not be used to treat cement contamination or higher pH fluids; less soluble at high pH.
- Overtreatment results in carbonate contamination; even minor amounts of excess carbonate ions can cause large increases in yield point, gel strengths, and fluid loss.

Soda ash is the common name for sodium carbonate ( $\text{Na}_2\text{CO}_3$ ). It is a weak base that is soluble in water and dissociates into sodium (Na) and carbonate ( $\text{CO}_3$ ) ions in solution.

Calcium is present in many makeup waters and formations. It can cause flocculation of the mud, resulting in increased rheology, gel strengths, and fluid loss. High-filtrate calcium causes precipitation of calcium-sensitive additives, such as POLY-PLUS\* high-molecular-weight liquid clay inhibitors and RINGFREE\* polymeric thinners, which are the most sensitive. Cellulosic polymers are only slightly calcium-sensitive and tolerate moderate levels of filtrate calcium.

Typical treatments of soda ash range from 0.25 to 2 lb/bbl [0.7 to 5.7 kg/m<sup>3</sup>], depending on the calcium level and water chemistry of the drilling fluid. One pound [0.45 kg] of soda ash removes the calcium from 1.283 lb [0.58 kg] calcium sulfate (anhydrite). Treatments should be made on an incremental basis to prevent over-treatment, which results in carbonate contamination.

In pure water, soda ash forms highly buffered solutions that have a pH range of 10.9–11.6 at concentrations of 0.21 to 30 lb/bbl [0.6 to 86 kg/m<sup>3</sup>]. Carbonate ions begin being converted into bicarbonate ( $\text{HCO}_3$ ) ions when the pH decreases below 11.3.

### Toxicity and handling

Bioassay information is available upon request. Handle as an industrial chemical, wearing protective equipment and observing the precautions described on the transportation and MSDS.

Soda ash is an alkaline material that can cause irritation to eyes, skin, or respiratory tract. Soda ash should be added slowly to the mud system either by mixing through the hopper or chemical barrel. Do not mix soda ash with other chemicals, especially caustic soda or lime. When using a chemical barrel, mix soda ash into a full barrel of freshwater and provide adequate agitation.

### Packaging and storage

Soda ash is a globally available commercial chemical and is packaged in 100-lb [45.4-kg] and 50-lb [22.7-kg], multiwall, paper sacks. Store in a dry area away from water or acids.

### Typical Physical Properties

Physical appearance	White powder
Specific gravity	2.51
pH	11.4
Solubility in water	572 degF [300 degC], 51 g/100 mL at 86 degF [30 degC]