

Caustic Soda Flake

Sodium Hydroxide

Mass of solid flakes with white color, highly soluble in water and alcohol, highly hygroscopic. The formula is NaOH. Solid flakes are produced through evaporation of liquid caustic soda. The applications include industries such as: O&G upstream and downstream, Alumina production, detergents and bleach, pulp & paper, textile and chemicals production.

Parameter	Unit	Amount
Purity of sodium hydroxide	%Wt	Min 98
Carbonate as Na ₂ CO ₃	%Wt	Max 1
Chloride as NaCl	%Wt	Max 0.02
Sulfate as Na ₂ SO ₄	%Wt	Max 0.01
Silicates as SiO ₂	%Wt	Max 0.02
Fe	mg/Kg	Max 30
Insoluble in water	%Wt	Max 0.1
Aluminium as Al ₂ O ₃	mg/Kg	Max 20
Heavy metals	mg/Kg	Max 20



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Intro

Caustic soda, also known as sodium hydroxide (NaOH), is a highly versatile chemical widely used in various industries. Available in different forms, including flakes, pellets, and liquid solutions, caustic soda flakes are particularly favored for their ease of handling, storage, and transport. This article will explore the properties and applications of caustic soda flakes, including their critical roles in alumina production, chemical manufacturing, pulp and paper, water treatment, food processing, textiles, cleaning, and the oil and gas industry. Additionally, we will discuss when to use flakes versus liquid sodium hydroxide.

Properties of Caustic Soda Flakes

Caustic soda flakes are solid, white, and crystalline substances with high solubility in water. They are hygroscopic, absorbing moisture from the air, which can lead to clumping if not stored properly. Sodium hydroxide is highly corrosive, making it necessary to handle it with care. The flakes have a high pH level, typically between 13 and 14 when dissolved in water, which makes them effective in neutralizing acids and facilitating various chemical reactions.

Applications of Caustic Soda Flakes

- 1. Alumina Production:** One of the significant applications of caustic soda flakes is in the production of alumina (aluminum oxide) through the Bayer process. In this method, bauxite ore is treated with sodium hydroxide, which dissolves aluminum-bearing minerals to form sodium aluminate. The undissolved impurities are separated, and the aluminum hydroxide is precipitated from the solution before being calcined to produce alumina. Caustic soda flakes are preferred for this application due to their convenience in handling and precise dosing during the digestion stage.
- 2. Chemical Manufacturing:** Caustic soda flakes are fundamental to the chemical industry, serving as a base for producing various chemicals, including soaps, detergents, dyes, and solvents. It is involved in saponification, where fats and oils react with sodium hydroxide to produce soaps and glycerin. Additionally, it is used to manufacture sodium hypochlorite (bleach) and other sodium-based compounds.
- 3. Pulp and Paper:** In the pulp and paper industry, caustic soda is used in the chemical processes of pulping and bleaching. It helps break down the lignin in wood chips,



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enabling the separation of cellulose fibers from the lignin. This process results in higher quality pulp, which is essential for producing paper and other wood products.

4. **Water Treatment:** Caustic soda is widely used in water treatment plants to adjust pH levels and neutralize acidity in wastewater. It aids in coagulating and precipitating contaminants, improving water quality. Caustic soda also helps in the removal of heavy metals from industrial discharge and enhances the efficacy of water disinfection processes.
5. **Food Processing:** In the food industry, sodium hydroxide flakes are used for various purposes, including food preservation and pH adjustment. For instance, it is utilized in processes like cocoa processing, where it helps produce cocoa powder by neutralizing the acidity of fermented beans. It's also employed in the curing of olives and as a pH regulator in various food products.
6. **Textile Industry:** Caustic soda plays an essential role in the textile industry, where it is used in processes such as mercerization. This treatment improves the dye uptake of cotton fibers, resulting in brighter colors and enhanced fabric strength. Sodium hydroxide is also involved in the production of synthetic fibers and the cleaning of textiles before dyeing.
7. **Cleaning and Detergents:** Caustic soda is a key ingredient in many household and industrial cleaning products. Its strong alkaline properties enable it to break down grease, oils, and fats, making it effective for degreasing surfaces, unclogging drains, and cleaning industrial equipment. In detergent formulations, sodium hydroxide helps enhance the cleaning power and effectiveness against tough stains.
8. **Oil and Gas Industry:** In the oil and gas sector, caustic soda flakes are used for several purposes:
 - **Environmental Cleanup:** Sodium hydroxide is employed in drilling muds to control pH and reduce the corrosiveness of the fluids, which is critical for the protection of downhole equipment.
 - **Water Treatment:** Caustic soda is used to treat produced water and wastewater from oil and gas extraction processes, helping to neutralize acidic components and reduce environmental impacts.



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- **Decommissioning Operations:** The flakes can also be used in the cleaning process for decommissioning pipelines and equipment, removing residues and minimizing contamination.

When to Use Caustic Soda Flakes vs. Liquid Sodium Hydroxide

The choice between caustic soda flakes and liquid sodium hydroxide often depends on specific operational needs:

- **Caustic Soda Flakes:** Flakes are more convenient for storage and transport, especially in bulk quantities. They are ideal for processes where precise control over concentrations is essential, as the flakes can be measured and dissolved in water according to requirements. This form is often preferred in batch processes, such as alumina production and chemical manufacturing.
- **Liquid Sodium Hydroxide:** Liquid caustic soda is typically used in continuous processes or systems where immediate consumption is required. It is easier to pump and mix with other fluids, making it suitable for applications such as large-scale water treatment or pH adjustment in industrial processes. Additionally, some operations may prefer liquid sodium hydroxide for its readiness for use, minimizing the need for dissolution time.

Conclusion

Caustic soda flakes are a powerful and versatile chemical with essential applications across various industries, including alumina production, chemical manufacturing, pulp and paper, water treatment, food processing, textiles, and cleaning. Their ease of handling and storage makes them a preferred choice in many applications. Whether used as flakes or in liquid form, sodium hydroxide plays a pivotal role in improving process efficiency, environmental safety, and product quality. Proper understanding of their properties and applications ensures that industries can leverage the benefits of caustic soda effectively while adhering to safety protocols.



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