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PACKAGING OF ANHYDROUS SODIUM HYDROXIDE

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This invention relates to an improvement in the packaging of anhydrous sodium hydroxide.

To comply with shipping regulations, generally caustic soda is packaged in non-reusable steel drums. These drums are filled with molten anhydrous caustic soda at a temperature from 660° F. to about 750° F. and permitted to solidify which may require cooling the drums over a period of 16 hours or more. Lids to the drums are applied immediately after the drums have been filled in order to prevent contamination during solidification. After the caustic soda has solidified, the drums are cleaned, painted and put in storage for a period of about 24 hours or more for final cooling. The lids initially applied or new ones are then securely fastened in position to complete the packaging operation.

A serious difficulty arises from the fact that molten anhydrous caustic soda when packaged in the presently used steel containers becomes contaminated with iron. This iron contamination usually results from the iron flaked or removed from the steel drum because of the high packaging temperature causes establishment of stresses in the steel, or from chemical reaction between the molten caustic and the drum steel.

When molten anhydrous caustic soda is packaged in ordinary steel drums the iron content may be increased 3 or 4 fold of what it originally contained. For example, the iron content of anhydrous caustic which may contain 0.0008 weight percent will increase to at least .0024 weight percent upon packaging. For many purposes for which caustic soda is used this increased iron content is not detrimental and thus the further increase in the iron content due to packaging is an immaterial factor. However, where caustic soda is to be used, for example, in the rayon industry, the iron content must be maintained at a minimum and caustic containing the increased iron concentration is not suitable.

It is known that nickel is resistant to caustic soda and thus numerous investigators have suggested using nickel clad, or lined drums. It has been even suggested that the inside of the drums be nickel plated. Since the drums are not reused, the cost of the nickel lined drum is prohibitive for the shipment of the anhydrous caustic soda which is a relatively cheap chemical. The plating of the drums is also economically prohibitive.

It is therefore an object of this invention to provide a package for anhydrous caustic soda which will not increase the iron contamination of the caustic soda and also be economical.

The above and other objects are attained by packaging anhydrous caustic soda having an iron content below .001 weight percent in a sealed aluminum lined drum. By sealing the anhydrous caustic soda in an aluminum lined drum the iron contamination of the caustic soda is not appreciably increased nor is the caustic appreciably contaminated with the aluminum.

The aluminum liner required in the drum is thin so that the cost of lining will be very small. The aluminum liner may be a separate liner that is placed in the drum or the steel may be coated with the aluminum before or after the drum is made. The lining may be .0018 inch thick or greater and possibly as little as 0.0003 inch thick. Aluminized steel is available commercially having an aluminum thickness of from .001 to .002 inch which may be used. Also since the melting point of aluminum is below that of the steel the aluminum surface may be obtained by hot dipping or metallizing by spraying molten aluminum. The cost of dipping or metallizing a drum is sufficiently lower than that of plating so that the cost of a drum is only increased by less than a dollar, while when nickel is used the cost may be as high as eight dollars per drum.

It is surprising and unexpected to find that aluminum which is not generally resistant to caustic soda may be used for packaging of anhydrous caustic soda without appreciable aluminum contamination. It is essential that the caustic soda be sealed into the drum shortly after the molten caustic soda has been added to the drum and cooled sufficiently to solidify it. If the anhydrous caustic soda in contact with the aluminum lined drum is exposed to the moisture generally found in the atmosphere, a reaction between the aluminum and caustic is effected and the caustic soda becomes contaminated with aluminum. Generally, the caustic soda remains sealed in the drum and the drum is opened only when the caustic soda is used.

The term "aluminum" as used herein is intended to have the ordinary dictionary meaning of being a metal having an atomic number 13 and an atomic weight of 26.98.

To illustrate the improvement obtained in using the aluminum lined drums, molten caustic was packaged in ordinary steel drums and also in drums which had a thin aluminum lining. Shortly after solidification samples of the caustic soda were taken and analyzed for its iron content.

The aluminum lined drum was constructed of aluminized steel which had a thin aluminum lining of approximately .0018 inch thick. The lid was also made of the same aluminized steel. The results obtained are shown in the table below. The iron content expressed in the table below is weight percent based upon the anhydrous caustic.

Table

Drum	Iron Content Weight Percent	
	Before Packaging	Average of the Drum After Packaging
Aluminized Steel:		
Drum 1	.00060	.00065
Drum 2	.00090	.00113
Plain Steel:		
Drum 1	.00080	.00280
Drum 2	.00080	.00280

The term "solid anhydrous sodium hydroxide" as used herein is intended to include anhydrous and substantially anhydrous caustic soda which is solid at room tempera-

ture and contains not more than about 2 weight percent of water.

What is claimed is:

1. A package of solid anhydrous sodium hydroxide sealed in a steel drum, the interior of which is lined with aluminum.

2. A package of solid anhydrous sodium hydroxide sealed in a non-reusable steel drum, the interior of which is of aluminized steel having a thickness of aluminum of from 0.002 inch to .00003 inch.

3. A package of solid anhydrous sodium hydroxide sealed in a non-reusable steel drum, the interior of which is lined with aluminum having a thickness of about .0018 inch.

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