

THE USE OF SOAPS FOR THE ABSORPTION OF BROMINE VAPOR.

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(Read 10 May 1916)

The writer has recently had occasion to investigate a large number of solid substances with regard to their power of absorbing bromine vapor. Of the different classes of substances examined, the following may be mentioned: soda lime, infusorial earths, solid alcohols, and soaps. The best results were obtained with soaps.

The absorption capacity of the different substances for bromine was determined as follows: A slow current of air was first bubbled through liquid bromine and then through concentrated sulphuric acid, after which it was passed through a U-tube containing the finely divided absorbent. To the exit of the U-tube was attached a small calcium chloride tube to prevent any loss of moisture. On leaving the U-tube, the air was conducted through a wash bottle containing a solution of potassium iodide and starch. The first appearance of blue colour in the wash bottle indicated the complete saturation of the absorbent with bromine.

During the absorption of bromine vapor by some of the soaps investigated, it was observed that considerable heat was developed in that part of the tube where absorption took place.

In all cases, it was found that the amount of bromine absorbed by the different soaps varied inversely as the rate at which the gas was passed through the absorption tube. For example, when air saturated with bromine was

passed through the absorption tube at the rate of four bubbles per second, "Gold Dust" was found to absorb about one-half its weight of bromine; whereas it was found to absorb 0.883 times its weight of the gas, when the rate was reduced to two bubbles per second. In some cases it was found that a sample of soap, which had become saturated with bromine, was capable of absorbing a further quantity of the gas after being allowed to stand for a time. For instance, a certain sample of "Castile" soap which had absorbed 0.75 times its weight of bromine was found, after an interval of eighteen hours, during which period it had remained in the U-tube, to be capable of taking up a further quantity of bromine, the weight absorbed increasing to 0.964 times the weight of the soap. Further, it was found that the amount of bromine absorbed by different soaps is influenced by the amount of moisture which they contain. Thus, a freshly ground, brown laundry soap, containing a high percentage of sodium oleate and some sodium resinate, was found to absorb 0.983 times its weight of bromine. When the same soap had been dried, it was only able to take up 0.515 times its weight of bromine.

Below is given the maximum weight of bromine absorbed by unit weight of soda lime and a number of different soaps, when air saturated with bromine was passed through the absorption tube at the rate of two bubbles per second:

Soda lime	0.477	gram
"Ivory" soap.....	0.48	"
"Santo" soap.....	0.607	"
"Olivette Castile" soap.....	0.631	"
"Gold Dust".....	0.883	"
"White Castile" soap.....	0.964	"
"Oleate" soap (a brown laundry soap).....	0.983	"
Pure sodium resinate.....	1.068	"
Pure sodium oleate.....	1.113	"

From the figures in the foregoing table, it will be observed that all the soaps are better absorbents of bromine vapor than is soda lime, a substance commonly employed for this purpose. It will further be noted that those soaps containing a high percentage of sodium oleate, such as "White Castile" soap and pure sodium oleate, and those containing a high percentage of sodium oleate and sodium resinate, such as brown laundry soaps and pure sodium resinate, have the greatest capacity for absorbing bromine. It is evident from the values in the foregoing table, that the efficacy of soaps in absorbing bromine vapor is due to the presence of the unsaturated carbon atoms of oleic and resin acids.

In view of the large capacity of soaps prepared from oleic and resin acids for absorbing bromine vapor, the writer recommends their use in the laboratory for this purpose, and suggests that such soaps, or pure sodium oleate or sodium resinate, might be employed with advantage in masks as protection against breathing bromine vapors.