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SUBJECT: Effect of Pre-cleaning of Glass Samplers on
the Oxygen Content of Sodium

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FROM: J. C. White

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EFFECT OF PRE-CLEANING OF GLASS SAMPLERS ON THE
OXYGEN CONTENT OF SODIUM

A study has been made to determine the effect of pre-cleaning glass samplers for sodium. The samplers are shown in Figure 1. In this investigation a series of two-bulb glass samplers was thoroughly cleaned with chromic acid, dried and degassed by E. E. Ketchen before evacuating and sealing the glass stem. A second series of samplers was obtained in the usual manner at the glass-blowing shop. This series received no prior cleaning treatment before evacuation and enclosure. Samples of sodium were taken with the two series of samplers from a common source and each bulb was analyzed for oxygen content by the modified butyl bromide method. The results are shown in the following table.

Table I

Effect of Pre-cleaning of Glass Samplers on the
Oxygen Content of Sodium

<u>Sampler</u>	<u>Oxygen, ppm</u>		<u>Coefficient of Variation, Per Cent</u>
	<u>Average</u>	<u>Range</u>	
Pre-cleaned			
Small bulb	238	210 to 264	8
Large bulb	262	191 to 313	15
Uncleaned			
Small bulb	261	216 to 301	13
Large bulb	339	311 to 401	11

The oxygen content of all samples was sufficiently high to remove some of the value of such an experiment. The contamination of sodium caused by the pickup of oxygen in uncleaned tubes was probably much lower than the impurities in the sodium itself before sampling.

A statistical evaluation of the results shows that the oxygen content of the two bulbs of the pre-cleaned series and the smaller bulb of the uncleaned series can be considered to be the same and different from the large bulb of the uncleaned series. The precision of the tests can be said to be approximately the same.

The results indicate that a cleansing action occurs within an uncleaned glass tube when molten sodium is used as a flush. The oxygen content of sodium in a bulb which has been cleaned by a flow of hot sodium is essentially the same as that in a bulb that has been cleaned by chromic acid treatment. Both methods of removing oxygen from the interior of the bulbs must be nearly 100 per cent effective as no further removal of oxygen occurs when a pre-cleaned bulb is flushed with molten sodium.

The above conclusions could be more accurately verified if the oxygen content of the original sodium could be lowered to such an extent, prior to sampling, that any oxygen pickup from the tubes would be more clearly evident.

Figure 1

Glass Apparatus for Sampling Molten Sodium