

A METHOD FOR THE PURIFICATION OF ETHANOL FOR USE IN ULTRAVIOLET ABSORPTION SPECTROPHOTOMETRY

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Commercial grade, 95% ethyl alcohol is unsatisfactory for use as a solvent in ultraviolet spectrophotometry. Small amounts of impurities in the alcohol which absorb strongly in the lower ultraviolet region (220-280 $m\mu$) interfere with absorption measurements. This is particularly true if 5 cm cells are used in the spectrophotometer. Some of the impurities in commercial grade alcohol can be demonstrated by their blue fluorescence under an ultraviolet "black light". This fluorescence may be used as a rough purity check on a sample of alcohol.

The following method of purification has been found to be very satisfactory and requires no special apparatus or reagents not found in the average laboratory.

Twenty-five grams of anhydrous phosphorus pentoxide is slowly added to 1.5 l of 95% alcohol. The alcohol is distilled in an all glass distillation apparatus and the fraction boiling at 78-79° C is collected. The distillate is then treated with 25g of KOH and refluxed for one hour. The alcohol is allowed to stand overnight (12-24 hours) and is then distilled through a short column. The product is collected over the temperature range 78.3-78.8° C. The alcohol thus prepared should transmit a minimum of 70% of the incident light at 220 $m\mu$ when compared with distilled water in 1 cm cells. The per cent transmission should rise to 93% at 240 $m\mu$ and 98-99% at 250 $m\mu$. Above 250 $m\mu$ the transmission should be 100%.

Leighton, et. al., (1) recommended a more involved procedure for the purification of ethanol for spectrophotometric use. Their transmission data were reported in terms of molar absorption coefficients,

$$k = D/dc$$

where k = molar absorption coefficient
 $D = \log_{10} I^0/I$
 c = molar concentration (17.15)
 d = cell width, cm.

These authors report a value of k at 2430 Å° (their lowest wave length) of $2.8 \times 1/10^3$. Values of k at the same wave length of various lots of stock alcohol, treated as described in this paper, have ranged from 1.2-2.7 $\times 1/10^{-3}$.

Various other methods of purification have been tried in this laboratory, but the above method has given satisfactory results and involves a minimum

of time, equipment and reagents.

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LITERATURE CITED

1. LEIGHTON, PHILLIP A.; CARY, R. W., and SCHIFF, L. T. 1931. The ultraviolet light absorption of ethyl alcohol purified by different methods. *J. Am. Chem. Soc.* 53:3017-3019.