

excitation in the shortwave region of absorption the Tl yield no longer depended on its concentration¹. In KCl-Tl, according to our measurements, the concentration of Tl was 1.5×10^{-4} gm Tl/gmKCl; the data for KCl-Tl correspond well with those available in the literature⁵. It should be noted that in KI-Tl the variations in the value of the yield for various crystals (with high content of Tl) is found to be greater during excitation with $\lambda = 245 \text{ m}\mu$ than with $\lambda = 285 \text{ m}\mu$. This is easily explained by the different degree of overlapping of the short wave region of Tl absorption with the boundary of absorption of the lattice itself, which, as has been shown², is inactive.

The above method was also used to measure the quantum yield of several organic monocrystals. The coefficient of reflection in this case was measured directly. With excitation of $\lambda = 250 \text{ m}\mu$ the yield amounts to: for toluene 0.57; for dibenzyl 0.44; for stilbene 0.43; for naphthalene 0.18. These values correspond satisfactorily with the data of other authors.

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* The cap was constructed by E. E. Bukke.

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308

The Surface Tension of Liquid He³ in the Region of Very Low Temperatures (1.0-0.35°K)

K. N. ZINOV'EVA

*Institute of Physical Problems,
Academy of Sciences, USSR*

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EARLIER¹ we discussed our measurements of the surface tension of liquid He³ from the criti-

cal temperature to 0.93°K by the method of capillary rise⁴. In the present work we have continued the measurements to lower temperatures using our earlier capillaries with diameters of 0.360, 0.224, and 0.188 mm. By pumping on He³ vapor, we were able to carry the measurements to 0.35°K.

The temperature of liquid He³ was determined by the vapor pressure of He³, measured with a McLeod gauge. In the temperature interval 0.5-1.0°K we used the temperature scale of Sydoriak and Roberts (see reference 2). Below 0.5°K, the temperature was calculated from the vapor pressure, using an empirical formula given in reference 2. The pressure of the saturated vapor of He³ at a temperature of 0.35°K was 0.008 mm Hg. To measure the position of the level in the capillary we used a cathetometer, KM-5, which enabled us to read the height with an accuracy of 0.001 mm. However, as in the previous work, the actual accuracy of the reading was no better than several hundredths of a millimeter, since the observation of the meniscus was made through eight dewar vessel walls. The shape of the meniscus did not vary, and the guide line was adjusted for some average position of the division line. The error, introduced by the deformations of the heterogeneous glass, and noted by us earlier¹, was no greater than $\pm 2\%$.

The measurement proceeded in the following way. After the temperature had reached the lowest point, around 0.3°K, the pumping was stopped and the liquid slowly warmed up. In the warming process, regular measurements were taken of the vapor pressure of He³ and the height of rise of the liquid in the capillary. The warm-up time from 0.3° to 1.0°K took approximately 2.5 hours.

The calculation of the coefficient of surface tension was made according to the equation $\alpha = \rho g r h / 2$, where the value of ρ , the density of liquid He³, was taken from the paper of E. C. Kerr³. The results obtained in the temperature interval 0.35-1.0°K, averaged for the three capillaries, are shown in Fig. 1 together with earlier data¹. Also shown are the results obtained by others^{4,5}. As we can see from the figure, the results from all three papers are in satisfactory agreement. (The old data have been recalculated using the new densities³.)

The error in determining the value of the surface tension in the region of very low temperature is approximately 5%. The maximum scatter of the individual points is shown by the arrows on the figure.

As we can see from the graph, the surface tension of He³ below 0.6°K approaches its limiting value equal to 0.152 dyne/cm. This value is 2.3 times smaller than the limiting value α_0 for He⁴, which is assumed to be equal to 0.35 dyne/cm on

the basis of extrapolated experimental data^{6,7}.

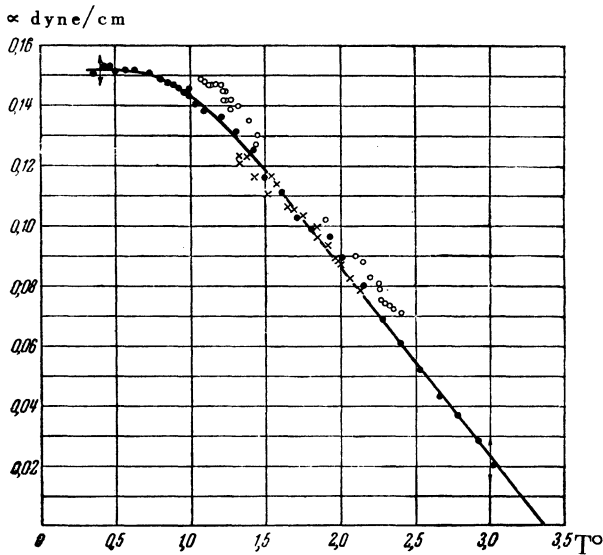


FIG. 1. ●-data from this work and reference 1; ×-Esel'son and Berezniak⁴; ○-Lovejoy⁵.

It is interesting to note that the character of the dependence of the temperature on the surface tension in He⁴ and He³ is exactly the same and differs only in magnitude. This is easy to see from Fig. 2, which shows α/α_0 as a function of T/T_{cr}

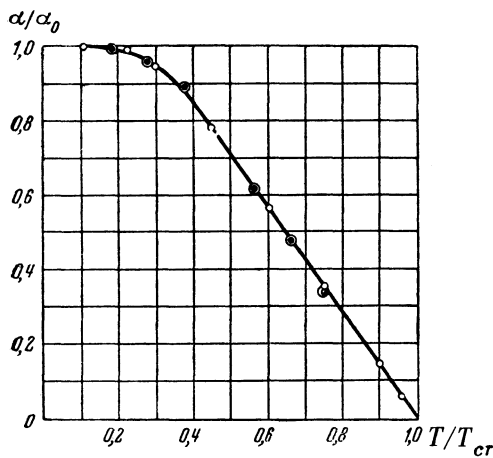


FIG. 2. ○-He⁴, ●-He³

for He³ and He⁴. Both curves coincide, within the limit of the accuracy of the measurements. Thus, we see that the different statistics of the isotopes leads to no noticeable difference in the temperature dependence of surface tension down to $T/T_{cr} = 0.19$.

In closing I wish to express my deep gratitude to

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305

Surface Ionization of Calcium, Strontium and Magnesium on Oxidized Tungsten

IU. K. SZHENOV

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THE surface ionization effects in alkali metal atoms are known to be well described by the Saha-Langmuir equations¹. In the case of the alkaline earth elements, no satisfactory agreement with theory has yet been obtained. The existing data on surface ionization of barium²⁻⁴, calcium and magnesium^{5,6} on tungsten were obtained under various experimental conditions and differ noticeably among themselves. It is possible that in some of these experiments the tungsten had become oxidized, thus altering the work function of the surface and complicating the observations. In this letter we shall describe some results of attempts to study the surface ionization of calcium, strontium and magnesium atoms on tungsten, undertaken with the aim of exploring the possibility of ionizing them effectively. A mass spectrometer method was used to measure the flow of ions, thus enabling the joint surface ionization of different types of atoms to be followed, and comparative measurements to be made⁶.

It was found that the change of surface ionization with temperature for calcium on tungsten