the basis of extrapolated experimental data[6,7].

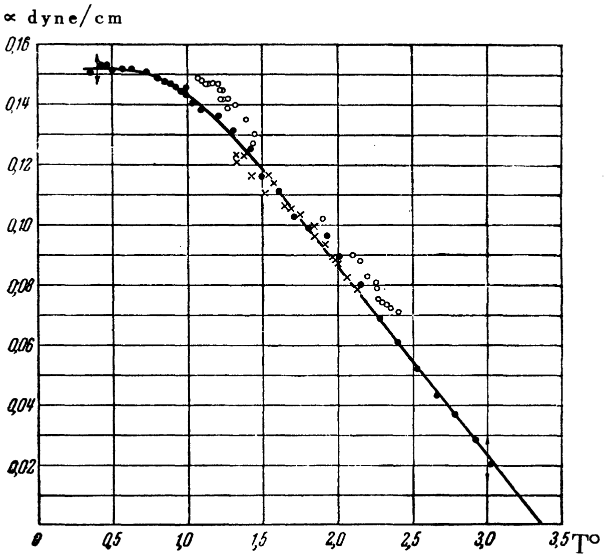

FIG. 1. ●-data from this work and reference 1; ×-Esel'son and Berezniak[4]; O-Lovejoy[5].

It is interesting to note that the character of the dependence of the temperature on the surface tension in He^4 and He^3 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} for He^3 and He^4. 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 $T/T_{cr} = 0.19$.

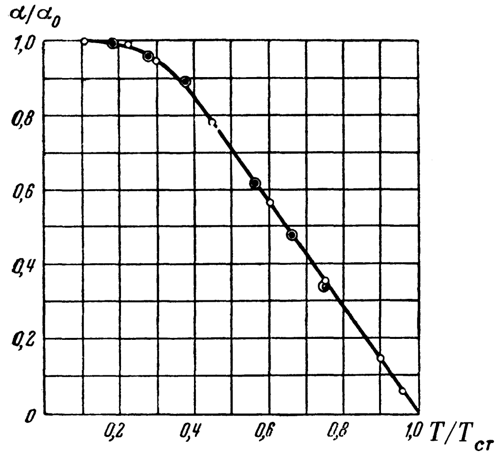

FIG.2. ⊙-He^4, O-He^3

In closing I wish to express my deep gratitude to Prof. V. P. Peshkov for his sustained interest in our work, and to N. I. Iakovlev who helped with the measurements.

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305

Surface Ionization of Calcium, Strontium and Magnesium on Oxidized Tungsten

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THE surface ionization effects in alkali metal atoms are known to be well described by the Saha-Langmuir equations[1]. In the case of the alkaline earth elements, no satisfactory agreement with theory has yet been obtained. The existing data on surface ionization of barium[2-4], 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 made[6].

It was found that the change of surface ionization with temperature for calcium on tungsten satisfies the Saha-Langmuir equation. Similar results for magnesium were obtained in the work reported in reference 6.

Attempts to increase the effectiveness of surface ionization of calcium by a preliminary oxidation of the tungsten did not give positive results. However, when a continuous stream of oxygen was directed at the incandescent tungsten, the ion current at first increased by two orders of magnitude, after which the equilibrium current, and the time required to establish it, were observed to depend on the pressure of oxygen near the filament, over a small range of pressure (of the order of 10^{-6} to 10^{-5} mm Hg). A further increase in pressure did not affect the magnitudes of the ion currents. At tungsten filament temperatures of about 2000°K there was a maximum in the ion current, and with increasing oxygen pressure the location of this maximum shifted slightly in the direction of higher temperatures. If the glowing filament were suddenly heated to temperatures above 2600°K and then reduced to its former temperature, a sudden initial jump in ion current was observed, followed by a drop to values noticeably lower than the initial current and then by a gradual recovery to the initial value. The recovery time decreased at higher pressures.

The intensity of the calcium beam was varied over such wide limits that the time required to form a monomolecular layer of calcium oxide on the filament would have required from a few seconds to several hours. None the less, an interruption in the oxygen supply invariably led to a sharp decrease in the ion current. Consequently, under these conditions the increased effectiveness of surface ionization of the calcium cannot be due to the formation of a layer of calcium oxide on the tungsten[5].

Analogous results were obtained with strontium, magnesium and sodium. In the case of sodium, the increased surface ionization at the much lower filament temperatures persisted even after the oxygen supply was cut off, as is usually observed on oxidized tungsten. (It is known that lithium is also effectively ionized on incandescent tungsten which is kept in a stream of oxygen[7]).

Thus in our experiments we have observed the surface ionization of calcium, strontium and magnesium on oxidized tungsten, under conditions of continuous regeneration of the decomposing layer of tungsten oxide. The greatest effect was obtained in a narrow interval of high temperatures and at suitably high oxygen pressures, where apparently adsorption of calcium, strontium or magnesium atoms on the surface does not play a substantial role but the rate of oxidation of the tungsten is considerable, so that the values of temperature and mean work function of the surface are optimal. It is to be expected that an increased degree of surface ionization, due to the increased work function of the tungsten when it becomes oxidized, would occur under definite conditions regardless of the type of atoms. It is proposed to make use if this effect to detect atomic beams of the alkaline earth metals in measuring their nuclear moments.

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309

Phosphorescence of the Crystal Phosphor ZnS-Cu during Excitation by an Electron Beam

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NOTWITHSTANDING the large number of investigations of cathodoluminescence, there are almost no works in the literature in which a comparison is carried out, on the very same specimens, of the kinetics of the after-glow of phosphors under excitation by light and electrons. For the beginning stages of afterglow (about 10^{-3} sec) such an investigation has been carried out[1]. In this work it was shown that the decay takes place nonspecifically with regard to the sort of excitation and that the difference in the observed decay curves can be explained by means