cated a sudden and rather surprising increase in yield around mass 60. Thus the $Ni^{58}(\gamma, n)$ yield is about 6 as compared with about 30 for Cu^{63}.

It may be pointed out that these figures are not necessarily inconsistent with the statistical theory of nuclear reactions (evaporation model). According to the statistical theory,[2] the yield will depend quite sensitively on the binding energy of a neutron to the nucleus in question. New thresholds of (γ, n) reactions have been measured by Baldwin and Koch,[3] who find a threshold of 10.9 ± 0.3 Mev for the Cu^{63} reaction. Although no data seem to be available on Ni^{58}, the same authors find 14.2 ± 0.4 Mev for the $Fe^{54}(\gamma, n)$ reaction. Since ${}_{28}Ni^{58}$ and ${}_{26}Fe^{54}$ both have a neutron excess of two, and in fact differ from each other by just an alpha-particle, whereas ${}_{29}Cu^{63}$ has a neutron excess of five, differing from ${}_{28}Ni^{58}$ by the addition of one proton and four neutrons, it is perhaps reasonable to suppose the binding energy of a neutron in the Ni^{58} nucleus to be about the same as that in Fe^{54}. With this assumption one can calculate the ratio of Cu^{63} to $Ni^{58}(\gamma, n)$ yield, using the level density formula $\exp(aE)^{\frac{1}{2}}$,[2] with $a=15$ Mev^{-1}, and taking the betatron spectrum to be inversely proportional to the energy.[1] One finds a ratio of about 4 using the neutron binding energies 10.9 Mev and 14.2 Mev, respectively, for Cu^{63} and Ni^{58}. By going to the extreme values consistent with the experiments quoted above, namely, 10.6 Mev and 14.6 Mev, respectively, one raises the ratio to slightly over 5, which is about the same as the experimental value.

Thus the experimental (γ, n) yields for the heavier nuclei can probably be understood within the framework of the statistical theory, considering all the uncertainties in the theoretical formulae (level densities, binding energies, etc.). For the lighter nuclei (mass <50), the statistical treatment is not expected to hold.

[1] M. L. Perlman and G. Friedlander, Phys. Rev. **74**, 442 (1948).
[2] V. F. Weisskopf and D. T. Ewing, Phys. Rev. **57**, 472 (1940).
[3] G. C. Baldwin and H. W. Koch, Phys. Rev. **67**, 1 (1945).

The Melting Pressure of Helium II

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Tammann[1] proposed the equation

$$T-1=\log(P_{\text{atmos}}-24.0),$$

for representing the melting pressure of helium up to 2.5°K. The equation, however, does not account for the singularity in the curve on meeting the λ-line.

The elliptic function,

$$p=a-[r-n(T-l)^2]^{\frac{1}{2}}, \tag{1}$$

$$dp/dT=[n(T-l)/a-p], \tag{2}$$

reproduces the values given by Keesom and Keesom[2] from 1.15 to 1.78°K with an average deviation of 0.1 percent and a maximum deviation of 0.3 percent.

Table I.

T, °K	p, atmos.		dp/dT
Scale 1937	K.K.	Eq. (1)	Eq. (2)
1.15	25.27	25.29	0.13
1.20	25.32	25.32	0.89
1.30	25.50	25.49	2.46
1.40	25.81	25.82	4.20
1.50	26.32	26.34	6.36
1.60	27.13	27.12	9.43
1.70	28.39	28.31	15.2
1.75	29.30	29.21	21.1
1.78	29.96	29.99	31.8

With $a=32$, $r=45$, $n=100$, and $b=1.14$, the results of the calculations are shown in Table I.

[1] W. H. Keesom, *Helium* (Elsevier Publishing Company, Inc., Amsterdam, 1942), p. 202.
[2] Reference 1, p. 203.

Discrepancies Caused by Source Charging in Beta-Spectrometers

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A study is being made of the radiations from Na^{22}, which emits positrons and gammas with a half-life of about three years. A small 180° spectrometer, a thin lens, and a large double-focusing spectrometer[1] have been used for this purpose. Each instrument employs G-M tubes whose thin Zapon windows have a low energy cut-off of less than five kilovolts.

The purpose of this letter is to report on a somewhat disturbing phenomenon which became apparent early in the investigation. A measurement of the positron spectrum with the lens spectrometer, which does not resolve positrons and negatrons, indicated the presence of a strong low energy peak at about 9 kev. Further work with the 180° instrument uncovered a strong negatron peak at 8 kev, whose intensity is roughly half that of the positron spectrum. This disagreement on the energy of the peak led us to seek a further check using the double-focusing spectrometer. The strong negatron peak was again found, but at about 25 kev. In all three instruments the same sodium chloride source was used. It was deposited in a thin layer upon a thin backing of Zapon.

It has been found that this enormous discrepancy stems from the fact that the sources are Zapon-mounted, and are therefore well insulated electrically from the body of the spectrometer. The sodium source and the spectrometer body form, in effect, a small capacitance, with a very high resistance leakage path between them. The magnitude of the capacitance will vary from instrument to instrument. The excess of positron emission develops a negative charge on the source, thus gradually establishing a considerable potential difference between source and vacuum chamber. As a result, positrons are decelerated and negatrons are accelerated.