The very abrupt fall of the curve near the end of the spectrum ($h\nu - 2mc^2$) in the case of positrons from a thorium-active deposit is in good agreement with the theory of internal conversion of γ-rays on negative levels, worked out by Hulme and Jaeger[3]. In Fig. 1, curve III shows the theoretical curve for the conversion of the γ-line ($h\nu = 2{,}620$ ekv.) according to Hulme and Jaeger. The remaining portion (IV) of curve I, as we have already suggested in a similar connexion in the case of radium C, is probably to be ascribed to the effect of the β-radiation. If we separate in this way the effect of the γ-rays, we obtain for the probability of the internal conversion of the γ-rays of thorium C″ about $4{\cdot}5\text{–}5{\cdot}5 \times 10^{-4}$, close to the theoretical value of $4{\cdot}6 \times 10^{-4}$ given by Hulme and Jaeger. The remaining number of positrons, which we ascribe to the effect of β-radiation, amounts to about one positron per 1×10^4 disintegrating atoms of thorium C and C″. More accurate measurements with radium C showed that for the positron yield a value of 0·02–0·03 is to be accepted.

A. I. ALICHANOW.
A. I. ALICHANIAN.
M. S. KOSODAEW.

Physico-Technical Institute,
Leningrad.
June 16.

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Formation of Drops in Supersaturated Vapour of Heavy Water

AN investigation of drop-formation in D_2O vapour, which was supersaturated by means of adiabatic expansion in a modified Wilson apparatus[1], gave the following values of the critical degree of expansion ($E = v_2/v_1$) for D_2O/H_2O mixtures, with and without an electric field:

Mol per cent D_2O	$T_{abs.}$	$E_{crit.}$ with electric field	$E_{crit.}$ without electric field
99	289·5	1·252 ± 0·003	1·230 ± 0·002
43	288·5	1·262 ± 0·003	1·240 ± 0·003
0	289·0	1·276	1·248

$T_{abs.}$ is the temperature of the vapour before expansion.

From the figures, the critical supersaturation of D_2O vapour at $T_{abs.} = 264$ was calculated to be 4·5, whereas the corresponding value of H_2O was 4·8. The result is quantitatively not in full agreement with Volmer's theory of formation of nuclei, which has been proved to hold good for a number of substances. According to Selwood and Frost[2] the surface tension of heavy water should be 5 dynes/cm. lower than that of normal water, and thus after Volmer the critical supersaturation of D_2O at $T_{abs.} = 264$ should be 4·2.

This slight discrepancy might be due to an error in the surface tension value of heavy water (too low), and this point is to be further investigated.

The large quantity of heavy water needed for the present investigation was provided by Norsk Hydro-Elektrisk Kvælstof A/S.

L. TRONSTAD.
H. FLOOD.

Technical University of Norway,
Trondhjem.

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Isotopic Constitution of Gold from Band-Spectroscopic Examination

PROF. A. J. DEMPSTER has recently announced[1] his mass-spectrographic result on the suspected gold isotopes Au^{197} and Au^{199}, using his newly designed positive ion source, and his results point to the non-existence of Au^{199}.

For several years I have made many exposures of the AuH violet $^1\Sigma \rightarrow {}^1\Sigma$ band system in the hope of detecting Au^{199} by this method, using a 25-plate reflecting echelon, a quartz Lummer plate or a 40-plate transmission echelon. The resolving power should be adequate to separate the two isotope lines if the ratio of Au^{199} to Au^{197} existed approximately in the ratio of 1 : 8·3 (or 1 : 7·0, if the atomic weight is recalculated on the $O^{16} = 16$ scale), as expected from the accepted chemical atomic weight of gold, namely, 197·21, and also if the two AuH molecules behaved normally, that is, had no appreciable electronic isotope effect compared with the already very small vibrational plus rotational effect (usually smaller than 0·05 $cm.^{-1}$). On none of the plates, on which the main line is strongly over-exposed, has the satellite been recorded, in agreement with Dempster's result.

Details of this work with photographs will be published in the Institute's *Scientific Papers*.

SUNAO IMANISHI.

Institute of Physical and Chemical Research,
Komagome, Hongo, Tokyo.
Aug. 12.

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Mechanism of Three-Carbon Tautomerism

WITH the object of throwing light on the mechanism of three-carbon tautomerism, we have studied the equilibration of vinylacetic and crotonic acids in the presence of 1·05 mols of sodium hydroxide in dilute 'heavy water' at 100° C. As a check, we have also examined the behaviour of butyric acid under the same conditions. The isotopic ratio in both the recovered solvent and the water obtained by combustion of the residual sodium salts has been determined by a flotation method accurate to one part per million of density; the necessary purifications were carried out without loss of water, thus avoiding the possibility of isotopic fractionation.

The results are summarised in the following table, in gm. of D_2O, calculated from the experimental density values and theoretical yields of solvent and combustion water respectively.

Acid	Original solvent	Final solvent		Combustion water	
		Found	Calcd.	Found	Calcd.
Butyric	0·6533	0·6542	0·6533	0·0001	0
Crotonic	0·8704	0·8658	0·8704	0·0002	0
Vinylacetic	0·8704	0·8613	0·8631	0·0068	0·0073

It is evident that whilst there was no detectable interchange with butyric and crotonic acids, substantial interchange occurred in the case of vinylacetic acid. The theoretical values in the latter case (corresponding to the interchange of one atom) have been calculated on the assumption that no isotopic discrimination occurs in the interchange reaction. This assumption is not necessarily valid (cf. A. Farkas, "Orthohydrogen, Parahydrogen and Heavy Hydrogen", Cambridge University Press, 1935, p. 200) and it is proposed, in extending the