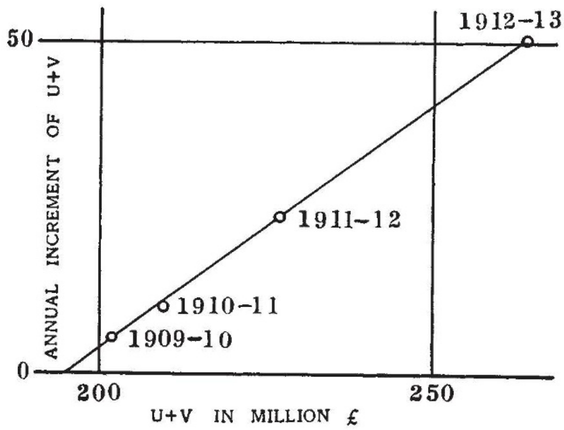
This implies that when $d(U+V)/dt$ is plotted against $U+V$, we should expect a straight line of slope $k-\alpha$. The statistics for Austria-Hungary have been taken from the "Statesman's Year Book", those for the other countries from a pamphlet by Per Jacobsson[1]. The accompanying diagram shows that the four points lie close to a straight line of slope $k-\alpha = 0 \cdot 73$ year^{-1}. Furthermore, by a short extrapolation, the line cuts the axis of zero $d(U+V)/dt$ at $U+V = 194$. This 194 million sterling is the amount of defence expenditure, by the four nations concerned, that would just have been mutually forgiven in view of the amount of goodwill then existing.



It is, to say the least, a remarkable coincidence that the trade between these opposing pairs of nations was on the average 206 millions sterling, close to 194.

A much fuller discussion is due to appear under the title "Generalised Foreign Politics". In particular, the assumption that U_0, V_0 were constant cannot be expected to remain valid for long periods of time. Also the budgets are variously stated.

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[1] Jacobsson, "Armaments Expenditure of the World," *The Economist*, London.

Resonance Absorption of Slow Neutrons

We have made measurements of the position of the resonance levels of some heavy elements for slow neutrons. The method is a development of that of Preiswerk and v. Halban[1], and depends essentially on finding how much paraffin must be traversed by neutrons in order to have their energy reduced from that of the resonance level of the element under investigation to that corresponding to known periods of silver or rhodium. In this way definite evidence has been obtained for resonance levels in cobalt, bismuth, lead, thorium, uranium, besides the known ones of silver and gold. The most interesting result is that two levels can be detected in bismuth, the first at about 1 volt, the second at about 11 volts. As bismuth is a pure element, both levels represent high excited states of radium E. Preliminary experiments with thorium and uranium give similar results, showing for thorium two levels, in the neighbourhood of 2 and 18 volts respectively, and for uranium levels about 5 and 30 volts. With cobalt we find a level at about 1 volt and nothing else of any intensity up to 40 volts. While it will require a careful study of the experimental conditions before these resonance energies can be fixed with certainty, we think these results give a trustworthy picture of the separation of energy levels in heavy elements. Such values are quite compatible with current theoretical ideas, as is also the suggestion of greater separation for the lighter element cobalt, and an increase in the separation as the first level goes to higher energies.

It seems likely that the interesting anomalous absorption of slow neutrons in boron, recently reported by Michiels[2], can be explained by the existence of two resonance levels in iodine. He finds, using iodine as a detector, that the absorption coefficient in boron is greatly altered if iodine is used as an initial filter instead of boron. If we assume, to a first approximation, that energy losses are unimportant, then the use of a sharply resonating detector effectively reduces the experiment to the investigation of the absorption of a heterogeneous beam consisting of as many homogeneous components as the detector has resonance levels. Suppose I_1 and I_2 are the initial intensities of the low- and high-energy components, τ_1, τ_2 and μ_1, μ_2 their absorption coefficients in iodine and boron respectively, and d_1 and d_2 the thicknesses of the iodine and boron filters, then the smaller boron absorption coefficient with iodine filtering means that $(\tau_1-\tau_2)d_1$ is greater than $(\mu_1-\mu_2)d_2$. The approximate constancy of the boron absorption coefficient with increasing boron filtering, and on the other hand its decrease with increasing iodine filtering, means that $\tau_2 I_2/\tau_1 I_1$ is much less than $e^{-(\mu_1-\mu_2)d_2}$ but comparable with $e^{-(\tau_1-\tau_2)d_1}$. Such relations are quite plausible, but a closer analysis is not justified unless great care is taken to allow for the scattering. The pronounced effect of different arrangements is shown by the divergence between Michiels' results for iodine filtering and those of Ruben and Libby[3]. On the evidence available, it appears as if iodine has two levels, one in the neighbourhood of 40 volts and the other of several hundreds of volts.

The significance of the change in activity when two filters of boron and iodine were used simultaneously, first in one order, and then reversed, can only be appreciated when all scattering effects and losses of energy in any hydrogenous material present are carefully taken into account, but it must be remembered that similar effects were found in the early days in the experiments on the absorption of heterogeneous γ-ray beams.

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[1] Preiswerk and v. Halban, *C.R.*, **201**, 722 (1935).
[2] Michiels, Nature, **142**, 431 (1938).
[3] Ruben and Libby, *Phys. Rev.*, **51**, 774 (1937).

Viscosity of Light Hydrogen Gas and Deuterium between 293° K. and 14° K.

In connexion with previous systematic investigations[1] on the viscosity of gases at low temperatures, we have studied hydrogen and deuterium gas. As is well known, such investigation is interesting in connexion with the theoretical calculations made respectively by Uehling[2] and Massey and Mohr[3].