sets of energy states, and these two sets may be thought of as forming the "phases" above mentioned. This may conveniently be taken as a picture of the second-order phase transition, i.e., the crystal oscillators going from one state of bounding to another. Also because the quantum of transition between two states of the oscillator is no longer $h\nu$, a shift or a new line may be possible in the Raman spectrum or infra-red absorption of the *crystal* near the λ-temperature. As there are many substances whose λ-temperatures are near room temperature, the investigation of the Raman spectrum may provide a test of the above ideas. Also, one must consider the current theory that the specific heat change may arise from molecular rotation within the crystal. Experiments on the Raman or infra-red absorption spectrum may lead to a decision between the two conceptions.

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[2] F. S. Auluck and D. S. Kothari, Proc. Camb. Phil. Soc. **41**, 175 (1945).

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On the Distribution of Electric Charge in Nuclei

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In a recent letter[1] by J. G. Winans entitled "A Classical Model for the Nucleus," attention was drawn to the striking relation between the atomic numbers (Z) and corresponding masses (A) of stable nuclei. Winans suggested a crystalline model in which the protons occupy surface positions as an obvious way of explaining the simple relation between Z and A.

The existence of this relation and its possible explanation by surface concentration of protons was already known to us, and we had gone so far as to test the hypothesis that protons are concentrated on or near the surface in the following simple way. In fission, if protons and neutrons are uniformly mixed the (charge/mass) ratios of the fragments should be roughly equal; whereas we should expect a higher relative concentration of charge on the light fragments, if the protons are concentrated near the surface of the nucleus before fission. We have investigated this on the basis of Coryell's tables[2] and have found that the ratio (charge/mass) is very closely the same for the light and heavy fragments. This fact, therefore, coupled with the hydrodynamical explanation[3] of the asymmetry of fission in analogy with the splitting of a classical liquid drop, seems to invalidate the idea that the protons are concentrated on the surface. In principle it is possible that some mechanism might exist to ensure constancy of Z/A for the fragments, but we know of no other nuclear phenomenon which would require such a mechanism.

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A Note on the Long-Lived Radio-Iodine

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The radioactive iodine isotope of half-life about 56 days, reported by Reid and Keston,[1] has been observed in an iodine sample separated from deuteron-bombarded Te in April, 1946, furnished by the M.I.T. Radioactivity Center.

Chemical identity of the activity was established by a series of extractions with iodine carrier. Iodide in aqueous solution was oxidized with nitrite, and the iodine extracted into CCl_4; re-extraction to water was performed with bisulfite as reducing agent. Through three such cycles, the specific activity as AgI remained constant within experimental error.

By use of a Kr-filled Geiger counter, critical absorption measurements of the x-radiations were made in Ag, Cd, In, and Sn foils. The energy of the radiations was observed to lie between the K-edges of Cd and In, characteristic of tellurium $K\alpha$ x-rays. Absorption in Al showed a small amount of an extremely soft component, and a half-thickness of 485 mg/cm^2 for the major fraction of the radiations. This corresponds to an x-ray energy of 27.5 kev, within experimental error of that expected for $K\alpha$ x-rays of Te. The soft component showed a half-thickness of 1.9 mg/cm^2 in Al, and 19 mg/cm^2 in C (polystyrene). The corresponding x-ray energies are 3.8 and 3.7 kev, respectively. The $L\alpha$ x-ray energy for Te is 3.8 kev. No particle radiations were observable from 20 mg samples (AgI or NaI) with a thin window counter, and no γ-rays of energy greater than 30 kev were apparent in the Al absorption curve. The mode of decay of the 56d I, therefore, appears to be pure orbital electron capture, with no accompanying particle or γ-radiations.

It can be shown by various considerations that the mass number of the long-lived iodine is more probably 125 than 129 as proposed by Reid and Keston.[1] The formation of I^{125} directly in the Te targets at the cyclotron is to be expected from the d, $2n$ reaction on Te^{125} (6 percent abundance) and the (d, n) reaction on Te^{124} (4.5 percent abundance). Considerations which render improbable the mass assignment of 129 are: (a) the proposed decay scheme[1] requires either that Te^{129} have a stable isomer, or (for the chain to reach a stable end product) that a unique chain of K-capture followed by two β^- decays occur (i.e., I^{129}—K→Te^{129}—β^-→I^{129}—β^-→Xe^{129} stable); (b) according to Bohr and Wheeler[2] the most stable nuclear charge (Z_A) for mass 129 is near 54 (Xe); thus I^{129} should have no appreciable probability for decay by K-capture, but should decay by β^- emission to stable Xe^{129}; (c) no radio-iodine of half-life near 56 days is reported among the U^{235} fission products,[3] whereas I^{129} must certainly be formed; the latter is listed as a very long-lived, hypothetical descendant of 70m Te^{129}.

The nucleus I^{125}, however, would certainly decay by K-capture or positron emission to stable Te^{125} and would not be formed in appreciable yield as a U^{235} fission product since it is shielded by stable Te^{125} from formation by β^- decay. Its predicted decay energy for K-capture, calculated from