Letters to the Editor

The Editor does not hold himself responsible for opinions expressed by his correspondents. He cannot undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. *No notice is taken of anonymous communications.*

NOTES ON POINTS IN SOME OF THIS WEEK'S LETTERS APPEAR ON P. 1103.

CORRESPONDENTS ARE INVITED TO ATTACH SIMILAR SUMMARIES TO THEIR COMMUNICATIONS.

Packing Fractions of Bromine, Chromium, Nickel and Titanium

I HAVE obtained a new determination of the packing fraction of ^{79}Br by measurements of the doublet given by its triply charged atom and the quintuply charged atom of ^{132}Xe, the value for which has been provisionally given[1]. As the difference in mass between ^{79}Br and ^{81}Br has also been measured[2], values for both isotopes can be calculated as given below. These are provisional only, but are certainly more reliable than those previously in use. I hope in the future to get more accurate results by means of the doublet ^{81}Br+++ — C_2H_3, but this cannot be used now owing to the presence of aluminium in the discharge tube.

Very satisfactory results were obtained with chromium. The volatile carbonyl was used, which when combined with suitable proportions of methyl chloride gave ^{52}Cr — $CH_3{}^{37}Cl$ the doublet required. As soon as the initial difficulties of admitting the vapours in the right proportions had been overcome, a great many well-matched doublets were photographed giving very consistent measurements.

Experiments with nickel were disappointing. Nickel carbonyl was used, but the line ^{58}Ni++ could not be obtained intense enough for comparison with C_2H^5. As the first order line ^{58}Ni was strong, it was considered worth while to compare the ratio of this to CO_2 by means of the fairly near ratio ^{16}O to ^{12}C, using artificial doublets. Four complete sets of comparisons were made, and the mean of these indicates a negative packing fraction considerably smaller than that previously estimated ten years ago by the same method.

The packing fraction of ^{48}Ti has recently been given by Dempster as $-7\cdot22 \pm 0\cdot1$ by direct comparison of its triply charged atom with the standard oxygen atom[3]. His comparisons of ^{48}Ti++++ — C were, however, not satisfactory. I have been to great pains to obtain and measure the corresponding doublet ^{48}Ti++ — C_2, as this affords an entirely independent check on the controversial value of ^{12}C. Titanium tetrabromide was used, but is very troublesome in the discharge. The line ^{48}Ti++ was very feeble and the exposures consequently long, and as there was little possible control on the relative intensities of the lines, only very few of the plates taken were of any value. After many weeks of work, seven reasonably well-matched doublets had been obtained with the mean result given below. If my value 2·96 for the packing fraction of carbon is used, the value obtained is virtually identical with Dempster's; conversely, this agreement provides a further independent and welcome confirmation of my value $12\cdot00355 \pm 0\cdot00015$ for the mass of ^{12}C. This and H = 1·00812 have been used in calculating these results:

Doublet	Number of doublets measured	Difference in packing fraction	Difference of mass
^{79}Br++ — ^{132}Xe+++++	6	$28\cdot30 \pm 0\cdot3$	0·0745
^{52}Cr — CH_3 ^{37}Cl	18	$9\cdot22 \pm 0\cdot15$	0·0479
^{48}Ti++ — $^{12}C_2$	7	$10\cdot20 \pm 0\cdot15$	0·0490

Symbol	Packing fraction	Isotopic weight
^{48}Ti	−7·24	$47\cdot9652 \pm 0\cdot0008$
^{52}Cr	−8·18	$51\cdot9575 \pm 0\cdot0008$
^{58}Ni	(−8·35)	$(57\cdot9516 \pm 0\cdot0020)$
^{79}Br	(−7·4)	$(78\cdot9417 \pm 0\cdot0020)$
^{81}Br	(−7·4)	$(80\cdot9400 \pm 0\cdot0020)$

F. W. ASTON.

Cavendish Laboratory,
Cambridge.
June 1.

[1] NATURE, 140, 149 (July 24, 1937).
[2] NATURE, 137, 357 (Feb. 29, 1936).
[3] *Phys. Rev.*, 53, 68 (1938).

Resonance in Nuclear Photo-Effects

IN connexion with the remarkable selectivity of nuclear photo-effects of heavy elements indicated by experiments, it was pointed out in a recent note in NATURE[1] that such photo-effects might provide a means of examining certain features of the mechanism of excitation of atomic nuclei not disclosed by ordinary experience about nuclear reactions by collisions. In fact, the probability of excitation of a nucleus by monochromatic radiation depends on the degree to which forced oscillations of given frequency of the nuclear matter can be produced, and experiments on the variation of the yield of the photo-effects with radiation frequency would therefore allow a direct estimate of the strength of coupling between the different modes of oscillation into which the collective motion of the nuclear particles may approximately be resolved.

In view of the very incomplete experimental evidence, I would like, however, to emphasize the preliminary character of any such estimates as attempted in the note referred to, and at the same time to direct attention to a possible misunderstanding of the argument regarding the separation of the course of the photo-effects into successive stages. Such a separation into the initial excitation of a certain mode of oscillation and its subsequent quenching due to the coupling cannot, of course, be carried out in the case of strictly monochromatic radiation. Nevertheless, a