

definite predictions which were recently made by the writer.⁴ The further discoveries by Aston of Ba_{135} and Ba_{137} are also concordant with these predictions. Further predictions of isotopes whose discoveries have not yet been reported include three additional tellurium isotopes, Te_{120} , Te_{122} and Te_{124} , with the possibility of Te_{123} as well, and two additional selenium isotopes, Se_{79} and Se_{81} . It is significant that allowance for these additional isotopes will change Aston's computed values in the directions of the chemical atomic weights, both for selenium and for tellurium.

Small uncertainties which, of course, do exist in the chemical atomic weights preclude the possibility of an exact estimate of the proportions in which these additional isotopes exist. However, we expect that these uncertainties are small compared with the divergences between the chemical and the mass spectrograph values. Hence we can make predictions as to the approximate percentages of these isotopes. These predictions lead to about 8% of Te_{120} , Te_{122} , Te_{124} (and possibly Te_{123}), taken collectively, and to about 9% of Se_{81} . No estimate for the amount of Se_{79} is possible. Failure heretofore to observe the 8% mixture of tellurium isotopes is reasonable since the 6% of Te_{125} alone remained, until now, undiscovered. Proximity to the very abundant Se_{80} (48%) may account for failure to observe both Se_{81} and Se_{79} .

The writer's predictions of these isotopes, as of Te_{125} , Ba_{136} and Sr_{87} , were based on the positions of missing atoms in a "Periodic Table" of atomic nuclei.⁴ Independently, Professor H. C. Urey⁵ made similar predictions, including isotopes of selenium and of tellurium. The predictions of further missing isotopes can now be extended to include Ce_{141} , Ce_{144} , and Nd_{148} . As a convenient aid in using the "Periodic Table" of isotopes it is useful to observe that the positions at which the various isotopes of a given element may occur occupy a pattern similar to successive knight moves on a chess board.

⁴ Johnston, THIS JOURNAL, 53, 2866 (1931).

⁵ Urey, THIS JOURNAL, 53, 2872 (1931).

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HERRICK L. JOHNSTON

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PREPARATION OF PINACOLONE

Sir:

Because of the need of large amounts of pinacolone for investigations in progress in this Laboratory, methods for its preparation have been studied. The usual method ["Organic Syntheses," Vol. I, pp. 87, 91] is time consuming.

We find that the addition of a dilute ether solution of tertiary-butyl-

magnesium chloride to an excess of acetyl chloride in ether gives a 40% yield of pinacolone, b. p. 103–106° at 746 mm. pressure.

Somewhat lower yields are obtained with other combinations of tertiary Grignard reagents and acyl halides.

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DARWIN E. BADERTSCHER
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PREPARATION OF SUBSTITUTED FLUORENONES

Sir:

The appearance of a paper by Langecker [*J. prakt. Chem.*, [2] **132**, 145–52 (1931)] citing certain attempts to prepare 1,8-dinitrofluorenone leads us to call attention to work of a similar nature which has for some time been in progress in this Laboratory. In May, 1927, Moore and Huntress [THIS JOURNAL, **49**, 1324–1334 (1927)] published a synthesis for both 2-nitro- and for 7-nitrophenanthridone. In November of the same year it was further shown [Moore and Huntress, *ibid.*, **49**, 2618–2624 (1927)] that 7-nitrophenanthridone could be prepared in almost quantitative yield by Beckmann rearrangement of 2-nitrofluorenone oxime. In pursuance of the studies of the phenanthridone series begun at that time, the present authors have been engaged since 1927 in attempting to obtain derivatives of fluorenone having substituents in one (or both) of the 1,8 positions. If an unsymmetrically substituted fluorenone oxime of this type could be obtained, it was hoped that stereoisomers might be isolated, and that by joint application of phenanthridone formation and of ring closure reactions involving the substituent and the oximino group, some additional light might be thrown upon the mode of interchange of radicals in the Beckmann rearrangement. Since Langecker's paper indicates its objective as the preparation of 1-substituted fluorenonenes, and since in dealing with the 2-nitrofluorenone oxime first reported by one of us it gives no evidence that the author was aware of our previous publications on fluorenone derivatives, it seems advisable that we reiterate the continuing interest of this Laboratory in this subject.

Of the few 1- or 1,8-substituted fluorenonenes on record in the literature (1-bromofluorenone, 1,3-dibromofluorenone, 1-hydroxyfluorenone, 1-amino-fluorenone, fluorenone-1,7-dicarboxylic acid, and 1,8-dinitrofluorenone), the alleged "1,8-dinitrofluorenone" of Schmidt and Stützel [*Ann.*, **370**, 22 (1909)] and of Kuhn and Jacob [*Ber.*, **58**, 1440 (1925)] is the only substance prepared by direct substitution. The structure assigned to this material is open to criticism upon several grounds. In the first place the nitrogen content given by Schmidt as 10.40% proves upon recalculation