

The simplest explanation for these facts is that a phosphorylated intermediate, capable of exchanging oxygen with water, is formed in the myosin portion of the actomyosin. The actin can then attack this intermediate with formation of an actin-myosin bond which holds the protein in contracted form.

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FORMATION OF VOLATILE COMPOUNDS BY Pb^{212} RECOILING FROM ALPHA DECAY¹

Sir:

The discovery that tritium and halogen atoms, recoiling from nuclear processes, undergo substitution reactions in the gas phase in high yield has prompted us to investigate the possibility of gas-phase reactions for metallic atoms undergoing nuclear recoil.²⁻⁴ Our experiments demonstrate the formation of volatile organo-lead compounds by Pb^{212} atoms from the alpha decay of Po^{216} in a methane atmosphere.

The thoron (Em^{220}) daughter activity in equilibrium with Th^{232} was removed from thorium nitrate solution by sweeping with carrier gas. The carrier gas flowed through a cold trap, a 200-ml. storage bulb, and then was vented. After the system reached equilibrium, the bulb was shut off and bypassed, and became a vessel for reaction of thoron decay products with sweep gas. The steady-state concentration of Em^{220} in the bulb was determined from a gas aliquot taken immediately after isolation from the flow system.

The formation of volatile Pb^{212} compounds was studied by isolating the reaction bulb until the decay of thoron to Pb^{212} was essentially complete (≥ 15 min.). An aliquot of the gas then was examined for Pb^{212} activity. An appreciable amount of the Pb^{212} in methane sweep gas was transferred with the aliquot. The results of these experiments are summarized in Table I. In similar experiments

TABLE I
PER CENT. VOLATILE Pb^{212} FROM Po^{214} RECOIL IN GASEOUS ATMOSPHERE

Gas	Delay time min.	Volatile activity, %
Methane	15	38
	30	20
	45	14
	60	19
	330	5
Helium	15	0
	30	0

with helium carrier, no Pb^{212} activity entered the proportional counter. The range of Pb^{212} (128 k.e.v. recoil energy) is < 1 mm. in methane or helium at STP,⁵ but long enough to ensure equilibrium in charge-exchange processes. Therefore, essen-

- (1) Research supported by A.E.C. contract No. AT-(11-1)-407.
- (2) M. El-Sayed and R. Wolfgang, *THIS JOURNAL*, **79**, 3286 (1957).
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- (4) J. Willard, *et al.*, *J. Chem. Phys.*, **20**, 1556 (1952); **25**, 904 (1956); *THIS JOURNAL*, **75**, 6160 (1953); **79**, 4609 (1957).
- (5) D. L. Baulch and J. F. Duncan, *Austral. J. Chem.*, **10**, 112 (1957).

tially no recoils will strike walls before thermalization, while all should be neutralized before chemical reaction.

The Em^{220} concentration was reproducible to $\pm 40\%$ —each run was compared to a zero-delay run immediately preceding. The decay curve in each case showed the growth of Tl^{208} and Bi^{212} daughters of Pb^{212} , as well as Em^{222} from Ra^{226} in solution.

The nature of the organo-lead compound(s) has not been established—the lower volatile percentages with longer delay times probably are caused by further reactions of the original species, leading to less volatile compounds.

Volatile metallic products may prove useful for quick chemical separations of nuclear recoils from thin films. They may also help to explain low gaseous diffusion coefficients observed for Tl^{208} ,⁶ and are important in measurements of bond-breaking accompanying β^- decay such as in $Pb^{210}(CH_3)_4$.⁷ Other metallic recoil atoms are being studied.

(6) D. L. Baulch, J. F. Duncan and J. P. Ryan, *ibid.*, **10**, 203 (1957).

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INTERCONVERSIONS OF POLYRIBONUCLEOTIDES AND NUCLEOSIDE TRIPHOSPHATES¹

Sir:

Ribonucleoside diphosphates have been shown to be the precursors of polyribonucleotides in the polynucleotide phosphorylase reactions.² Enzymes catalyzing this reaction have since been demonstrated in extracts from a variety of microbial and plant sources,³ and purified from several different bacteria.³⁻⁵ An enzyme catalyzing the phosphorylation of adenylic polynucleotide to ADP⁶ has recently been isolated from nuclei of mammalian liver.⁷ Some evidence has been accumulated, however, which suggests that the incorporation of AMP into polymeric material catalyzed by soluble extracts from mammalian sources may utilize ATP as the substrate.⁸⁻¹¹

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(6) Abbreviations used: tris, tris-(hydroxymethyl)-aminomethane, P_i , inorganic phosphate, PP_i , inorganic pyrophosphate, ATP, adenosine 5'-triphosphate, ADP, adenosine 5'-diphosphate, GTP, guanosine 5'-triphosphate, UTP, uridine 5'-triphosphate, CTP, cytidine 5'-triphosphate, RNA, ribonucleic acid or mixed polyribonucleotide, c.p.m., counts per minute above background, corrected for self-absorption.

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(9) P. C. Zamecnik, M. I. Stephenson, J. P. Scott and M. L. Hoagland, *Federation Proc.*, **16**, 275 (1957).