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Editor's Page

Our cover molecule is tetraethyllead, which was for about 50 years the most important organometallic compound, with an annual production on the order of one-half billion pounds in its heyday. The present essay serves as a prologue to the story of its dramatic rise and fall, which will be the subject for Part 2. Had it not been for its outstanding performance as an antiknock agent in the internal combustion gasoline engine, tetraethyllead would have remained in obscurity, merely one of the many known main-group organometallic compounds—and not an attractive one at that. It was difficult to prepare and purify and it was dangerously toxic.

The early European academic chemists who prepared and studied tetraethyllead found it to be rather troublesome. In contrast to the lighter group 14 elements Si, Ge, and Sn, for which stable tetrahalides exist, the absence of a useful inorganic Pb(IV) halide is notable. This left either a Pb(II) halide or elemental lead (or one of its alloys) as practical starting materials, which, as will be seen, caused problems. In fact, Carl Löwig, who first prepared tetraethyllead (by the reaction of ethyl iodide with a sodium−lead alloy) missed it completely, isolating instead the oxidation product of hexaethyldilead, which was a minor product of the reaction. Tetraethyllead, the major product, apparently went down the drain.

The account of Fritz Paneth's discovery that pyrolysis of tetramethyl- and tetraethyllead vapor generated methyl and ethyl radicals in the gas phase and that these had sufficiently long lifetimes to react with metal mirrors to produce metal alkyls is included in the present essay as an interlude. This was the first demonstration that these radicals, which Frankland sought so avidly in the 1840s, were capable of existence, at least in the gas phase, and that they had characteristic chemistries.

The cover molecule was kindly provided by Professor Arnold L. Rheingold.

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Editor

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