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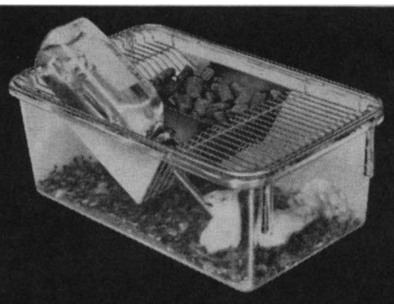

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Report of the AAAS Air Conservation Commission 348 pp., illus., bibliography, index. 1965. Price: $8. AAAS members' cash orders: $7.

"Chaired by Dr. James P. Dixon, the twelve member Commission provided an outstanding representation of the many physical, chemical and social disciplines involved in the definition and dissection of the problem of air pollution. In the course of their deliberations the Commission called upon no less than fifty-five experts; a situation which led to acknowledgments to a list of people which reads like 'Who's Who in Air Pollution.' As the result of these deliberations, this book probably represents the most thoughtful, realistic, and penetrating analysis of air pollution as a factor in the societies of today and tomorrow now available. It is a 'must' for the serious student and professional, and can be highly recommended to the interested citizen."—(*Bulletin American Meteorological Society,* December 1966)

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RECENT
findings

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RADIATION-INDUCED POLYMERIZATION

Ford Motor Company research in radiation cross-linking mechanisms leads to a new paint-curing process

Polymerization initiated by high-energy electrons is being explored by Ford Motor Company scientists. The kinetics of the copolymerization of unsaturated esters with styrene show that unusually rapid rate processes occur by mechanisms which do not follow classical concepts. These results reflect the unique mode of interaction between high-intensity, high-energy electrons and organic molecules.

Optimum reaction rates at a given radiation intensity are noted for solutions containing 65% ester (Figure 1). The overall rate depends both on the reactivity of the components and the steric constraints imposed on the system by the rigid network produced. Since the reaction occurs at room temperature, below the glass transition point of the network, the growing chains are not sufficiently mobile to accommodate the configuration predicted by the established copolymerization theory. The structure of the product depends instead on the concentration of double bonds at the instant of radiation.

As the beam intensity becomes greater (Figure 2), the rates increase linearly; network formation occurs within small, isolated volume elements swept out by the incident electrons. At still higher intensities, the volume elements overlap, so that the efficiency of the reaction now is reduced. A consequence of such fundamental studies was the development of a major innovation in paint-curing technology. Chemical structures exhibiting maximum sensitivity to radiation, and with rheological and weathering properties required for optimum performance, were designed and synthesized. The result is a coating that cures in seconds. And at room temperature.

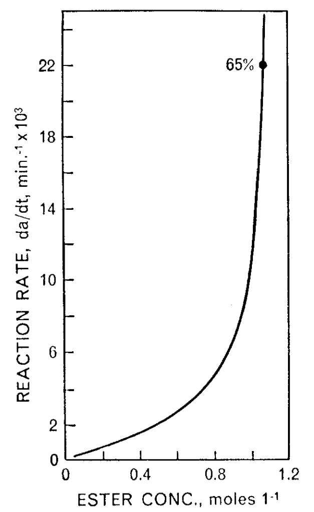

Figure 1. This graph shows the rate of polymerization as a function of ester concentration; commercially useful systems are in the 65% ester range [Burlant and Hinsch, J. Polymer Science, 2, 2135 (1964)].

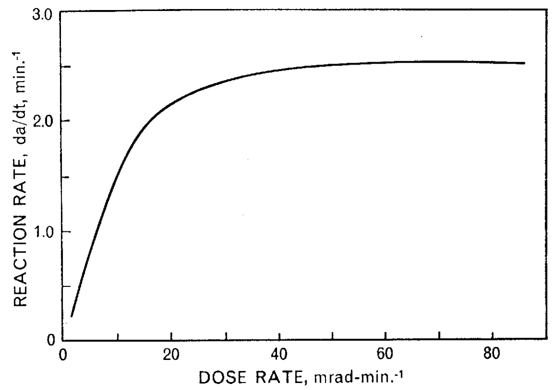

Figure 2. This graph shows the rate of polymerization as a function of radiation intensity for 65% ester solutions; optimum rate occurs with an electron beam intensity of 40 MRAD-min^{-1} [Burlant and Hinsch, J. Polymer Science, 3, 3587 (1965)].

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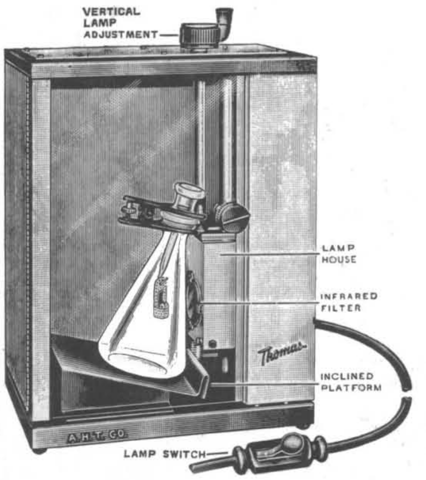
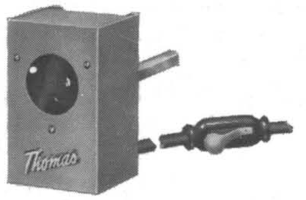


Thomas-Ogg Infrared Igniter



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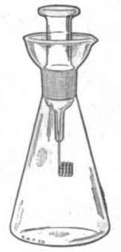
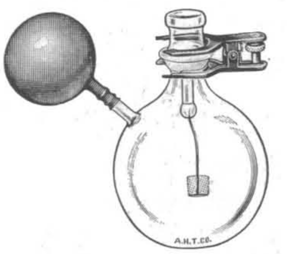
Thomas-Ogg Combustion Flask

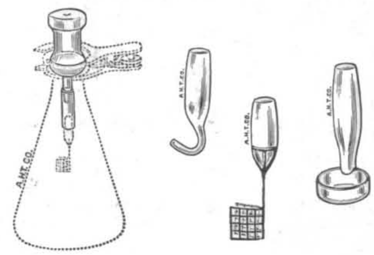
Thomas Addition Funnel



Thomas-Schöniger Flask



Thomas-Lisk Combustion Flask



Thomas-Haack Stopper with separable sample holders

For many years it was thought that combustion equipment for conversion of organically bound elements to inorganic radicals had to be complicated. Elaborate combustion trains with furnaces, flowmeters, tubes, boats, scrubbers and absorbers—or high pressure metal bombs—were used. The equipment was costly, the analysis was slow.

Schöniger, using a converted iodine flask with a platinum flag sealed below the stopper, wrapping his sample in a paper packet, and igniting the paper from a burner flame, obtained equally good results. The only accessories he needed were an oxygen tank and a piece of rubber hose. The flask served as combustion chamber, absorber, and finally as the titration or precipitation vessel . . . and there was no undesirable metal contamination.

Thomas was the first to offer the Schöniger flask, and the first to recognize the value of modifications as they were developed by subsequent authors. Modifications include the clamp-closed Ogg flask with ball-and-socket seal, which is somewhat easier to vent following combustion; the Lisk flask, which takes larger samples and incorporates a rubber balloon for safe expansion of gases during combustion; the Haack stopper with its separable sample carriers; and the Addition Funnel for wash-down of radioactive samples.

Most significant, because of their safety features when working with samples of unknown character, are the Ogg Infrared Igniters for remote firing of the sample. The cabinet model is the more convenient, but the clamp-up model can be used in any suitable hood.

Copy of detailed Bulletin 6472-B sent upon request.
See also Thomas catalog pages 696-699.

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