Table 1. Results of measurements

Measured values (counts/min)	Actual values (disintegrations/min)	Difference (%)
1,090	1,110	2
2,100	2,220	5
4,490	4,440	1
6,430	6,660	3
9,230	8,880	4
11,550	11,100	4
12,600	13,300	5
15,050	15,500	3
18,200	17,800	2
21,700	22,200	2

background but not for resolving time; the actual values are computed from A.E.R.E. data and our own dilutions; one can see that our precision averages 3.1 percent, which is deemed satisfactory for our purpose. At 100-percent efficiency our background reaches 2000 counts/min; if 1 hr is allowed to measure the sample and a 2-percent relative standard deviation is accepted, 2.0×10^{-10} c can be measured.

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Latex Micro-Molding and Latex-Plaster Molding Mixture

Two refinements of the basic technique for molding objects in liquid rubber—a method for making minutely detailed replicas of small and intricate surfaces and a method for quickly filling undercuts and building up mold thickness—have proved exceedingly useful in research. This discussion is intended to supplement my earlier paper on latex-molding techniques (*1*) and Quinn's basic manual (*2*).

Micro-molding. The process of micro-molding grew out of a need for high-fidelity positive replicas of diminutive Carboniferous amphibian skeletons that are preserved in exquisite detail as natural molds in coal-shale. The replicas must be relatively permanent and suitable for photography and study at magnifications of 30 diameters and greater. They must furthermore be made without damage to the delicate specimens. Such standard methods as making plasteline squeezes fail to meet these requirements, and ordinary latex-molding methods do not fill crevices properly or achieve bubble-free surfaces.

For micro-molding the standard Von Fuehrer latex compound, a thick aqueous suspension of prevulcanized rubber particles, is diluted to the consistency of milk with water previously deaerated by distillation or boiling. I have found an opaque red latex best for study and photography. For optimum surface contact, a liquid detergent such as Rohm & Haas' surface-active agents Tamol N or Triton X-100 (*3*) may be added to the latex or brushed over the surface beforehand. Because of their limited tendency to form bubbles these compounds, particularly the first, have proved superior to the household detergents that are sometimes added to latex (*4*).

The first coat is applied with a small brush or rod moved slowly over the surface so as not to override the advance of the wetting agent; this is done best under a low-power binocular microscope. Latex that collects in depressions should be blown out gently with a blowpipe, and any bubbles that form can be broken by blowing on them. Successive thin layers can be applied hourly and dried by the heat of an electric or an infrared lamp. Deep cavities must be filled gradually with several layers, for a solid plug of latex will shrink as it dries. When the latex coating is thick enough to mask the color of the specimen, a layer of undiluted compound is applied to fill minor depressions. For building up thickness, pure latex or latex-plaster mixture is preferable to inelastic fillers such as cheesecloth.

When the backing coat has dried thoroughly, the mold can be loosened at one corner and carefully peeled. Stretching and flexing the rubber during the peeling process serves to minimize damage to the specimen. For convenience of labeling, handling, and storage, flat molds or casts that will not be used for plaster-casting can be cemented with a little latex to heavy 3 by 5-in. or 5 by 8-in. cards on which the data are typed. The backs of other molds can be labeled indelibly in a contrasting color of dilute latex.

Latex-plaster mixture as filler. The great disadvantage to latex molding is the long drying time required. Backing layers of preshrunk cheesecloth or mixtures of latex with sawdust or ground cork speed the drying only moderately. Plaster of paris, however, makes a highly effective filler and drying agent, since it absorbs moisture both physically and chemically, as water of hydration. The method described here was taught to me by Robert G. Caffrey, sculptor and technician at the Carnegie Museum in Pittsburgh.

Plaster is so active a dehydrator that the mixture must be made in small batches and applied immediately, for it sets in about 1 min. I put a flat dab of latex about the size of a half-dollar on the palm of my hand, dump plaster over it from a small jar, and dump back whatever fails to adhere. The rest is hurriedly mixed with a small spatula and applied to the mold in a layer some 2 mm thick. The proper percentage of plaster varies with the job at hand and the consistency of the latex. The mold surface must be kept free of powdered plaster if succeeding layers are to adhere. Excess compound that solidifies on hands or tools is easily rubbed off.

If mild heat is applied, the mixture dries in an hour or less; when the surface fails to retain a fingernail impression, the next layer may be added. Even in thicknesses of 1 cm or more the mold remains pliable enough to pop out of undercuts and peel easily. With this process, molds may, if necessary, be started and peeled the same day. Heavy and fragile plaster mother-molds are less often needed. The simplicity of these molding methods and the excellent results obtainable should recommend them to workers in several fields.

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References and Notes

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3. Samples furnished for testing by V. C. Meunier of Rohm & Haas, Philadelphia, are gratefully acknowledged. These compounds are also excellent mold-wetting agents in plaster-casting. A little detergent in the mix water wets plaster quickly, permits increased density by reducing viscosity of the liquid plaster, and improves surface fidelity of casts.
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