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AC-DC-66-1274X

R & D Department

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ACHESON COLLOIDS COMPANY

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Port Huron, Michigan

1st Review Date:
Authority: ADC
Name:
2nd Review Date:
Authority: ADD
Name:

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file

Project CPD-A-66

MONTHLY REPORT #4

Covering Period from

January 1 to January 31, 1960

SANDIA SYSTEMATIC DECLASSIFICATION REVIEW
DOWNGRADING OR DECLASSIFICATION STAMP

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SANDIA SYSTEMATIC DECLASSIFICATION REVIEW

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Arthur J. Stock

February 12, 1960

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SPECIAL A B C DISPERSION

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I. SUMMARY

With the receipt of quantities of UO_2 powder, our experimental work has continued. There seems to be no interaction when separate dispersions of each solid are mixed together. Thus, it is probable that a master dispersion mixing technique will prove superior to any dry blending technique.

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II. INTRODUCTION

Work continues at Acheson Colloids Company in the production of a superior dispersion of lead and uranium dioxide in epoxy resin. Although the project was delayed by a lack of raw material, this has now been remedied. Thus, investigations this last month have dealt mostly with the determination of interaction between the two solids as dispersed.

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III. PROCEDURES AND RESULTS

As soon as the UO_2 was received from Sandia, a rubout of the material was made in IPON 828. Under the microscope the following evaluation was made:

Maximum	14 microns
Numerous	7.0 to 10.5 microns
Numerous	3.5 to 6.3 microns
Many	1.4 to 2.8 microns
Majority under	1.4 microns

lacking in fines

Comparing this with the Superfine S powder results, it is noticeable that the UO_2 is more coarse than the lead. Also, the UO_2 particles are angular rather than spherical. So far we have not run a check on the material from NZ.

Having the above rubout available, we further took a previous dispersion of lead in epoxy, EC-3001, and blended it with the UO_2 dispersion. The resulting mix appeared as shown in Figure 1.

[redacted]

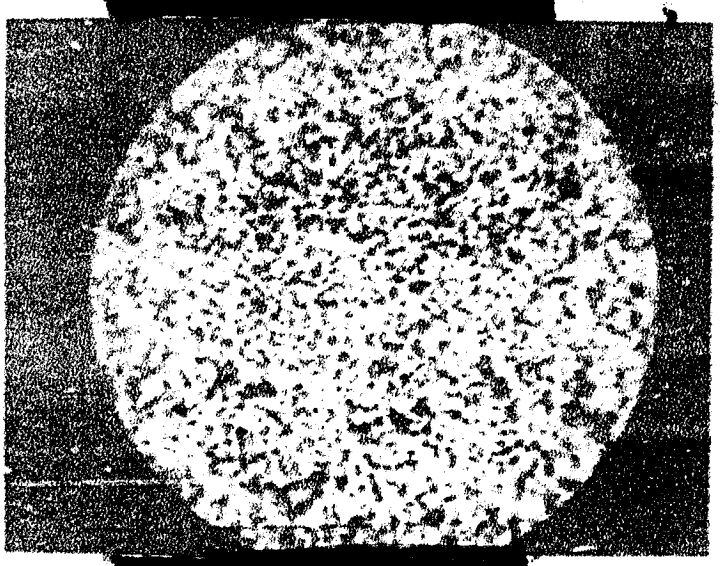

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Figure 1

[redacted]

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It should be noted that no flocculation is apparent. Evidently added dispersing agents are not needed for producing a good, stable system. There is always the question of whether flocculation might occur during the curing of the resin. As soon as we have made solid blocks of the full mix, we plan to start curing these sections of the mix so that we can detect any flocculation tendencies under curing. Also, this may show the source of any bubbles.

After examination of the new powder, another batch of lead in epoxy, EC-3002, was made using the masticator. A slightly larger mill load was used so that the blades were completely covered. This made for much less air entrainment in the mixing procedure. In a subsequent run, EC-3002A, the drier DMP-30 was added also in the final thinning blend of 828 and DOSA. Then the mixer was emptied and put into aluminum dishes for curing. Also some EC-3002 was blended with the correct amount of DMP-30 and put into molds. This allowed a comparison of the two methods of adding the drier.

The molds were then subjected to the full curing cycle with good results. Upon hardening, typical samples were cut open using a hacksaw with subsequent filing. As shown in Figure 2, there is a very fine porous structure evident. It is not known whether this is a result of air entrainment or of chemical reaction and evolution of gas during cure. In either case, this points to the need for vaccum molding techniques, should a pore-free structure be needed for evaluation purposes.

It might be noted that a more dense structure seemed to result when the drier was mixed in, subsequent to mastication. Perhaps the standing time allowed the air bubbles to rise.

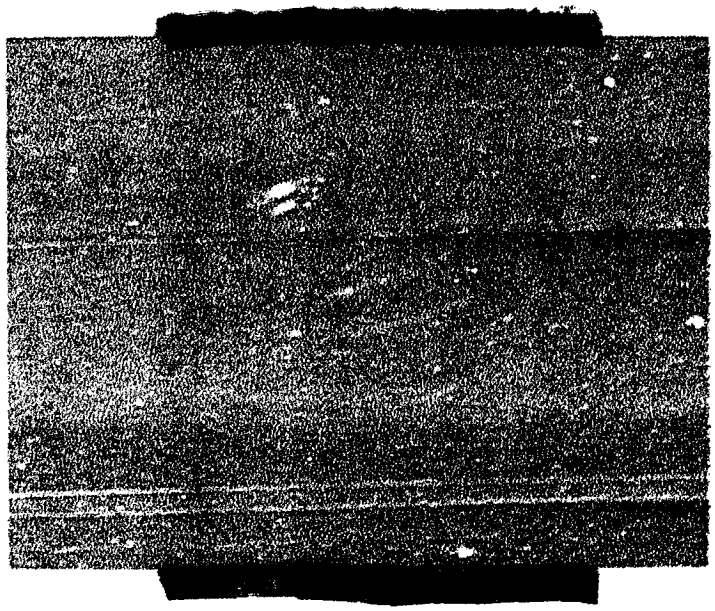

Figure 2.

[redacted]

Because of the difficulty of observing matrix structure in the thick form, it is possible that much of future work will be done in thin films so that microscopic observation is easier. So far it appears that the procedure of wet mixing of two dispersions will lead to an improved final product.

IV. DISCUSSION

Now that we are acquainted with the characteristics of both lead and UO_2 dispersions we will concentrate on the effects of mixing them together. The molded product made in January did not appear of sufficient interest to be sent to Sandia. However, our future work should result in products for evaluation by Sandia.

V. COSTS PER MONTH

Through an oversight the Acheson Colloids Company accounting department didn't bill the November cost of $273.28. This is being taken care of this month, along with December costs of $607.28. We have recently advised C.C. Smith of Sandia that as of January 31, 1960, we estimate that approximately 20% of contract cost has been realized, and our present estimated completion date is April 30, 1960.

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