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ADDITION OF STANDARD QUANTITIES OF
CHEMICALS IN CERTAIN REDUCTION OPERATIONS
IN THE 234-5 BLDG.

I. Introduction

A proposal by "B" Division that operations be simplified by adding fixed amounts of calcium and iodine in the reduction step as a time saving device has been investigated. Preliminary work by F.J. Quinn, HW 21825, July 29, 1951 (1) indicated that a large supply of calcium and iodine should be weighed at one time to save the maximum amount of time.

The advantages of this procedure are:

1. A saving of \$140.00 per 100 runs in direct labor costs by:
 - a. Elimination of 13.5 hours/100 runs of holdup in the process while the chemicals are being weighed.
 - b. Weighing and handling large quantities of calcium and iodine at one time which eliminates about 50 hours of the operator's time.
2. A more efficient use of the operator's time.

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II. Summary and Conclusions

- ① Ten test runs in the 410-430 gram range have been compared with twenty normal runs made in this period. The average yields were 98.27% for the normal method and 98.26% for the test runs. No effect on individual yields by the variance in per cent calcium and the iodine ratio was observed.

Seventy per cent of the runs normally fall into the 410-430 gram range. By controlled compositing of the feed batches, it should be possible to increase the percentage of the PuF_4 runs that fall in this range.

III. Recommendations

The following recommendations should be followed to effect the savings given above:

- ① 1. That 101.6 grams of iodine and 153.8 grams of calcium be used for reductions when the quantity of PuF_4 used is between 410 and 430 grams,
2. That a minimum of a twenty run supply of calcium and iodine be prepared at one time,
3. That the calcium be packaged in shellie bags,
4. That the calcium shellies be stored under argon in a metal container.
5. That the iodine be packaged in Lusteroid tubes with rubber stoppers taped tightly.
6. That a means be provided to keep the iodine tubes upright.

IV. Experimental

On the basis of ten test runs in the 410-430 (1) gram range, standard quantities of calcium and iodine were weighed out. They were charged to 5" by 1 1/4" diameter Lusteroid tubes fitted with rubber stoppers. The tubes were then placed in cardboard containers and stored in Hood 9 to be used as needed.

Ten runs in the specified range were tested and the results compared with twenty normal runs. A plot of per cent yield versus run number is shown on Figure 1. The runs are labelled as to old or new procedure. Both procedures show minor fluctuations but the overall average is virtually a constant. A plot of individual powder weights versus per cent yield is shown on Figure II. Since the quantity of calcium and iodine added to each charge was that considered standard for the 420 gram charge, it was possible that as the powder charge increased above 420 grams the yield would decrease. This would result in a curve with negative slope. Such was not the case. The results plotted on Figure II show no effect on yield as the powder weight varies from 414 to 428 grams.

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V. Chemical Storage

The cost of Insteroid tubes with rubber stoppers is \$.14, while the shellie bags are about \$.025 each. This makes it desirable to use the shellie bags. It is possible to package calcium in these bags if they are kept in an inert atmosphere such as argon.

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1. HW 21825 "Constant Chemical Addition to Reduction Operation in the 234-5 Bldg." F.J. Quinn, July 29, 1951.

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1W22200.

FIG 1

GRAPH OF YIELD VS. RUN NUMBER

average yield for 20 runs using old method--96.27%
average yield for 10 runs using new method--96.26%

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