

Interoffice Communication

To E. M. Smith, Aberdeen, Mississippi
From R. A. Frohreich, Ponca City, Oklahoma
Date July 29, 1974
Subject Results of Steam Stripping 5446 and 5406 Resins

The steam stripping experiments on production batches in V-12 building indicate this to be a viable way to reduce the VCM content of 5446 and 5406 resins to less than 200 ppm.

This work was undertaken to determine the following:

1. Does the addition of steam during recovery reduce the VCM content of the slurry?
2. If so, what is the magnitude of the reduction?
3. What improvement in yield would result from this procedure?
4. What is the VCM content of the dried resin ex the dryer?
5. Is the resin quality affected?
6. Would a capacity reduction result from steam stripping?
7. Would there be an increase in maintenance problems with the recovery systems?
8. What effect would the procedure have on reducing VCM emissions in regard to EPA and OSHA standards?
9. What relationship does time and temperature of the recovery have on the residual VCM content of the slurry and resin product?

I am pleased to be able to report that answers to these questions appear to be favorable or beneficial from an operations standpoint.

The VCM content (resin basis) of the 5446 and 5406 slurries from the reactors which were heated to 160-180°F during recovery averaged about 0.2 percent. Slurries which are recovered by the standard procedure contain 1.5 to 2 percent VCM. Thus

incorporation of steam stripping into the plant operational procedure should improve the yield by about 1.5 percent. Analytical results for all the runs are included in the attached tables.

The VCM content of the dried resin after screening ranged from 10 to 200 ppm.

Steam stripping did not have a detrimental effect on product quality. The gel, contamination, dry time, volatiles, bulk density, and particle size results are included in the attached tables. Heat stability tests have not been completed.

The average time required for recovery using the steam stripping procedure was about 85 minutes, compared to about 45 minutes when using the standard procedure. After these runs were completed, the steam supply header was modified to provide increased steam pressure. The time required for recovery with the higher pressure steam has been about 60 minutes.

There did not appear to be an appreciable increase in plugging or other problems with the recovery system during the testing. Although about 70 batches were steam stripped, this is not enough experience to fully determine if recovery at the increased temperatures will be a problem.

In regard to EPA regulations, the VCM remaining in the slurry is discharged to the atmosphere in the slurry blend tank exhaust and the dryer exhaust. The steam stripping procedure would reduce these emissions from about 10,000 pounds per day to 1,300 pounds per day. From an OSHA standpoint, there would be less VCM exposure in opening reactors, slurry transfers, centrifuging, drying, and transferring resin and performing maintenance in these areas.

From these studies, we conclude that the ending recovery temperature is the most important variable in establishing the residual VCM in the slurry and dried resin. In contrast to previous reports, we see no relationship between the time of recovery and residual VCM content. Because of the limited temperature range investigated plus the difficulties of sampling and analyzing for VCM, the results have a considerable amount of scatter. The recovery temperature-VCM relationships are

E. M. Smith

Page 3

shown in Figures 1 and 2. The plots do show that, as the recovery temperature increases, the VCM remaining in the slurry and dry resin decreases. With the capability of heating the batches to higher temperatures as a result of the increased steam pressure, recovery temperatures of 190 to 200°F are presently being investigated.

Boiling takes place during essentially all of the recovery operation when using the steam stripping procedure. Early in the recovery, the VCM boils off as the pressure is reduced. Later the boiling is due primarily to the water vapor. When most of the VCM is removed, the recovery temperature corresponds to the boiling point of water at the recovery pressure.

The procedure used in these runs is as follows. Steam is injected into the reactor during recovery through a 1/2-inch pipe connection in the dump valve and the batch is heated to the desired temperature. Four similar batches are then combined to make a blend. The blend is then dried in the normal manner. Samples were taken at the reactors, blend tanks, centrifuge, and dryer and then analyzed for VCM content.

Mr. Jerry Powell requested that we also check the VCM content of 5350 and 5385 resins heated to 150°F with the reactor jacket during recovery. This procedure reduced the VCM in the reactor slurry to about 0.5 percent and to 600-2,000 ppm in the dried resin. These results are also shown in the tables.

Similar steam stripping runs are being conducted on 5350 and 5385 resins. The results of these runs will be reported to you upon completion of the analytical work.

We would like to express our appreciation to your operations, maintenance, and laboratory groups whose cooperation and extra effort made it possible to conduct this testing.

We will be happy to answer questions you may have concerning this work.

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E. M. Smith
Page 4

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TRP:FEL:REB:GEH:CRM:ETM:MDM

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