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ASAP

INTER-OFFICE MEMO **TENNECO CHEMICALS, INC.**

TO M. W. WILLIAMS AT PISCATAWAY DATE January 2, 1969

FROM H. B. CARR AT BURLINGTON COPY TO P. F. Albanese
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File

SUBJECT MVC - STATUS REPORT

Since August, there have been five periods of variable monomer quality. These periods, summarized in attachment 1 together with corresponding Houston gas chromatographic data and Flemington Polymerization Research Bottle Polymerization data, are as follows:

1. 8/7 - 8/31 - This is a period in which 65% of the monomer came from outside sources. The average of several Dow Test Conversions was 82.1%, which indicates high quality monomer.

2. 8/31 - 9/20 - This period represents good quality Houston monomer received after the plant turn-around. Tentative specifications were established, effective 9/20/68, (Reference 1).

3. 9/20 - 10/20 - Monomer quality deteriorated as indicated by Houston gas chromatographic tank car data. The plant was shut-down for three days, 10/12 - 10/14 to clean out, the light ends column (Reference 7). Dow Tests on monomer samples yielded 58.0% conversion for virgin and 40.0% for recovered monomer.

4. 10/20 - 11/15 - Houston monomer quality improved after the shut-down period and met the tentative specifications. Dow Tests on monomer samples yielded 69.8% conversion for virgin and 54.0% for recovered.

5. 11/15 to present - Monomer quality has steadily worsened but is not yet as poor as the monomer prior to the 10/12 shut-down. In a recent phone conversation, P. M. Reed stated that the Houston Process Engineering and Operations Groups do not have an explanation for this trend. The number of tank cars exceeding the specifications are listed in Attachment 1.

These periods of variable monomer quality have been evaluated by observation of plant performance in a coordinated program involving Quality Control, Process Engineering and Polymerization Research. An evaluation such as this over relatively short periods is difficult because of the influence of other variables such as formulation changes and the effects

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of other raw materials. However, despite this fact and while recognizing that other interpretations are possible, the following effects are concluded in this report to be related to monomer:

1. <u>Plastisol Reaction Times</u>

Process Engineering has plotted plastisol reaction times in chronological order from 8/7 to 12/3/68 (Attachment 3). As pointed out in E. J. Hourihan's memo to H. B. Carr of 12/13/68 (Reference 2), the variability of DHW-80 emulsifier affected plastisol reaction times during this period and representative samples will be evaluated by Qualtiy Control and C. W. Johnston.

However, notwithstanding the effect of DHW-80, relatable trends in reaction times with the varying periods of monomer quality exist and are summarized in Attachment 2.

2. <u>Suspension Plant Reaction Times and Particle Size Distribution</u>

In A. V. Wagner's report on Particle Size Control (Reference 8), it was pointed out that monomer quality may affect reaction times and that reaction times apparently affect particle size. In reviewing the chart included with this report, there are trends in particle size and reaction time variation which relate to monomer quality variation and these are summarized in Attachment 4.

3. <u>Copolymer Light Absorbance and Homopolymer Heat Stabiltiy</u>

Attachment 5 summarizes the light absorbance plot of 315 Copolymer and the heat stability plot of 250 Homopolymer shown in Attachments 6 and 7. Here again, relatable trends with varying monomer quality are apparent.

4. <u>PR Bottle Polymerization Evaluations</u>

It is interesting to note in Attachment 1 that even in periods of "good" Houston monomer, none of the results pass the minimum Dow Test conversion requirement of 80% in five hours. It has been demonstrated previously (Reference 9) that Conoco, Ethyl and Stauffer monomers (which were used during the 8/7 - 8/31 period) consistently meet this 80% minimum requirement and are very low in unsaturate impurities. This fact offers additional indication of the importance of monitoring light end unsaturates. However, whether plant performance suffers from the effect of individual light ends, and/or synergistic combinations and/or relatable amounts of heavier end impurities is not known at this time.

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Burlington Quality Control has established the gas chromatographic conditions for analyzing light end impurities on its new instrument and is in the process of quantifying the analysis. We should be routinely analyzing Houston tank cars by the end of January. Further, a gas chromatographic method was found in the literature for determining heavy end impurities (J. Chromatog., 34 (1968) 394-498) and will be investigated.

The conclusions, based on the results in this report, are:

1. The tentative specs. are meaningful and may require further adjustment as additional data is accumulated.

2. The Houston plant shut-down of 10/12/68 was justified in light of the deleterious affects of poor quality monomer on our productivity and quality.

3. Burlington Quality Control's gas chromatographic capability for analyzing monomer on a statistical basis should be expedited.

4. In addition to monomer, the investigation and definition of critical quality parameters of DHW-80 plastisol emulsifier must be given high priority.

Attachment 1

## Monomer Quality Summary

### Gas Chromatographic

| Monomer Period | | Analysis Data Virgin | Analysis Data Recovered | Dow Test Data Virgin | Dow Test Data Recovered |
|---|---|---|---|---|---|
| 8/7 - 8/31 Good Monomer, 65% from outside suppliers | | | | 82.1% | |
| 8/31 - 9/20 Good | | In spec., except propadiene 5-55 ppm | | 66.4% | |
| 9/20 - 10/20 Poor | Propylene | 23-148 | 204 | 58.0% | 40.0% |
| | Propadiene | 60-205 | 1,401 | | |
| | Butene-1 | 1-9 | 40 | | |
| | Methyl Acetylene | 5-86 | 512 | | |
| | 1,3 Butadiene | 1.6-3.0 | ND | | |
| | | | Total 2,157 | | |
| 10/20 - 11/15 Good | Propylene | In spec. | 90 | 69.8% | 54.0% |
| | Propadiene | | 1,071 | | |
| | Butene -1 | | 146 | | |
| | Methyl Acetylene | | 264 | | |
| | 1,3 Butadiene | | ND | | |
| | | | Total 1,571 | | |
| 11-15 - present Worsening | Propylene | 21-37 | From 11/15 to 12/22, 23 of 80 cars out of spec. (last 20 in spec.) | | |
| | Propadiene | 62-176 | From 11/8 " ", 83 " 93 " " " " | | |
| | Butene-1 | 5-7 | From 11/29 " ", 19 " 46 " " " " | | |
| | Mehtyl Acetylene | 5-30 | From 11/8 " ", 76 " 93 " " " " | | |
| | 1,3 Butadiene | 1.7-18 | From 11/15 " ", 66 " 80 " " " " | | |

Attachment 2

## Plastisol Reaction Times

| Monomer Period | 1730 | 1740 |
|---|---|---|
| 8/7 - 8/31<br>Good | No Prod. | av. 29.9(18-20 lbs.cat.) with "slow" DHW-80,0.5% Dow Conversion |
| 8/31 - 9/20<br>Good | av. 25.5 (20 lbs.cat.) change in DHW-80 had no effect | av. 29.2 (20 lbs.cat.) change in DHW-80 had no effect |
| 9/20 - 10/20<br>Poor | av. 20.0 (14-16 lb. cat.) with "fast" DHW-80, 21.5% Dow Conversion. Then, an increase noted from 21.0 to 30.0 (12 lbs. cat.) | Increase from 25.5 to 30.5 (20 lbs.cat.) with same DHW-80 as 8/31 - 9/20. Then, increase from 22.0 (16 lbs.) to 29.0 (14 lbs.) with "fast" DHW-80. An average of 30.6 (14 lbs.) finally resulted. |
| 10/20 - 11/15<br>Good | Decrease from 30.0 (12 lbs.) to 24.6 (16 lbs.) with new DHW-80 | Decrease from 30.6 (14 lbs.) to 27.6 (14 lbs.) |
| 11/15 to present<br>Worsening | Increase from av. 24.7 (16 lb.) to 28.0 (16 lbs.) with new DHW-80. | Increase from av. 25.8 (16 lbs.) to 29.9 (18 lbs.) with new DHW-80. Then 29.0 (18 lbs.) |