UNION CARBIDE CHEMICALS COMPANY
DIVISION OF UNION CARBIDE CORPORATION
P. O. BOX 471, TEXAS CITY, TEXAS

April 25, 1962

Dr. Hans Bauer
Wacker Chemie, GmbH
Burghausen/OBB,
Abteilung J,
West Germany

Suspension Polyvinyl
Chloride Polyerizations
At High Temperatures
(Methocel-15 Recipe)

Dear Dr. Bauer:

This letter is being sent to you to provide you with some information about our planned operations and ask you for your comments and suggestions. As you know from the Design Report information forwarded to you early in April, our new autoclaves will be capable of operating at pressures up to 200 psig. We established this pressure rating to permit us to operate at the higher temperatures without the use of trichloroethylene or other resin viscosity degraders which are normally used when the required high temperatures cannot be achieved in equipment of lower pressure rating. In addition, operation without trichloroethylene would eliminate the cost of this raw material, increase productivity of the process, and eliminate the problems of separating this additive from recovered monomer before reuse.

We are planning to use your basic recipe for the H100/Kf series of resins using Methocel-15 suspending agent, sodium bicarbonate buffer, and dilauroyl peroxide catalyst, but we are not certain that we can operate at the higher temperatures successfully with this recipe. The following table lists the resin viscosities we plan to make.

I. This is the range of resin viscosities we plan to produce without trichloroethylene degrader, and the temperatures and pressures involved:

| | RESIN SPECIFIC VISCOSITY, $\eta$ sp* | APPROXIMATE K-VALUE | TEMPERATURE, °C | AUTOCLAVE PRESSURE, psig |
|---|---|---|---|---|
| 1) | 0.110 - 0.120 | 50 - 51 | 74 | 180 |
| 2) | 0.140 - 0.150 | 57 | 64 | 145 |
| 3) | 0.165 - 0.175 | 61 - 62 | 58 | 124 |
| 4) | 0.175 - 0.190 | 64 - 65 | 56 | 115 |
| 5) | 0.190 - 0.205 | 65.5 - 66.5 | 52 | 108 |
| 6) | 0.205 - 0.215 | 68 - 69 | 50 | 100 |

* 0.2 gm resin in 100 ml nitrobenzene at 20°C.

II. At the present time we are producing these resins at South Charleston according to the following recipes:

| | Specific Viscosity, $\eta$ sp | Operating Temp, °C | Trichloro-Ethylene, % | Catalyst, % | Monomer /Water Ratio | Methocel 15, % | Buffer, % |
|---|---|---|---|---|---|---|---|
| 1) | 0.110-0.120 | 57.5 | 2.2 | 0.20 | 37/63 | 0.15 | 0.15 |
| 2) | 0.140-0.150 | 57 | 1.0 | 0.17 | 37/63 | 0.15 | 0.15 |
| 3) | 0.165-0.175 | 57 | 0.2 | 0.13 | 33/67 | 0.15 | 0.15 |
| 4) | 0.175-0.190 | 56 | None | 0.13 | 33/67 | 0.15 | 0.15 |
| 5) | 0.190-0.205 | 52 | None | 0.20 | 33/67 | 0.15 | 0.15 |
| 6) | 0.205-0.215 | 50 | None | 0.32 | 33/67 | 0.15 | 0.15 |

We have experienced considerable foaming with the two lowest viscosity polymerizations, 1) and 2), and believe this is caused by the use of trichloroethylene in the charge, since that is the only major change in the recipe.

We would like to know whether you believe the higher temperatures (64° and 74°C) which we plan to use will permit us to produce good resin with the Methocel-15, sodium bicarbonate recipe. What will be the effect of these temperatures n the suspending agent and its ability to produce the desired resin particles with ut agglomeration and excessive fisheye formation? Would you expect any problem of maintaining a reasonable reaction rate with dilauroyl peroxide at these temperatures? Would you expect the resin to have good heat and light stability

or be deficient in these respects? Could you suggest ways that the c ncentrations of Methocel-15, bicarbonate, and dilauroyl peroxide could be adjusted to make high temperature polymerization more reliable? What is th highest temperature you would recommend for dilauroyl peroxide? Can high temperature reactions be maintained properly by periodic catalyst additions, in your opinion?

We are presently unable to make development scale polymerizations to determine this information because our 600-gallon experimental autoclave has been dismantled for transfer here to our Texas plant.

We must know whether we need to include facilities in the new plant to store and meter trichloroethylene for these lower viscosity resins, if our pres nt plans to operate without trichloroethylene are not practical. In addition, w must make provisions for the removal of trichloroethylene from recovered monomer in the event we are forced to use this degrader to produce good resin. At this time, we would prefer not to use trichloroethylene at all, but if we must, we would prefer to duplicate our present South Charleston processes than to change to other recipes using different suspending agents or surfactants such as you now use for your H100/55D resin. What provisions do you recommend for removal of trichloroethylene from recovered vinyl chloride?

Please reply to me directly at the Texas City Plant:

Mr. J. F. Erdmann
Building 114
Union Carbide Chemicals Company
P. O. Box 471
Texas City, Texas, U.S.A.

I will be awaiting your comments on these questions with great interest. Thank you very much for your advice and help on the questions. I send you my best personal regards.

Very truly yours,

J. F. Erdmann

JFE/des

cc: Mr. J. A. Bruton, New York Office
Dr. R. P. Kurkjy, Geneva
File

bcc: Mr. A. R. Anderson
Mr. L. B. Dampman
Mr. D. L. Engle
Mr. O. A. Holt
Mr. R. W. Quarles
Mr. D. E. Richardson
Mr. H. H. Savage
Mr. C. O. Steinmetz
Mr. M. E. Sutherland
Dr. D. M. Young