# Reactor Opening Loss Calculations

Date: 3-29-79 Reactor: D-400 Blend No. 38285 Sample No. 43
Resin Type: 5385

DATA:

| | | |
|---|---|---|
| Total Reactor Volume | = 2512 | $FT^3$ |
| Reactor Temperature | = 131 °F + 460 = 591 | °R |
| Reactor Pressure | = 30.0# in. Hg × 25.4 = 763 | mm Hg |
| VCM Charge Amount | = 623 counts × 10 = 6230 | Gal. |
| VCM Density (T = 51 °F) | = 7.744 | #/Gal |
| VCM to PVC Conversion | = 76 | % |
| Measured Vapor Concentration | = 1588 | ppm |
| Avg. Measured Slurry Concentration | = 78 | # VCM / MM# PVC |
| $H_2O$ Vapor Pressure @ Rx. Temp | = 118 | mm Hg |

a) One mole of ideal gas occupies 359 cu. ft. at 32°F (492°R) and 760 mm Hg

b) The volume correction at the reactor's temperature and pressure is:

$$V_c = 359 \times \frac{760}{763} \times \frac{591}{492} = 429.5 \text{ cu. ft/\# mole}$$

c) Total moles in reactor at time of sampling:

$$M = \frac{\text{Reactor Volume}}{V_c} = \frac{2512}{429.5} = 5.85 \text{ \# moles}$$

d) Moles of dry gas in reactor at time of sampling:

$$M_{DRY} = M \times \frac{(\text{Rx. Press} - H_2O \text{ Vapor Press})}{\text{Reactor Pressure}} = 5.85 \times \frac{(763 - 118)}{763} = 4.94 \text{ \# moles}$$

e) VCM emissions:

$$\# = M \times 10^{-6} \times \text{Vapor Concentration} \times \text{VCM Molecular Weight}$$
$$= 5.85 \times 10^{-6} \times 1588 \times 62.499 = 0.58 \text{ \# VCM}$$

$$\#_{DRY} = M_{DRY} \times 10^{-6} \times \text{Vapor Concentration} \times \text{VCM Molecular Weight}$$
$$= 4.94 \times 10^{-6} \times 1588 \times 62.499 = 0.49 \text{ \# VCM}$$

f) Lbs. of PVC produced in reactor:

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$$R = \text{VCM Charge Amount} \times \text{VCM Density} \times \text{VCM to PVC Conversion}$$
$$= 6230 \times 7.744 \times .76 = 36,666 \text{ \# PVC}$$

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## REACTOR OPENING LOSS CALCULATIONS (CONT.)

g) VCM EMISSIONS IN VAPOR PER MM lbs. PVC

$$E = \frac{\#_{VCM} \times 10^6}{R} = \frac{0.58 \times 10^6}{36{,}666} = 15.8 \text{ \# VCM/MM \# PVC}$$

$$E_{DRY} = \frac{\#_{DRY} \times 10^6}{R} = \frac{0.49 \times 10^6}{36{,}666} = 13.4 \text{ \# VCM/MM \# PVC}$$

h) TOTAL VCM EMISSIONS FROM REACTOR IN VAPOR AND SLURRY

$$T = E + \text{Avg. Slurry Concentration} = 16 + 78 = 94 \frac{\text{\# VCM}}{\text{MM \# PVC}}$$

$$T_{DRY} = E_{DRY} + \text{Avg. Slurry Concentration} = 13 + 78 = 91 \frac{\text{\# VCM}}{\text{MM \# PVC}}$$