Reactor Opening Loss Calculations

Date: 3-19-79 Reactor: D-742 Blend No. 13734 Sample No. 31
Resin Type: 5425

DATA:

Total Reactor Volume	=	2916 FT^3
Reactor Temperature	=	113 °F + 460 = 573 °R
Reactor Pressure	=	29.89 in. Hg × 25.4 = 759 mm Hg
VCM Charge Amount	=	715 counts × 10 = 7150 gal.
VCM Density (T=51 °F)	=	7.744 #/gal
VCM to PVC Conversion	=	70 %
Measured Vapor Concentration	=	31302 ppm
Avg. Measured Slurry Concentration	=	631 # VCM / MM# PVC
H_2O Vapor Pressure @ Rx. Temp	=	72 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:

$$V_c = 359 \times \frac{760}{759} \times \frac{573}{492} = 418.7 \text{ cu. ft/\# mole}$$

c) Total moles in reactor at time of sampling:

$$M = \frac{\text{Reactor Volume}}{V_c} = \frac{2916}{418.7} = 6.97 \text{ \# moles}$$

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

$$M_{DRY} = M \times \frac{(\text{Rx. Press} - H_2O \text{ Vapor Press})}{\text{Reactor Pressure}} = 6.97 \times \frac{(759 - 72)}{759} = 6.30 \text{ \# moles}$$

e) VCM emissions:

$$\# = M \times 10^{-6} \times \text{Vapor Concentration} \times \text{VCM Molecular Weight}$$
$$= 6.97 \times 10^{-6} \times 31302 \times 62.499 = 13.63 \text{\# VCM}$$

$$\#_{DRY} = M_{DRY} \times 10^{-6} \times \text{Vapor Concentration} \times \text{VCM Molecular Weight}$$
$$= 6.30 \times 10^{-6} \times \quad \times 62.499 = 12.32 \text{ \# VCM}$$

f) Lbs. of PVC produced in reactor:

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$$R = \text{VCM Charge Amount} \times \text{VCM Density} \times \text{VCM to PVC Conversion}$$
$$= 7150 \times 7.744 \times 0.70 = 38{,}759 \text{ \# PVC}$$

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Reactor Opening Loss Calculations (cont.)

g) VCM Emissions in Vapor per MM lbs. PVC

$$E = \frac{\#_{VCM} \times 10^6}{R} = \frac{13.63 \times 10^6}{38,759} = 352 \text{ \# VCM / MM \# PVC}$$

$$E_{DRY} = \frac{\#_{DRY} \times 10^6}{R} = \frac{12.32 \times 10^6}{38,759} = 318 \text{ \# VCM / MM \# PVC}$$

h) Total VCM Emissions from reactor in vapor and slurry

$$T = E + \text{Avg. Slurry Concentration} = 352 + 631 = 983 \frac{\text{\# VCM}}{\text{MM \# PVC}}$$

$$T_{DRY} = E_{DRY} + \text{Avg. Slurry Concentration} = 318 + 631 = 949 \frac{\text{\# VCM}}{\text{MM \# PVC}}$$