P10-14

Assume the rate law is of the form

$$r_{Dep} = \frac{k P_{VTIPO}^2}{1 + K P_{VTIPO}^2}$$

At high T K ↓ as T ↑ ∴ $K P_{VTIPO}^2 << 1$

$$r_{Dep} = k P_{VTIPO}^2$$

$$\frac{r_{Dep}}{P_{VTIPO}^2} = k$$

Run #	1	2	5
k	$\frac{0.028}{(0.05)^2}$	$\frac{0.45}{(0.2)^2}$	$\frac{7.2}{(0.8)^2}$
	11.2	11.28	11.25

At low T and low P

$$r_{Dep} = k P_{VTIPO}^2$$

$$\frac{r_{Dep}}{P_{VTIPO}^2} = k$$

	Run 1	Run 2
	$\frac{0.004}{0.1^2}$	$\frac{0.015}{0.2^2}$
	= 0.4	0.375

↑ low Pr. data fits

at high P $KP^2_{VTIPO} >> 1$

$$r_{dep} = \frac{k P^2_{VTIPO}}{K P^2_{VTIPO}} = \frac{k}{K}$$

at $P_{VTIPO} = 1.5$ $r = 0.095$

$P_{VTIPO} = 2$ $r = 0.1$

Activation energy :

at low P high T $k = 11.2$

at low P low T $k = 0.4$

$$\ln\left(\frac{k_2}{k_1}\right) = \frac{E}{R}\left(\frac{1}{T_1} - \frac{1}{T_2}\right)$$

$$\ln\left(\frac{11.2}{0.4}\right) = \frac{E}{R}\left(\frac{1}{473} - \frac{1}{393}\right)$$

$$\frac{E}{R} = 7738 \ 1/k$$

$$E = 15375 \ \frac{cal}{mol}$$