

EXAMPLE 1 LECTURE SET 4

Puddle example:

$$\ln \frac{V_2}{V_1} = \beta (T_2 - T_1) - K(P_2 - P_1)$$

this won't work if $\beta = f(T)$ go back one step.

$$\frac{dV}{V} = \beta dT - K dP$$

$$\frac{dV}{V} = (2 \times 10^{-5} T - 7 \times 10^{-5}) dT$$

integrate. state 1 to state 2

$$\ln \frac{V_2}{V_1} = 2 \times 10^{-5} \frac{1}{2} T^2 - 7 \times 10^{-5} T + \text{const} \Big|_{T_1}^{T_2}$$

$$\ln \frac{V_2}{V_1} = 1 \times 10^{-5} ([277.15]^2 - [274.15]^2) - 7 \times 10^{-5} (277.15 - 274.15)$$

$$= (1 \times 10^{-5}) 1653.9 - 7 \times 10^{-5} (3)$$

$$= 0.016329$$

$$V_2 = e^{0.016329} \cdot V_1 = 1.0165 \cdot 5 = 5.08 \text{ L}$$

The volume increased by approx. 80 mL to 5.08 L