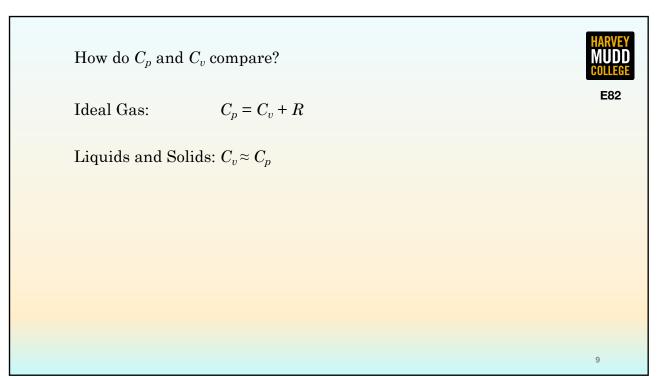
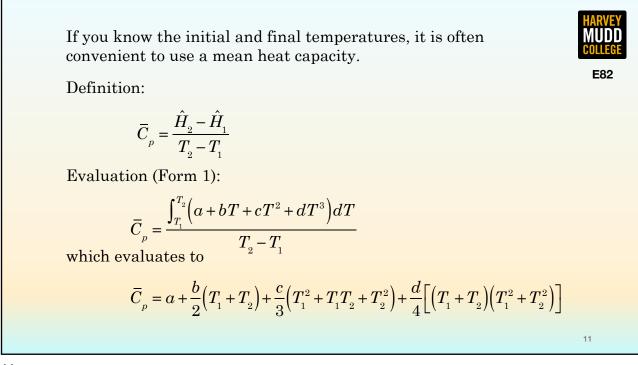


What if the pressure changes? In general: $d\hat{H} = C_p dT + \left[\hat{V} - T\left(\frac{\partial \hat{V}}{\partial T}\right)_p\right] dP$ Ideal Gas: $\Delta \hat{H} = \int_{T_1}^{T_2} C_p(T) dT$ No pressure dependence Liquids and Solids: $\Delta \hat{H} = \int_{T_1}^{T_2} C_p(T) dT + \int_{P_1}^{P_2} \hat{V} dP \approx \int_{T_1}^{T_2} C_p(T) dT + \hat{V} \Delta P$



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Evaluation (Form 2):
$$\begin{split}
\overline{C}_{p} &= \frac{\int_{T_{1}}^{T_{2}} \left(a + bT + cT^{-2}\right) dT}{T_{2} - T_{1}}
\end{split}$$
which evaluates to
$$\begin{split}
\overline{C}_{p} &= a + \frac{b}{2} \left(T_{1} + T_{2}\right) + \frac{c}{T_{1}T_{2}}
\end{split}$$
If you have tabulated heat capacities the integration can be done numerically.

It should be obvious that $\begin{aligned}
\hat{\mu} = \hat{\Gamma}_{\mu} \Delta T
\end{aligned}$ The things in thermodynamics rarely are. $\begin{aligned}
\hat{\mu} = \int_{1}^{T_{\mu}} C_{\mu}(T) dT = \int_{1}^{T_{\mu}} (\alpha + \beta T + cT^{2} + dT^{3}) dT \quad \text{or} = \int_{1}^{T_{\mu}} (\alpha + \beta T + cT^{-2}) dT dT
\end{aligned}$

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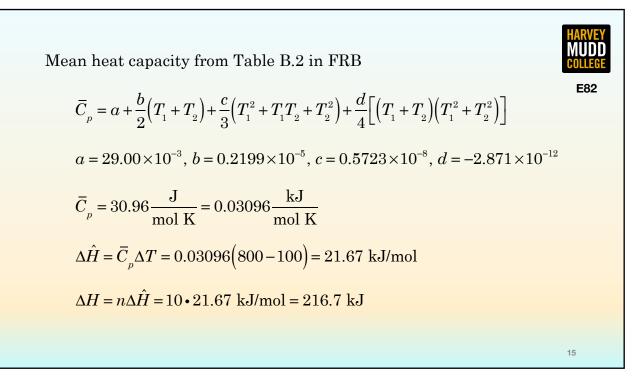
Example: Calculate ΔH for 10 moles of N₂ going from 100°C to 800°C. Compare the results for an approximate heat capacity, the mean heat capacity formula, integrating the heat capacity, and using Table B.8 in FRB.

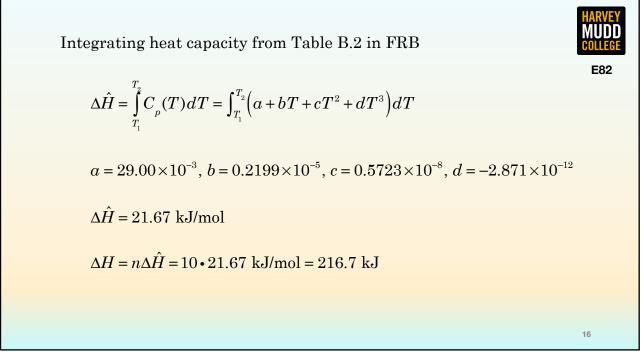
Approximate heat capacity for a diatomic gas.

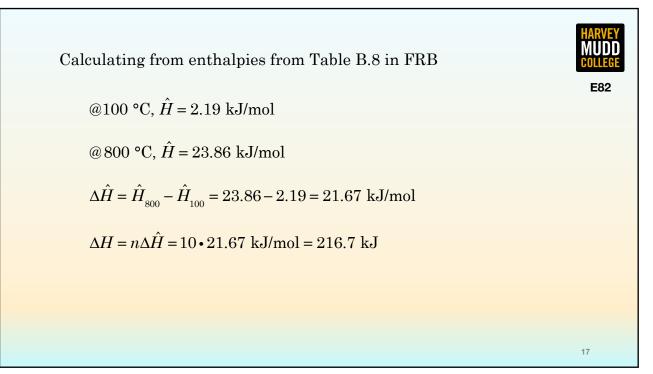
$$C_{p} = \frac{7}{2}R = 3.5 \cdot 8.314 \frac{\text{J}}{\text{mol K}} = 29.10 \frac{\text{J}}{\text{mol K}} = 0.0291 \frac{\text{kJ}}{\text{mol K}}$$
$$\Delta \hat{H} = C_{p} \Delta T = 0.0291 (800 - 100) = 20.37 \text{ kJ/mol}$$

$$\Delta H = n\Delta \hat{H} = 10 \cdot 20.37 \text{ kJ/mol} = 203.7 \text{ kJ}$$

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R	8.3145J/mol K		Comparison	C	ΔH hat	ΔIJ	04 d;ff
n T	10g-mol		Approx C_p	0.02910			-6.01%
T_1	100°C		Mean C_p				
T_2	800°C		Int. C_p				0.00%
			Table B.8	N/A	21.67	216.7	-0.02%
7/2 R	0.02910kJ/mol K						
ΔH hat	20.37 kJ/mol						
ΔH	203.7 kJ						
C_p bar	0.03096 kJ/mol °C	a	b	с	d		
ΔH hat	21.67 kJ/mol	2.90E-02	2.20E-06	5.72E-09	-2.87E-12		
ΔH	216.7kJ						
ΔH hat	21.67kJ/mol						
ΔH	216.7kJ						
	Hhat (kJ/mol)						
100 °C	2.19						
800 °C							
ΔH hat	21.67 kJ/mol						
ΔH	216.7kJ						

