Chap. 2 **REPEAT / REVIEW: Slides #60-61**
Feb 5 **Perfect Gas Expansions/Compression**

A sample of 32 g of $CH_4(g)$ is initially at a pressure of 500 kPa and volume of 20 L.

M = 16
$C_{V,m}$ = 27.3 J/mol-K

Calculate q, w, ΔU and ΔH for each of the following processes:

1. The gas is expanded reversibly and isothermally to a volume of 40 L.

2. The gas is expanded reversibly and adiabatically to a pressure of 200 kPa and a volume of 40 L.

Chap. 2 **REPEAT / REVIEW: Slides #60-61 (CONT'D)**
Feb 5 **Perfect Gas Expansions/Compression**

A sample of 32 g of $CH_4(g)$ is initially at a pressure of 500 kPa and volume of 20 L.

Calculate q, w, ΔU and ΔH for each of the following processes:

3. The gas is cooled at a constant pressure of 500 kPa to a volume of 12 L.

$w = -P\Delta V$ $\quad q = \Delta H$

$\Delta U = n C_{V,m} \Delta T = 2(27.3)(361 - 601)$

$= -13,100\ J$

$q = \Delta H = n C_{P,m} \Delta T = 2(35.1)(361 - 601)$

$= -17,100\ J$

$T_2 = \frac{500(12)}{2(8.31)}$

$= 361\ K$

$\Delta U = q + w \rightarrow w = \Delta U - q$

$= -13,100 - (-17,100)$

$= 4,000\ J$

4. The gas is heated at a constant volume of 20 L until the pressure reaches 700 kPa.

$T_2 = \frac{700(20)}{2(8.31)} = 842\ K$

$q = \Delta U = n C_{V,m} \Delta T = 13,200\ J$

$\Delta H = n C_{P,m} \Delta T = 17,200$

$w = 0$

$w = -P\Delta V$

$= -500(12 - 20)$

$= 4000\ kPa \cdot L$

$= 4000\ J$