

**UNIVERSITY CEU SAN PABLO
SCHOOL OF PHARMACY
DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY**

COMPLEMENTARY PROBLEMS OF PHYSICAL CHEMISTRY

2018-19

LESSON 2

6. One mole of carbon monoxide undergoes a reversible process from 10 atm and 10 l to a final pressure of 1 atm. Considering ideal behaviour, calculate Q, W, ΔU , ΔH , ΔA and ΔG if the process is :
- a) isochoric
 - b) isothermal
- Data:** $C_p = 7n/2 R$ and $C_v = 5n/2 R$

Solution:

- a) $Q = -22812.74 \text{ J}$; $W = 0$; $\Delta U = -22812.74 \text{ J}$; $\Delta H = -31937.76 \text{ J}$; $\Delta S = -47.86 \text{ J}\cdot\text{K}^{-1}$;
 $\Delta G = \text{It can not be calculated}$; $\Delta A = \text{It can not be calculated}$
- b) $Q = 23345.89 \text{ J}$; $W = -23345.89 \text{ J}$; $\Delta U = 0$; $\Delta H = 0$; $\Delta S = 19.14 \text{ J}\cdot\text{K}^{-1}$;
 $\Delta G = \Delta A = -23345.89 \text{ J}$.

7. 5 l of an ideal monoatomic gas at 300 K and 1 atm are compressed to 100 atm. Calculate Q, W, ΔU , ΔH , ΔS , ΔA , ΔG , for the reversible isothermal process.
- Data:** $R = 0.082 \text{ atm}\cdot\text{l}\cdot\text{mol}^{-1}\cdot\text{K}^{-1} = 1.987 \text{ cal}\cdot\text{mol}^{-1}\cdot\text{K}^{-1} = 8.314 \text{ J}\cdot\text{mol}^{-1}\cdot\text{K}^{-1}$

Solution:

$Q = -2333.99 \text{ J}$; $W = 2333.99 \text{ J}$; $\Delta U = \Delta H = 0$; $\Delta S = -7.78 \text{ J}\cdot\text{K}^{-1}$; $\Delta G = \Delta A = 2334.78 \text{ J}$.