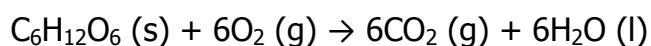


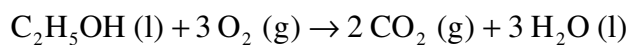
Problem Session #4

- 1) The oxidation of glucose, $C_6H_{12}O_6$, is a basic metabolic process in all life. In cells, it is performed by a complex series of enzyme-catalyzed reactions. The overall reaction is



If the standard enthalpy of formation of glucose is -1277 kJ/mole , what is the ΔH_r^0 for this process? The ΔH_f^0 values for $CO_2 (g)$ and $H_2O (l)$ are -393.51 and -285.83 kJ/mole , respectively.

- 2) Combustion of ethanol in a constant- volume calorimeter produces $1364.34 \text{ kJ.mol}^{-1}$ at $25 \text{ }^\circ\text{C}$. What is the value of ΔH_r^0 for the following combustion reaction?

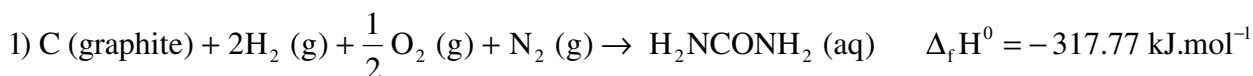
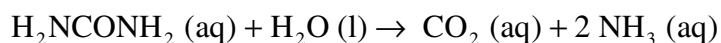


- 3) What are the standard enthalpy changes at 298.15 K and 2000 K for the following reaction?



	$\Delta_f H^0 (CO)(\text{kJ.mol}^{-1})$	$\Delta_f H^0 (CO_2)(\text{kJ.mol}^{-1})$
298.15 K	-110.527	-393.522
2000 K	-118.896	-396.784

- 4) Calculate ΔH_r^0 for the hydrolysis of urea to give carbon dioxide and ammonia in aqueous solution:





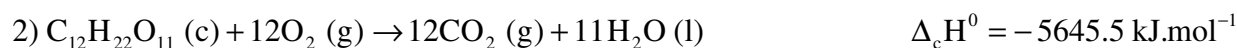
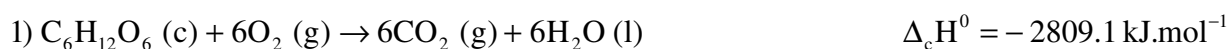
- 5) The enthalpy changes in complete combustion of crystalline α -D-glucose and maltose at 298 K, with the formation of gaseous CO_2 and liquid H_2O , are:

$$\Delta_c \text{H}^0 (\text{kJ.mol}^{-1})$$

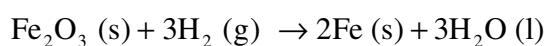
$$\alpha\text{-D-Glucose, C}_6\text{H}_{12}\text{O}_6 (\text{c}) \quad -2809.1$$

$$\text{Maltose, C}_{12}\text{H}_{22}\text{O}_{11} (\text{c}) \quad -5645.5$$

Calculate the enthalpy change accompanying the conversion of 1 mol of crystalline glucose into crystalline maltose.



- 6) Calculate the ΔH^0 at 85°C for the reaction



The data are: $\Delta \text{H}_{298}^0 = -33.29 \text{ kJ.mol}^{-1}$ and

Substance	$\text{Fe}_2\text{O}_3 (\text{s})$	$\text{Fe} (\text{s})$	$\text{H}_2\text{O} (\text{l})$	$\text{H}_2 (\text{g})$
$\bar{C}_p^0 (\text{J.K}^{-1}.\text{mol}^{-1})$	103.8	25.1	75.3	28.8