CHEM 123 Quiz 2A

Name (*Please print*): Key

UBC student number: _____

Please put **FIRST LETTER** of **LAST NAME** in this box.

Total number of marks: 7 (1 mark each unless indicated!)

Standard UBC Exam guidelines apply for this quiz. No talking and no study aids. **A calculator is permitted!**

Circle the correct answer for each question - there is ONE correct answer for each question!

The space below is left blank for you to use as "scrap paper" for calculations.

1. Which of the following terms can be correctly associated with enthalpy?

   i. Heat under constant pressure conditions
   ii. Extensive quantity
   iii. Path independent

   (A) (ii) and (iii) (C) (ii) only (E) (i) and (iii)
   (B) (iii) only (D) (i), (ii) and (iii)

2. The combustion of 4.54 g of Sucrose in a piston releases 75 kJ of energy. 62 kJ of the energy is absorbed by the surroundings, and the rest is used to expand the volume of the piston. Determine ΔU, q, and w for the system.

   (A) ΔU = +75 kJ, w = +137 kJ, and q = -62 kJ
   (B) ΔU = +75 kJ, w = +13 kJ, and q = +62 kJ
   (C) ΔU = -75 kJ, w = -13 kJ, and q = -62 kJ
   (D) ΔU = -75 kJ, w = -137 kJ, and q = +62 kJ
   (E) ΔU = -137 kJ, w = -62 kJ, and q = -75 kJ

3. A certain chemical reaction absorbs 10.1 kJ of heat under constant volume conditions and absorbs 8.4 kJ of heat under constant pressure conditions. What is the sign and magnitude of work performed under constant pressure conditions?

   (A) -8.4 kJ (C) -1.7 kJ (E) +10.1 kJ
   (B) +1.7 kJ (D) -10.1 kJ

4. **[2 MARKS]** Use the following reactions:

   $2\ LiOH(s) \rightarrow Li_2O(s) + H_2O(l)$ $\Delta H° = 379.1$ kJ
   $LiOH(s) + H_2(g) \rightarrow LiH(s) + H_2O(l)$ $\Delta H° = 111.0$ kJ
   $2\ H_2O(l) \rightarrow 2\ H_2(g) + O_2(g)$ $\Delta H° = 285.9$ kJ

   To determine $\Delta H°$ for the reaction:

   $$2\ LiH(s) + O_2(g) \rightarrow Li_2O(s) + H_2O(l)$$

   (A) +125.2 kJ (C) -128.8 kJ (E) +128.8 kJ
   (B) -17.8 kJ (D) -303.6 kJ

5. **[2 MARKS]** Determine $\Delta H°$ for the following reaction using the enthalpy of formation values for each species (given below).

   $$PCl_5(g) + 4\ H_2O(l) \rightarrow H_3PO_4(s) + 5\ HCl(g)$$

$\Delta H°_f$ (kJ/mol)	-398.9	-285.9	-1281.1	-92.3

   (A) -688.6 kJ (C) -74.9 kJ (E) -900.3 kJ
   (B) -200.1 kJ (D) -1000.6 kJ

END OF QUIZ

CHEM 123

Quiz 2B

Name (*Please print*): Key

UBC student number: _____

Please put **FIRST LETTER** of **LAST NAME** in this box.

Total number of marks: 7 (1 mark each unless indicated!)

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Circle the correct answer for each question - there is ONE correct answer for each question!

The space below is left blank for you to use as "scrap paper" for calculations.

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1. Which of the following terms can be correctly associated with enthalpy?

   i. Heat under constant volume conditions
   ii. Extensive quantity
   iii. Path independent

   (A) (ii) and (iii) (C) (ii) only (E) (i) and (iii)
   (B) (iii) only (D) (i), (ii) and (iii)

2. The combustion of one mole of methane in a piston releases 802 kJ of energy. 150 kJ of this energy was used to expand the piston while the rest went into heating the surroundings. Determine ΔU, q, and w for the **system**.

   (A) ΔU = +802 kJ, w = -150 kJ, and q = -652 kJ
   (B) ΔU = +802 kJ, w = +150 kJ, and q = +652 kJ
   (C) ΔU = -802 kJ, w = -150 kJ, and q = -652 kJ
   (D) ΔU = -802 kJ, w = -150 kJ, and q = +652 kJ
   (E) ΔU = -952 kJ, w = -150 kJ, and q = -802 kJ

3. A certain chemical reaction absorbs 10.1 kJ of energy at constant volume and absorbs 8.4 kJ at constant pressure. What is ΔU for the reaction?

   (A) -8.4 kJ (C) -1.7 kJ (E) +10.1 kJ
   (B) +8.4 kJ (D) -10.1 kJ

4. **[2 MARKS]** Use the following reactions:

   $2\ NOCl(g) \rightarrow 2\ NO(g) + Cl_2(g)$ $\Delta H° = +75.56$ kJ
   $2\ NO(g) + O_2(g) \rightarrow 2\ NO_2(g)$ $\Delta H° = -113.05$ kJ
   $2\ NO_2(g) \rightarrow N_2O_4(g)$ $\Delta H° = -58.03$ kJ

   To determine $\Delta H°$ for the reaction:

   $$N_2O_4(g) + Cl_2(g) \rightarrow 2\ NOCl(g) + O_2(g)$$

   (A) 246.65 kJ (C) 95.52 kJ (E) 20.54 kJ
   (B) -95.52 kJ (D) -246.65 kJ

5. **[2 MARKS]** Compute $\Delta H°$ for the following reaction given the enthalpy of formation values for each species (given below).

   $$CO_2(g) + 2\ HCl(g) \rightarrow COCl_2(g) + H_2O(l)$$

$\Delta H°_f$ (kJ/mol)	-393.51	-92.30	-223.01	-285.85

   (A) -994.67 kJ (C) -23.05 kJ (E) -69.25 kJ
   (B) 23.05 kJ (D) 69.25 kJ

END OF QUIZ