Chapter 5 Thermochemistry Summary/Prequiz

1. 4. Calculate the kinetic energy (J) of a 150 lb jogger (68.1 kg) traveling at 12.0 mile/hr (5.36 m/s).
   a) 1.96×10^3
   b) 365
   c) 978
   d) 183
   e) 68.1

2. What is the ΔE (in J) of a system that releases 12.4 J of heat and does 4.2 J of work on the surroundings?
   a) 16.6
   b) 12.4
   c) 4.2
   d) -16.6
   e) -8.2

3. Which one of the following conditions would always result in an increase in E of a system?
   a) The system loses heat and does work on the surroundings.
   b) The system gains heat and does work on the surroundings.
   c) The system loses heat and has work done on it by the surroundings.
   d) The system gains heat and has work done on it by the surroundings.
   e) None of these is correct.

4. The value of ΔH° for the reaction below is -72 kJ. How many kJ of heat will be evolved when 1.0 mol of HBr is formed in this reaction?

   $$H_2(g) + Br_2(g) \rightarrow 2HBr(g)$$

   a) 144
   b) 72
   c) 0.44
   d) 36
   e) -72

5. If the molar heat capacity of a compound with the formula C_2H_6SO is 88.0 J/mol-K, what is the specific heat (in J/g-K) of this substance?

a) 88.0
b) 1.13
c) 4.89
d) 6.88×10^3
e) -88.0

6. The $\Delta H°$ for reactions 1 and 2 are -390 kJ and -745 kJ, respectively. $\Delta H°$ for reaction 3 is _____ kJ.

$IF(g) + F_2(g) \rightarrow IF_3(g)$ (1)

$IF(g) + 2F_2(g) \rightarrow IF_5(g)$ (2)

$IF_5(g) \rightarrow IF_3(g) + F_2(g)$ (3)

a) +355
b) -1135
c) +1135
d) +35
e) -35

7. Calculate $\Delta H°_{rxn}$ (in kJ/mol) for:
$Ca(OH)_2 + 2H_3AsO_4 \rightarrow Ca(H_2AsO_4)_2 + 2H_2O$

Substance	$\Delta H_f°$ (kJ/mol)
$Ca(OH)_2$	-986.6
H_3AsO_4	-900.4
$Ca(H_2AsO_4)_2$	-2346.0
H_2O	-258.9

a) -744.9
b) -4519
c) -4219
d) -130.4
e) -76.4

8. 50.0 mL of 1.0 M HCl were mixed with 50.0 mL of 1.00 M NaOH in a coffee cup calorimeter. The resulting solution changed temperature from 23.0° C to 29.8° C. Which one of the following is <u>not</u> true concerning this experiment? Assume the resulting solution had the density and specific heat of pure water, i.e., 1.00 g/mL and 4.18 J/g-K, respectively.

a) The reaction was exothermic.
b) 2.8 kJ of heat were transferred during the process.
c) For this reaction, q_{rxn} = -2.8 kJ.
d) The heat flow was measured under condition of constant pressure.
e) 1.4 kJ of heat were transferred during the process.