CHEM 110: Chapter 5 Practice Test Questions

Multiple Choice

1) The kinetic energy of a 7.3 kg steel ball traveling at 18.0 m/s _____ J.
A) 1.2×10^3
B) 66
C) 2.4×10^3
D) 1.3×10^2
E) 7.3

2) Calculate the kinetic energy in joules of an 80.0 g bullet traveling at 300.0 m/s.
A) 3.60×10^6
B) 1.20×10^4
C) 3.60×10^3
D) 12.0
E) 80.0

3) The ΔE of a system that releases 12.4 J of heat and does 4.2 J of work on the surroundings is _____ J.
A) 16.6
B) 12.4
C) 4.2
D) -16.6
E) -8.2

4) The change in the internal energy of a system that absorbs 2,500 J of heat and that does 7,655 J of work on the surroundings is _____ J.
A) 10,155
B) 5,155
C) -5,155
D) -10,155
E) 1.91×10^7

5) The value of $\Delta H°$ for the reaction below is -72 kJ. _____ kJ of heat are released 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

6) The value of ΔH° for the reaction below is -790 kJ. The enthalpy change accompanying the reaction of 0.95 g of S is _____ kJ.

$$2S\,(s) + 3O_2\,(g) \rightarrow 2SO_3\,(g)$$

A) 23
B) -23
C) -12
D) 12
E) -790

7) The value of ΔH° for the reaction below is +128.1 kJ:

$$CH_3OH\,(l) \rightarrow CO\,(g) + 2H_2\,(g)$$

How many kJ of heat are consumed when 15.5 g of $CH_3OH\,(l)$ decomposes as shown in the equation?
A) 0.48
B) 62.0
C) 1.3×10^2
D) 32
E) 8.3

8) The value of ΔH° for the reaction below is -1107 kJ:

$$2Ba\,(s) + O_2\,(g) \rightarrow 2BaO\,(s)$$

How many kJ of heat are released when 15.75 g of Ba (s) reacts completely with oxygen to form BaO (s)?
A) 20.8
B) -63.5
C) 114
D) 70.3
E) -35.1

9) A sample of aluminum metal absorbs 9.86 J of heat, upon which the temperature of the sample increases from 23.2°C to 30.5°C. Since the specific heat capacity of aluminum is 0.90 J/g-K, the mass of the sample is _____ g.
A) 72
B) 1.5
C) 65
D) 8.1
E) 6.6

10) The temperature of a 15-g sample of lead metal increases from 22°C to 37°C upon the addition of 29.0 J of heat. The specific heat capacity of the lead is _____ J/g-K.
A) 7.8
B) 1.9
C) 29
D) 0.13
E) -29

11) The specific heat of liquid bromine is 0.226 J/g-K. How much heat (J) is required to raise the temperature of 10.0 mL of bromine from 25.00°C to 27.30°C? The density of liquid bromine: 3.12 g/mL.
A) 5.20
B) 16.2
C) 300
D) 32.4
E) 10.4

12) ΔH for the reaction

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

is _____ kJ, given the data below.

$$IF\ (g) + F_2\ (g) \rightarrow IF_3\ (g) \quad \Delta H = -390\ kJ$$

$$IF\ (g) + 2F_2\ (g) \rightarrow IF_5\ (g) \quad \Delta H = -745\ kJ$$

A) +355
B) -1135
C) +1135
D) +35
E) -35

13) Given the following reactions

$$Fe_2O_3\ (s) + 3CO\ (s) \rightarrow 2Fe\ (s) + 3CO_2\ (g) \quad \Delta H = -28.0\ kJ$$

$$3Fe\ (s) + 4CO_2\ (s) \rightarrow 4CO\ (g) + Fe_3O_4\ (s) \quad \Delta H = +12.5\ kJ$$

the enthalpy of the reaction of Fe_2O_3 with CO

$$3Fe_2O_3\ (s) + CO\ (g) \rightarrow CO_2\ (g) + 2Fe_3O_4\ (s)$$

is _____ kJ.
A) -59.0
B) 40.5
C) -15.5
D) -109
E) +109

14) Calculate ΔH° (in kJ) for reaction 3.

$2S\ (s) + 3O_2\ (g) \rightarrow 2SO_3\ (g) \quad \Delta H = -790\ kJ$
$S\ (s) + O_2\ (g) \rightarrow SO_2\ (g) \quad \Delta H = -297\ kJ$

the enthalpy of the reaction in which sulfur dioxide is oxidized to sulfur trioxide

$2SO_2\ (g) + O_2\ (g) \rightarrow 2SO_3\ (g)$

is _____ kJ.
A) 196
B) -196
C) 1087
D) -1384
E) -543

15) The value of ΔH° for the reaction below is -186 kJ.

$H_2\ (g) + Cl_2\ (g) \rightarrow 2HCl\ (g)$

The value of ΔH_f^o for HCl (g) is _____ kJ/mol.
A) -3.72×10^2
B) -1.27×10^2
C) -93.0
D) -186
E) +186

16) The value of ΔH° for the following reaction is -3351 kJ:

$2Al\ (s) + 3O_2\ (g) \rightarrow 2Al_2O_3\ (s)$

The value of ΔH_f^o for Al_2O_3 (s) is _____ kJ.
A) -3351
B) -1676
C) -32.86
D) -16.43
E) +3351

17) The internal energy of a system is always increased by _____.
A) adding heat to the system
B) having the system do work on the surroundings
C) withdrawing heat from the system
D) adding heat to the system and having the system do work on the surroundings
E) a volume compression

18) Which one of the following is an exothermic process?
A) ice melting
B) water evaporating
C) boiling soup
D) condensation of water vapor
E) Ammonium thiocyanate and barium hydroxide are mixed at 25°C: the temperature drops.

19) Which of the following is a statement of the first law of thermodynamics?
A) $E_k = \frac{1}{2}mv^2$
B) A negative ΔH corresponds to an exothermic process.
C) $\Delta E = E_{final} - E_{initial}$
D) Energy lost by the system must be gained by the surroundings.
E) 1 cal = 4.184 J (exactly)

20) For a given process at constant pressure, ΔH is negative. This means that the process is _____.
A) endothermic
B) equithermic
C) exothermic
D) a state function
E) energy

21) The units of of specific heat are _____.
A) K/J or °C/J
B) J/K or J/°C
C) J/g-K or J/g-°C
D) J/mol
E) g-K/J or g-°C/J