C5Practice

Multiple Choice
Identify the choice that best completes the statement or answers the question.

____ 1. The kinetic energy of a 7.3 kg steel ball traveling at 18.0 m/s is _____ J.
a. 1.2×10^3
b. 66
c. 2.4×10^3
d. 1.3×10^2
e. 7.3

____ 2. Calculate the value of ΔE in joules for a system that loses 50 J of heat and has 150 J of work performed on it by the surroundings.
a. 50
b. 100
c. -100
d. -200
e. +200

____ 3. The value of $\Delta H°$ for the reaction below is -126 kJ. The amount of heat that is released by the reaction of 25.0 g of Na_2O_2 with water is _____ kJ.

$$2Na_2O_2\ (s) + 2H_2O\ (l) \rightarrow 4NaOH\ (s) + O_2\ (g)$$

a. 20.2
b. 40.4
c. 67.5
d. 80.8
e. -126

____ 4. The value of $\Delta H°$ 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

____ 5. The value of $\Delta H°$ for the reaction below is -1107 kJ:

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

How many kJ of heat are released when 5.75 g of BaO (s) is produced?

a. 56.9
b. 23.2
c. 20.8
d. 193
e. 96.3

____ 6. The specific heat capacity of lead is 0.13 J/g-K. How much heat (in J) is required to raise the temperature of 15 g of lead from 22°C to 37°C?

a. 2.0
b. -0.13
c. 5.8×10^{-4}
d. 29
e. 0.13

____ 7. Given the following reactions

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

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

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

____ 8. The value of $\Delta H°$ for the following reaction is -3351 kJ:

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

The value of $\Delta H_f°$ for Al_2O_3 (s) is _____ kJ.

a. -3351
b. -1676
c. -32.86
d. -16.43
e. +3351

____ 9. Given the data in the table below, $\Delta H°_{rxn}$ for the reaction

$$4NH_3\,(g) + 5O_2\,(g) \rightarrow 4NO\,(g) + 6H_2O\,(l)$$

is _____ kJ.

Substance	$\Delta H_f°$ (kJ/mol)
H_2O (l)	-286
NO (g)	90
NO_2 (g)	34
HNO_3 (aq)	-207
NH_3 (g)	-46

a. -1172
b. -150
c. -1540
d. -1892
e. The $\Delta H_f°$ of O_2 (g) is needed for the calculation.

____ 10. A 25.5-g piece of cheddar cheese contains 37% fat, 28% protein, and 4% carbohydrate. The respectiv fuel values for protein, fat, and carbohydrate are 17, 38, and 17 kJ/g, respectively. The fuel value for this piece of cheese is _____ kJ.
a. 450
b. 330
c. 790
d. 99
e. 260

____ 11. The internal energy of a system _____.
a. is the sum of the kinetic energy of all of its components
b. is the sum of the rotational, vibrational, and translational energies of all of its components
c. refers only to the energies of the nuclei of the atoms of the component molecules
d. is the sum of the potential and kinetic energies of the components
e. none of the above

____ 12. Which one of the following conditions would always result in an increase in the internal energy 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 the above is correct.

____ 13. When a system _____, ΔE is always negative.
a. absorbs heat and does work
b. gives off heat and does work
c. absorbs heat and has work done on it
d. gives off heat and has work done on it
e. none of the above is always negative.

____ 14. 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.

____ 15. ΔH for an endothermic process is _____ while ΔH for an exothermic process is _____.
a. zero, positive
b. zero, negative
c. positive, zero
d. negative, positive
e. positive, negative

____ 16. 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

____ 17. Which one of the following statements is true?
a. Enthalpy is an intensive property.
b. The enthalpy change for a reaction is independent of the state of the reactants and products.
c. Enthalpy is a state function.
d. H is the value of q measured under conditions of constant volume.
e. The enthalpy change of a reaction is the reciprocal of the ΔH of the reverse reaction.

____ 18. Of the following, $\Delta H_f°$ is not zero for _____.
a. O_2 (g)
b. C (graphite)
c. N_2 (g)
d. F_2 (s)
e. Cl_2 (g)

____ 19. For which one of the following equations is $\Delta H°_{rxn}$ equal to $\Delta H_f°$ for the product?

a. $Xe\,(g) + 2F_2\,(g) \rightarrow XeF_4\,(g)$
b. $CH_4\,(g) + 2Cl_2\,(g) \rightarrow CH_2Cl_2\,(l) + 2HCl\,(g)$
c. $N_2\,(g) + O_3\,(g) \rightarrow N_2O_3\,(g)$
d. $2CO\,(g) + O_2\,(g) \rightarrow 2CO_2\,(g)$
e. $C\,(diamond) + O_2\,(g) \rightarrow CO_2\,(g)$

____ 20. With reference to enthalpy changes, the term standard conditions means _____.

(a) P = 1 atm
(b) some common temperature, usually 298 K
(c) V = 1 L

a. a only
b. b only
c. c only
d. a and c
e. a and b

Short Answer

21. You will have two free response type questions. One will involve your understanding of calorimetry, including percent error calcualtion. The other will involve your determining the standard heat of formation of a substance given thermodynamic data.

C5Practice
Answer Section

MULTIPLE CHOICE

1. ANS: A	PTS: 1	DIF: 2	REF: Sec. 5.1
2. ANS: B	PTS: 1	DIF: 2	REF: Sec. 5.2
3. ANS: A	PTS: 1	DIF: 3	REF: Sec. 5.4
4. ANS: B	PTS: 1	DIF: 3	REF: Sec. 5.4
5. ANS: C	PTS: 1	DIF: 3	REF: Sec. 5.4
6. ANS: D	PTS: 1	DIF: 3	REF: Sec. 5.5
7. ANS: A	PTS: 1	DIF: 3	REF: Sec. 5.6
8. ANS: B	PTS: 1	DIF: 2	REF: Sec. 5.7
9. ANS: A	PTS: 1	DIF: 3	REF: Sec. 5.7
10. ANS: A	PTS: 1	DIF: 3	REF: Sec. 5.8
11. ANS: D	PTS: 1	DIF: 3	REF: Sec. 5.2
12. ANS: D	PTS: 1	DIF: 2	REF: Sec. 5.2
13. ANS: B	PTS: 1	DIF: 2	REF: Sec. 5.2
14. ANS: D	PTS: 1	DIF: 2	REF: Sec. 5.2
15. ANS: E	PTS: 1	DIF: 1	REF: Sec. 5.3
16. ANS: C	PTS: 1	DIF: 1	REF: Sec. 5.3
17. ANS: C	PTS: 1	DIF: 3	REF: Sec. 5.4
18. ANS: D	PTS: 1	DIF: 2	REF: Sec. 5.7
19. ANS: A	PTS: 1	DIF: 3	REF: Sec. 5.7
20. ANS: E	PTS: 1	DIF: 1	REF: Sec. 5.7

SHORT ANSWER

21. ANS:
?

PTS: 1