Answers to Review Questions pg. 350 #2-10,14-18

2. c 3. d

4. m = 10.0 g, ΔT = 1.00 °C

$Q = mc\Delta T$

= 10.0 g × 4.19 J/g · °C × 1.00 °C

= 41.9 J

The correct answer is b.

5. The mass of the sample does not affect the answer.

C = 2.337 kJ/°C ΔT = 3.03 °C

$Q = C\Delta T$

= 2.337 kJ/°C × 3.03 °C

= 7.08 kJ

The correct answer is b.

6. % efficiency = 40.0 kJ/50.0 kJ × 100% = 80.0%
The correct answer is c.

7. e

8. Reverse equation (1) and add equation (2) to it.

Cancel compounds found on opposite sides of the equations.

-1(1) $A + 2C \rightarrow AC_2$ $\Delta H° = -50$ kJ

(2) $AC_2 + B \rightarrow BC_2 + A$ $\Delta H° = -20$ kJ

$2C + B \rightarrow BC_2$ $\Delta H° = -70$ kJ

The correct answer is a.

9. e

10. It takes 31.8 kJ to decompose 1 mol of Ag_2S.

Find the number of moles. n = m/M

M = 2 × 107.868 g/mol + 32.065 g/mol = 247.801 g/mol

n = 123.9 g x 1 mol/247.801 g = 0.5000 mol

Q = nΔHr

= 0.5000 mol × 31.8 kJ/mol

= 15.9 kJ

The correct answer is a.

14. $nAlCl_3$ = 6.85 g x 1 mol/133.341 g = 0.051372 mol

ΔH° = nΔHsoln

= 0.051372 mol × (-373.8 kJ/mol)

= -19.2029 kJ

Heat absorbed by water = 19.2029 kJ = 19 202.9 J

Q = mcΔT

19 202.9 J = 255.0 g × 4.19 J/g°C × ΔT

ΔT = 17.973°C

Tf - Ti = 17.973°C

48.7°C - Ti = 17.973°C

Ti = 30.7°C

15. $I_2(s)$ + 20.85 kJ → $I_2(l)$

16. ΔH°r = [∑(nΔH°f products)] - [∑(nΔH°f reactants)]

ΔH°r = [(1 mol)(ΔH°f $C_2H_2(g)$) + (1 mol)(ΔH°f $Ca(OH)_2(s)$)] - [(1 mol)(ΔH°f $CaC_2(s)$) + (2 mol)(ΔH°f$H_2O(l)$)]

-128.0 kJ = [(1 mol)(227.4 kJ/mol) + (1 mol)(–985.2 kJ/mol)] - [(1 mol)(ΔH°f CaC2(s)) + (2 mol)(-285.8 kJ/mol)]

ΔH°f CaC2(s) = -58.2 kJ/mol

17. ΔHneutralization = -55.31 kJ/mol of $HNO_3(aq)$

n($HNO_3(aq)$) = 0.0500 mol/L × 0.400 L = 0.0200 mol

ΔHneut = Q/n

-55.31 kJ = Q/0.020 0 mol

Q = 1.1062 kJ = 1106.2 J

Heat absorbed by solutions:

Qsoln = 1 106.2 J = mcΔT

ΔT = 19.00°C - 18.67°C = 0.33°C

1106.2.J = m × 4.19 J/g°C × 0.33°C

Total mass of solutions = m = 800.028 9 g = 800.0 g

Total volume of solutions = 800.0 g × 1.000 g/mL = 800.0 mL

Volume of KOH solution = 800.0 mL - 400.0 mL = 400.0 mL

18. (1) × -1/2: $2NO(g) + 3/2\ O_2(g) \rightarrow N_2O_5(g)$ ΔH = -223.7 kJ

(2) × -1: $2NO_2(g) \rightarrow 2NO(g) + O_2(g)$ ΔH = 114.2 kJ

$2NO_2(g) + O_2(g) \rightarrow N_2O_5(g)$ ΔHr = -109.5 kJ