5.1 Study Worksheet KEY

1. *Look them up in the IB textbook (make sure that it is the "IB approved" definition for each)

2. a) endothermic b) exothermic

3. a) CH_3COOH (l) + 2 O_2 (g) → 2 H_2O (l) + 2 CO_2 (g) ΔH = -871.7 kJ/mol (always a "nice" thing to add to a balanced combustion equation)

b) 1743 kJ of energy released

c) –see a standard enthalpy diagram in the textbook (I have my drawing in the classroom)

-exothermic reactions: combustion and neutralization

d) $\Delta H = \Sigma H_{products} - \Sigma H_{reactants}$ Therefore the enthalpies of the reactants were greater than that of the more stable products in a combustion reaction. Also energy is released!

4) Sorry I'm not drawing the diagram on here. I have one on my key in the classroom. This reaction endothermic.

5) a) NaOH (reactant) energy is greater than that of products.

b) Exothermic

6) There are twice as many molecules to "heat up" to achieve the same average kinetic energy as the smaller beaker (so twice as much energy).

7). Exothermic: ΔH sign is negative; Energy is released; Products are more stable than reactants; Temperature (of immediate surrounding area) increases

Endothermic: positive; absorbed; reactants are more stable than products; Products have more energy than reactants; Temperature (of surrounding area) decreases

8) -44.5 kJ/mol (3 SF)

Assumptions: 1) Specific heat capacity of the NaOH solution = specific heat capacity of water 2) 100 g of water + 1.00 g NaOH = 100 g solution

9) -114 kJ/mol (3 SF)

Assumptions: 1) Specific heat capacity of the solution = specific heat capacity of water 2) Total mass of reaction = 200 ml 2) 200 ml of solution = 200 g solution

10) 8.502 kJ of heat lost

11) 84.3 g

12) a) .813 K (or °C) b) 13.8 °C

13) 0.657 J g^{-1} K^{-1}

14) 73.2 kJ energy needed

15) a) + 1.88 kJ b) Since the enthalpy change is proportional to the number of moles, there would be a greater temperature change. By increasing the moles of ammonium nitrate more heat energy will be absorbed by the ammonium nitrate.

16) a) 7.00 x 10^3 kJ needed b) 167 kJ c) 0.249 mol

17) a) 184 kJ energy released b) 23 kJ released

c) 20.0 moles d) 152 kJ energy released

18) a) 2 NaOH (aq) + H_2SO_4 (aq) → Na_2SO_4(aq) +2 H_2O (l)

b)

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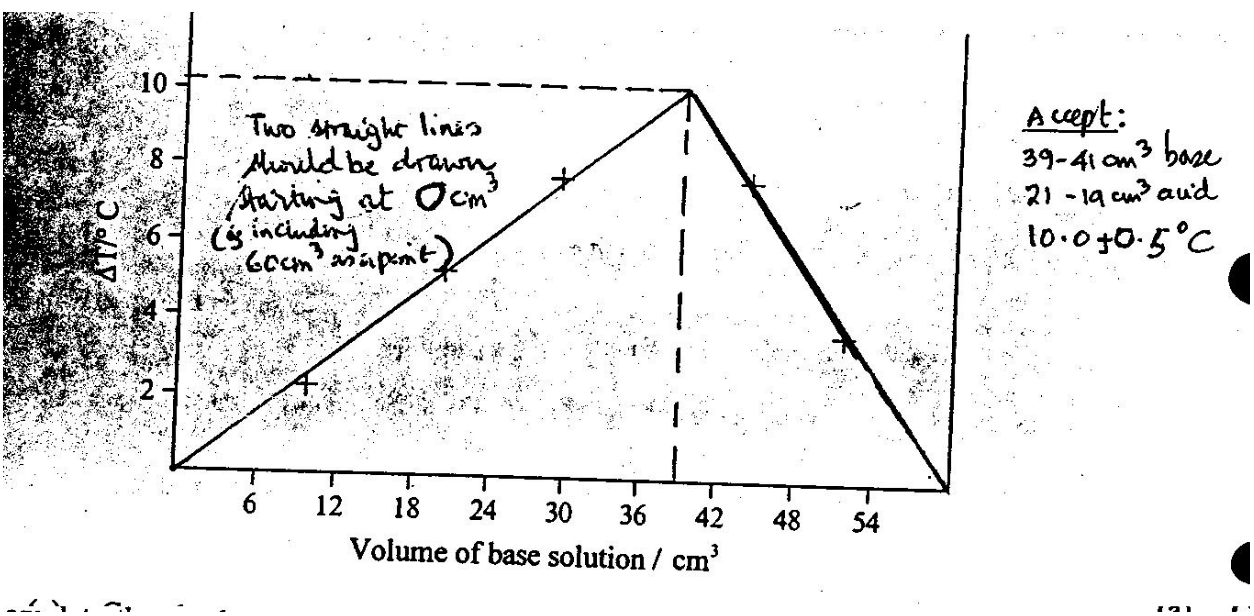

c) 10.0-10.2°C

d) 0.04875 moles NaOH and 0.02625 moles H2SO4 → 20. cm^3

e) NaOH

f) - 52 kJ/mol

g) 6.0% difference; Source of error is heat loss to surroundings; ensure reaction vessel is well insulated and has a lid (Styrofoam);