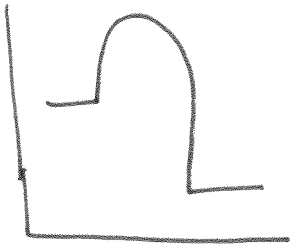
Homework Problems: (Do on separate paper)

Answers: 1c: 1409 kJ 2b: 4.99 grams

1. $CH_4\ (g) + 2O_2\ (g) \rightarrow CO_2\ (g) + 2H_2O\ (l)\ \Delta H = -890.2$ kJ
   a. Is this reaction exothermic or endothermic?

   exothermic b/c ΔH is negative

   b. Draw an energy path diagram that represents this reaction



   c. Calculate the amount of heat given off/absorbed when 25.40 g of methane, CH_4, burns.

$$\frac{25.40\ g\ CH_4}{16.05\ g\ CH_4} \times \frac{1\ mole\ CH_4}{1\ mole\ CH_4} \times \frac{-890.2\ kJ}{} = -1409\ kJ$$

(16.05 g CH4: conversion molar mass; 1 mole CH4: from rxn)

2. Glycine is important for biological energy. The combustion of glycine is given by the following equation:

   $4C_2H_5O_2N\ (s) + 9O_2\ (g) \rightarrow 8CO_2\ (g) + 10\ H_2O\ (l) + 2N_2\ (g) + 3857$ kJ .

   a. Is this reaction endothermic or exothermic?

   exothermic b/c energy is produced

   b. How many grams of glycine ($C_2H_5O_2N$) is needed when 64.2 kJ of energy is absorbed/produced? (exo)

exo

$$\frac{-64.2\ kJ}{-3857\ kJ} \times \frac{4\ mole\ C_2H_5O_2N}{1\ mole\ C_2H_5O_2N} \times \frac{75.08\ g\ C_2H_5O_2N}{} = 4.99\ g\ C_2H_5O_2N$$

(-3857 kJ: from rxn; 75.08 g C2H5O2N: conversion molar mass)