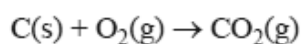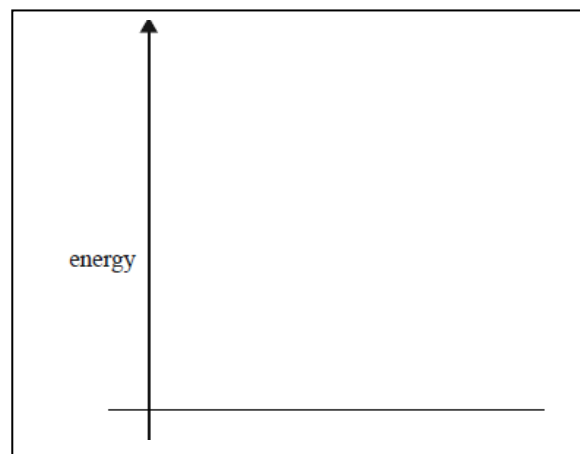**Friday Worksheet**   **Name:** ………………..
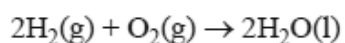
Heat of reaction worksheet 1

1) Sketch the energy profile for the complete combustion of ethanol using the axis on the right, labelling the energy of the reactants, the products and the activation energy.
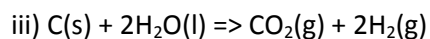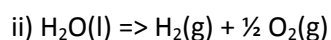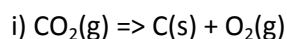
energy

$$C(s) + O_2(g) \rightarrow CO_2(g) \qquad \Delta H = -393.5 \text{ kJ mol}^{-1}$$

$$2H_2(g) + O_2(g) \rightarrow 2H_2O(l) \qquad \Delta H = -571.6 \text{ kJ mol}^{-1}$$

2) Consider the two equations above.
    a) What is the ΔH of the following reactions?
        i) $CO_2(g) => C(s) + O_2(g)$

        ii) $H_2O(l) => H_2(g) + \frac{1}{2} O_2(g)$

        iii) $C(s) + 2H_2O(l) => CO_2(g) + 2H_2(g)$

    b) 0.346 grams of dried coal (pure carbon) is used to heat 200.0 grams of water at 25.0 °C.
   i. What is the amount of heat in kJ produced during the combustion of 0.346 g of coal?

        ii. Assuming no energy loss from the system and specific **heat capacity** of water is 4.18 joules/gram/°C, what is the final temperature of the water?

3) A student experimentally determined the molar enthalpy of combustion of ethanol (M = 46.0 g mol⁻) using the equipment shown in the simplified diagram on the right. The student made the following experimental measurements

Mass of water in beaker = 100g
Amount of ethanol combusted = 0.960 grams
Temperature rise of the water = 40.0 °C

- stirrer
- thermomete
- beaker
- draft shield
- water
- spirit burne
- ethanol
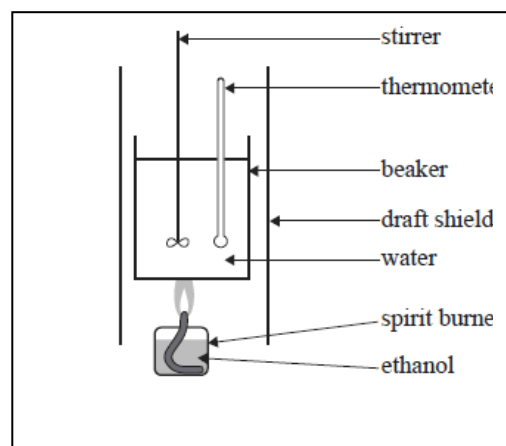
a) Write a balanced chemical equation for the combustion of ethanol.

b) Calculate the molar enthalpy of combustion of ethanol according to the student's results is