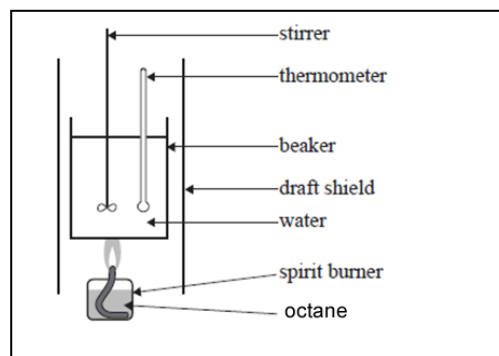


Video worksheet – deriving thermochemical equations from experimental data and data book.

1. Ethane undergoes complete combustion with atmospheric oxygen at SLC. Write the balanced thermochemical equation for this reaction, states included.
2. Pure octane is placed in a spirit burner and used to heat 100.0 mL of water. Complete combustion of 0.03510 grams of octane takes place and the temperature of the water rises from 25.00 °C to 28.10 °C.

a. Calculate the amount of energy, in kJ, absorbed by the water .

b. Calculate the molar heat of combustion (ΔH_c)
Molar mass of octane = **114.23g/mol**

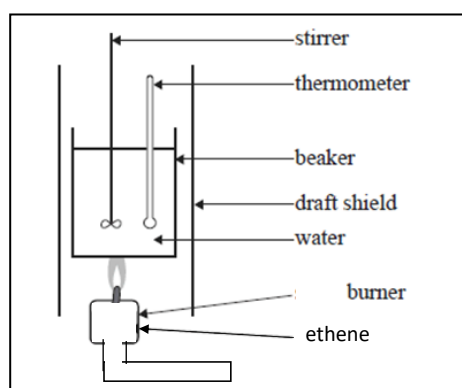


- c. Write a balanced thermochemical equation for the complete combustion of octane.
3. Acetic acid ($C_2H_4O_2$), commonly known as vinegar, is allowed to undergo complete combustion in atmospheric oxygen at SLC. At the completion of the reaction 4.40 grams of CO_2 was formed and 44.6 kJ of heat energy was released.
 - a. Write a balanced chemical equation for the complete combustion of acetic acid, states included.
 - b. Write a balanced thermochemical equation for the complete combustion of acetic acid.
 4. A volume of 40.0 litres of ethene gas undergoes complete combustion, at SLC, to release 353 kJ of energy.
 - a. Write a balanced chemical equation for the complete combustion of ethene gas, states included.
 - b. Write a balanced thermochemical equation for the complete combustion of ethene gas.

5. A volume of 50.0 litres of hydrogen gas undergoes complete combustion, at SLC, to release 353 kJ of energy.
- Write a balanced thermochemical equation for the complete combustion of hydrogen gas, states included.
 - Give the amount, in grams, of hydrogen gas that reacted to the right number of significant figures?
 - What amount, in mol, of H₂ gas remained unreacted?

6. A volume of 49.60 litres of ethene gas reacts with limited oxygen gas to undergo incomplete combustion. A gas and a liquid were the only products formed at SLC. The heat released from the reaction was used to raise the temperature of 100.0 grams of water by 6.89 °C using the apparatus shown below.

- Write a balanced chemical equation for the incomplete combustion of ethane gas, states included.



- Give the amount, in kJ, of energy absorbed by the water during the combustion of ethene. Give the answer to the right number of significant figures.

- Give the *molar heat of combustion of ethene* as determined experimentally

- Write a balanced thermochemical equation for the incomplete combustion of ethene gas, states included.

- What is assumed when calculating the answer to question c. above?

7. Butane gas burns in atmospheric oxygen at SLC.

- Write a balanced thermochemical equation for the complete combustion of butane gas, states included.

- On another occasion 12.4 litres of butane gas undergoes combustion to produce two different products, a solid and water, at SLC. Write the balanced thermochemical equation, states included, for the reaction given that 55.0 kJ of heat energy was released.

8. Ethanol undergoes complete combustion in atmospheric oxygen at SLC.

- Write a balanced chemical equation for the complete combustion of ethanol, states included.

- A volume of 12.4 litres of oxygen gas was consumed in the release of 220 kJ of heat energy. Using the information provided and the equation given in a. above, write the balanced thermochemical equation, states included, for the complete combustion of ethanol at SLC