Enthalpy lab

Environment, Nature

LAB OF ENTHALPY CHANGE IN COMBUSTION

Objective: Determine the Enthalpy change of combustion ? Hc of three different alcohols. Methanol, Ethanol and Isopropilic acid. Procedure: 1. Fill the spirit micro burner with Ethanol and weight it 2. Pour 100 cm3 of water into the aluminum cup 3. Arrange the cup a short distance over the micro burner 4. Measure the temperature of water 5. When the temperature of the water has risen by 10°C, record the temperature. 6. Reweight the microburner. Record 7. Repeat steps 1 to 6 but now with Methanol 8.

As the mass of water is the same in the 3 alcohols the %uncertainty is the same for all the alcohols Absolute uncertainty of the measuring cylindermass of water ? 100 Calculating ? mass change (alcohol’s burned mass) (initial mass ± 0. 01 g)-(final mass ± 0. 01 g) Calculating percentage uncertainty in alcohol burned mass Absolute uncertainty of alcohol's burned massalcohol's burned mass ? 100 Calculate the percentage uncertainty of alcohol burned moles percentage uncertainty of alcohol burned mass+percentage uncertainty of alcohol`s molar mass Calculating ?

H (enthalpy change) ? H=-mass of water x specific heat of water x ? T of water mol of alcohol * The specific heat for water is 4. 18 = 100x4. 184x 10= 4, 184 J or 4, 184 KJ exothermic Methanol= * H2O = 100 ml * mH2O= 100 mg * t1 H2O= 23°C Mass (i) methanol= 5. 38g * tf= H2O= 33°C Mass (f) methanol= 5. 08 g ? T= TF-TI= ? T= 10°C Calculating mass change ? m= mi-mf= 5. 38-5. 30= 0. 30g ? m=? mMr= 0. 3032. 04= 0. 009 mol ? H=-4. 1840. 009=-464888. 9jmol % uncertainity(balance)=±0. 020. 30x 100= 6. 67 % % uncertainity(thermometer)=±110x 100= 10 % %error=-726000-(-

464888.)-726000x 100= 36% Qualitative Observations We could see from the burn of methanol that the flame owas of color orange red, moreover therewere not dirt in the bottle. Ethanol * H2O = 100 ml * mH2O= 100 mg * t1 H2O= 24°C Mass (i) ethanol= 5. 33 g * tf= H2O= 34°C Mass (f) ethanol= 4. 94 g ? T= TF-TI= ? T= 10°C Calculating mass change ? m= mi-mf= 0. 39 g 5. 33-4. 94= 0. 39 g ethanol 0. 3946. 07 g/mol= 0, 008 mol ? H=-4. 1840. 008=-523, 000jmol % uncertainity(balance)=±0. 020. 39x 100= 13 % % uncertainity(thermometer)=±110x 100= 10 % %error=-1360000-(-523000. 0)-1368000x 100= 61. % Qualitative Observations We can observe a lost of weight during the experiment, moreover the flame was orange blue but with a big strong orange , it didn't burn complete therefore show dirt in the cup. Isopropolic acid * H2O = 100 ml * mH2O= 100 mg * t1 H2O= 24°C Mass (i) = 5. 45 g * tf= H2O= 34°C Mass (f) ethanol= 5. 20g ? T= TF-TI= 10 c ? m= mi-mf= 0. 25 g Isopropolic acid 0. 25 60, 1g/mol= 0, 004 mol ? H=-4. 1840. 04=-1, 046, 000jmol % uncertainitybalance=±0. 020. 25x 100= 8% % uncertainity(thermometer)=±110x 100= 10 % %error=-2006. 9-(-1046. 0)-2006. 9x 100= 47. 9% At last, the alcohol used was Isopropilic acid. The flame with this alcohol was the strongest flame, it was very strong, was very yellow at the top and blue at the bottom. * We could also notice that all the 3 alcohols produced Soot. (is a general term that refers to impure carbon particles resulting from the incomplete combustion) Conclusion = As we know the finality of the lab was to find the enthalpy change in the three alcohol; methanol, ethanol and isopropyl alcohol.. Enthalply change is to see or measure up the toal energy of thermodynamic system.

Focusing in the result we got the actual enthalpy change with a smaller value in the theoretical this is because during the experiment there was a lot of energy lost mostly in the heat . the percentage of uncertainty could be also emphasize that the heat was lost due to we didn’t aggregate in precise way the distance between the flame and the micro burner, and percentage error was high because the heat was transfereedto the materials in the system not only to the water . Moreover from the qualitative observations we could conclude out it there was a complete or incomplete combustions.

Methanol got a complete combustion since there was no soot under the cup, therefore carbol dioxide was realeased. 2CH4O (1) + 3O2 (G) = 2CO2(g) + 4H2O (l) Ethanol case was different we see that some sootappeared in the cup, therefore carbon dioxide and carbon monoxide . C2H6O (l)+ 3O2(G)= 2CO2 (g)+3H2O (l) C2H6O (l)+ 3O2(G)= 2CO(g)+3H2O (l) Isopropilic Acid , there was soot produced in the experiment, there was a incomplete combustion there was more carbon moxide produced than carbpn dioxide Errors Complete combustion was not completed because of the lack of oxygen available.

The micro burner had a little wick which affects the intensity of the flame The distance between the micro burner and the metallic calorimeter varies. So its no a fair experiment Heat was lost to the surrounding and the aluminum cup absorbed some of it. Improvements Use aluminum foil for a next trial to keep the flame and the base of the cup insulated from the surroundings. Measure an exact distance and keep it constant for all trials. For a next trial uses a longer wick that will provide a more intense flame that

wont run out Try to provide an adequate oxygen supply that would be suitable for lab conditions.