Determination of the Molar Enthalpy of Combustion of Paraffin Wax IB Chemistry HL

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1 Purpose

The purpose of this lab was to determine the molar enthalpy of the combustion of Paraffin Wax ($C_{25}H_{52}(s)$) in the following reaction:

$$C_{25}H_{52}(s) + 38\,O_2(g) \longrightarrow 25\,CO_2(g) + 26\,H_2O\,(g)$$

2 Evidence

2.1 Qualitative Observations

The Paraffin Wax candle appears white and opaque, with the colour fading into orange nearing the bottom. Upon touch, the Paraffin Wax feels slightly slippery, and after putting the candle down, the slippery sensation transfers to your hands.
The Paraffin Wax candle was able to be attached to the watchglass by exposing the bottom of the candle to a flame, in which the melted paraffin wax at the bottom was able to stick onto the watchglass. This indicates that melted paraffin wax exhibits adhesive properties.

The container surrounding the base of the Paraffin Wax candle does not leave any openings for air to escape other than the opening at the top.
These observations are shown in Figure 1.

Figure 1: Appearance of the Paraffin Wax candle attached to watch-glass within container.

The can containing the water has a proportionally greater height than diameter. The opening at the top of the can is significantly wider than the diameter of the thermometer, indicating that the space within the can is not entirely closed and isolated. The two holes allowing for the rod to pass through does wrap around the rod tightly, however because it is a manually created hole, it still allows for passage of air within the can and outside the can. These observations are shown in Figure 2.

Figure 2: Appearance of can used to contain the water from a top view

The Aluminium Foil surrounding the can leaves an opening at the top between the ring and the diameter of the can, as seen in Figure 2.
The process of conducting a trial involved raising the ring along the Ring Stand, lighting the candle, and lowering the ring. This means that there is an interval of time from lighting the candle where combustion was not taking place within the calorimeter. Additionally, after lowering the ring to a reasonable height where the bottom of the aluminium foil surrounding the can meets the top of the container surrounding the candle, the two ends of the aluminium foil become separated due to the significantly larger diameter of the container at the bottom. This leaves a few openings at the side of the aluminium foil cylinder.
Some of these observations can be seen in Figure 3.

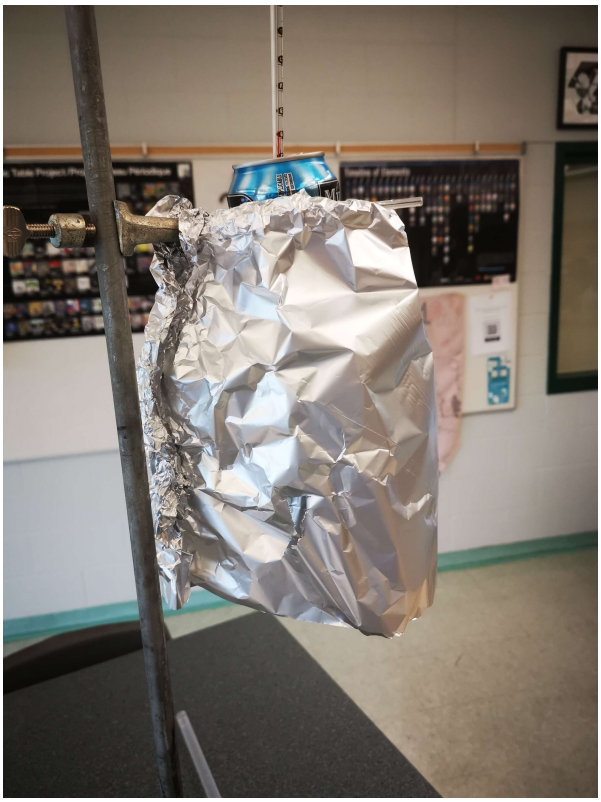

Figure 3: View of aluminium foil attached around elevated ring on ring stand

As seen in Figure 4, there is a black stain on the bottom of the can containing the bottom. This is presumably solid carbon produced by incomplete combustion from previous calorimetry experiments.

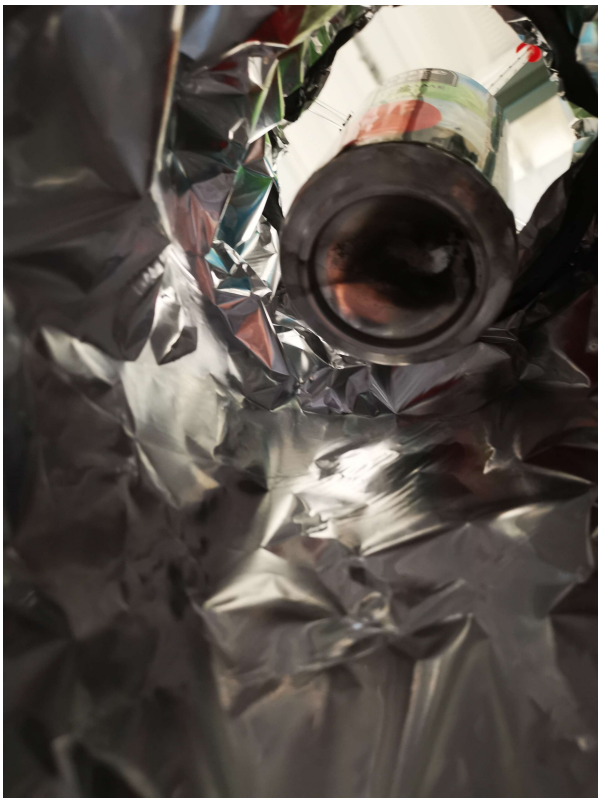

Figure 4: Appearance of black stain on the bottom of the can containing water

2.2 Quantitative Data

3 Analysis

4 Conclusion

4.1 Summary

4.2 Evaluation

4.3 Suggested Improvements

References

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