Internal Energy of Smarties and their Nutritional Counterpart

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# Introduction

Ultimately, we want to determine the heat capacity of a bomb calorimeter so we can determine the energy of the combustion of Smarties candy. The heat capacity of calorimeter is determined by combusting a benzoic acid standard and comparing the rise in temperature to the enthalpy of combustion of benzoic acid using the following equation:

|  |  |
| --- | --- |
| **Equation 1:** The calculation of calorimeter heat capacity | (1) |

where is the change in temperature measured in the water and is the heat transferred to the water. This value is calculated using the following equation:

|  |  |
| --- | --- |
| **Equation 2:** First law: calculation of constant volume heat transfer | (2) |

where change in enthalpy is calculated using enthalpies of formation of each of the relevant compounds in the combustion of benzoic acid. This works due to the definition of enthalpy and since we are using a bomb calorimeter which results in a constant volume process (). The term becomes which is less than 5% of . In general, we find that for most processes due to this term.

# Data

|  |  |  |  |
| --- | --- | --- | --- |
|  | Mass of sample (g) |  |  |
| Benzoic acid standard |  |  |  |
| Smarties candy |  |  |  |

Using thermo table data [1] we calculate the enthalpy of combustion for benzoic acid.

Using bond enthalpy calculations [2]

# Results and Discussion

Wow look at those results

# References

1. Engel, T; Reid, P. *Physical Chemistry: Thermodynamics, Statistical Thermodynamics, and Kinetics*, 4th Ed.; Pearson Education: Glenview, IL, 2019; pp. 630-635

2. 1. Engel, T; Reid, P. *Physical Chemistry: Thermodynamics, Statistical Thermodynamics, and Kinetics*, 4th Ed.; Pearson Education: Glenview, IL, 2019; p. 93