Calorimetry Lab Report

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Heat capacity of the system

Mass of wire = 0.0185 g

Mass of wire left = 0.0079 g

Mass of wire combusted = 0.0106 g

Mass of wire + pellet = 1.0126 g

Mass of pellet = 0.9941 g

$\Delta H_c(BA) = 0.9941g \ * \ -26435.8 \ J/g = -2.6279829 \times 10^4$ J

$\Delta U(wire)$ = 0.0106 g * -5858 J/g = -62.0948 J

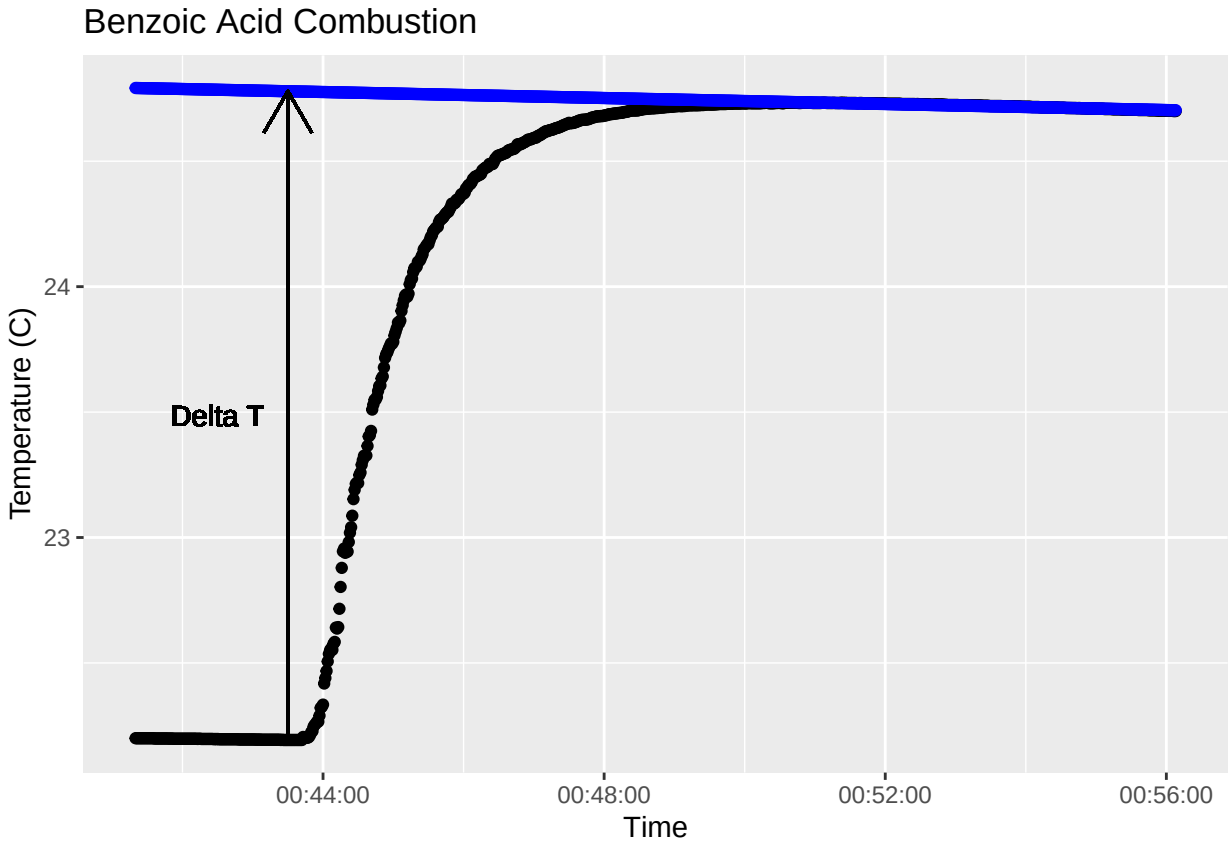
$C_6H_5COOH(s) + 7.5O_2(g) \rightarrow 7CO_2(g) + 3H_2O(g)$

Moles of benzoic acid = 0.0081484

Moles of net gas produced per mole of benzoic acid = 2.5

Δn = 2.5 * Moles of benzoic acid = 0.0203709

$\Delta U(BA) = \Delta H(BA) - RT\Delta \ n = -2.6330336 \times 10^4$ J



$$C_v = -\frac{\Delta H(BA) - RT\Delta n + \Delta U(Wire)}{\Delta T}$$

$\Delta T = 2.5858321$ K

$C_v = 1.0207 \times 10^4 \pm 8$ J/K

Naphthalene

Mass of wire = 0.0153 g

Mass of wire left = 0.0136 g

Mass of wire combusted = 0.0017 g

Mass of wire + pellet = 0.5748 g

Mass of pellet = 0.5595 g

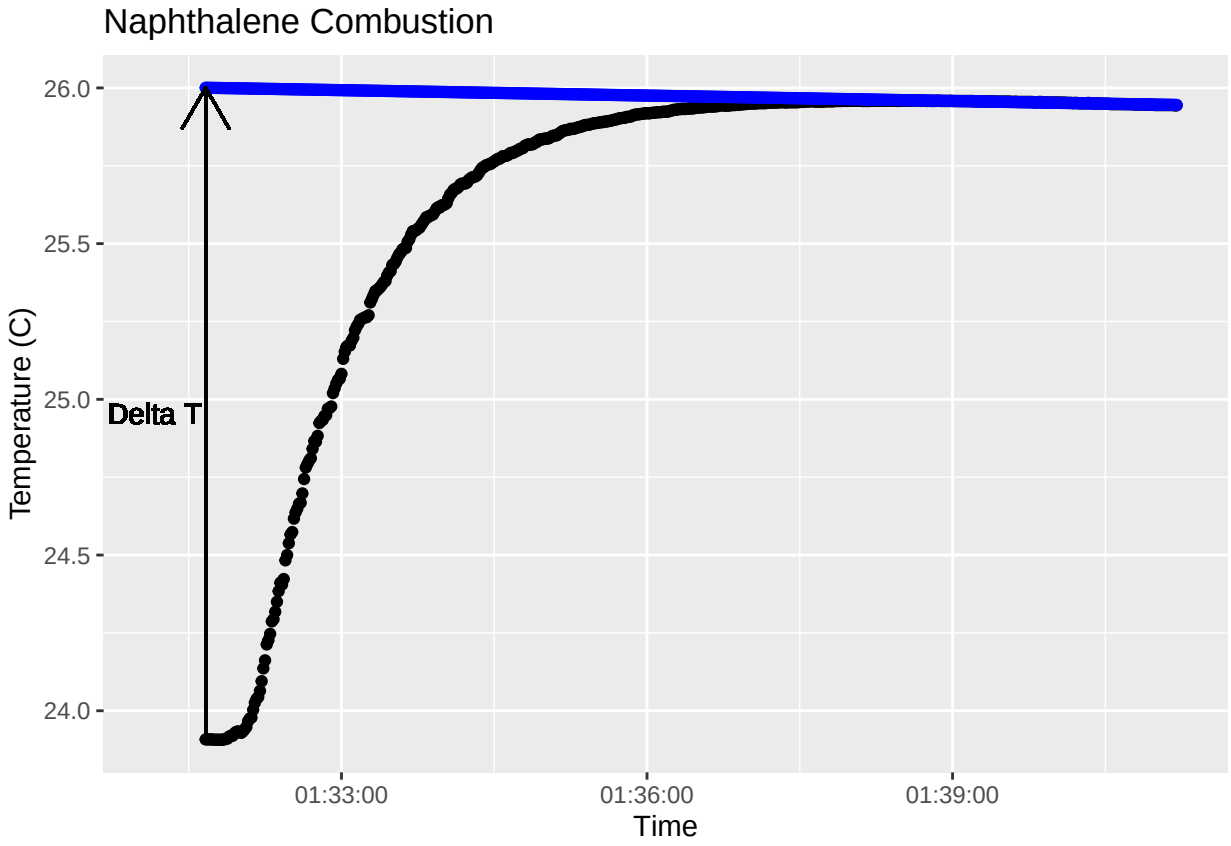
$\Delta U(wire)$ = 0.0017 g * -5858 J/g = -9.9586 J

$C_{10}H_8(s) + 12O_2(g) \rightarrow 10CO_2(g) + 4H_2O(g)$

Moles of naphthalene = 0.0081484

Moles of net gas produced per mole of naphthalene = 2

Δn = 2 * Moles of naphthalene = 0.0162967



$\Delta H(N) = -\Delta T C_v + RT\Delta n - \Delta U(wire)$

ΔT = 2.0925538 K

$\Delta H(N) = -2.1307396 \times 10^4$ J

$\Delta \tilde{H}(N) = \frac{\Delta H(N)}{moles\ naphthalene}$

$\Delta \tilde{H}(N) = -4.881 \times 10^6 \pm 4000$ J/mol

Gummy Bear

Mass of wire = 0.0162 g

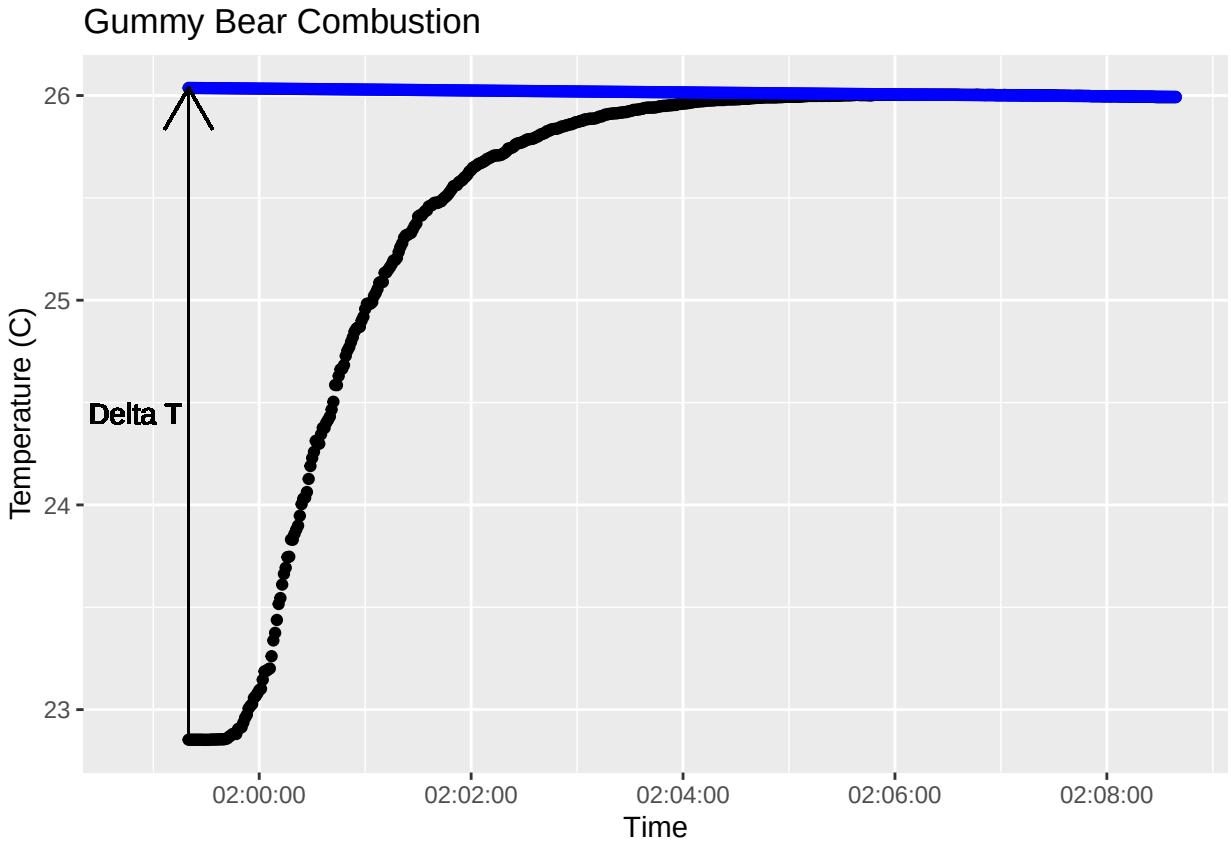
Mass of wire left = 0.008 g

Mass of wire combusted = 0.0082 g

Mass of wire + gummy bear = 2.2202 g

Mass of gummy bear = 2.204 g

$\Delta U(wire)$ = 0.0082 g * -5858 J/g = -48.0356 J



$\Delta U(bear) = -\Delta T C_v - \Delta U(wire)$

ΔT = 3.1840326 K

$\Delta U(bear) = -3.24 \times 10^4 \pm 30$ J