Answer on Question #67133, Chemistry / General Chemistry

For dimethyl phthalate is 4685 kj/mol. assume .985g of dimethylphtalate is combusted in a calorimeter whose heat capacity is 7.548 kj/C at 21.901 C. What is final temperature?

Solution:

$C_{10}H_{10}O_4$ = 0.985 g / 194.075 g/mol = 0.00507 mol

ΔH_{comb} = 4685 kJ/mol

C_p = 6.894 kJ/°C

Initial heat = 21.901°C

Heat released = 4685 kJ/mol × 0.00507 mol = 23.75 kJ

With the equation of the heat capacity

$C_p = Q/\Delta T$

We find

$\Delta T = Q / C_p$

ΔT = 23.75 kJ / 6.894 kJ/°C = 3.445 °C

Finally

$\Delta T = T_2 - T_1$

$T_2 = \Delta T + T_1$

T_2 = 3.445 °C + 21.901°C = 25.346 °C

Answer: 25.346 °C