

Data Sheet Calorimetry (Part A)

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Heat Capacity of Calorimeter #1:

	Trial 1	Trial 2	Trial 3
Initial temperature of room temperature water from temperature probe, T_i ($^{\circ}\text{C}$)	22.6 $^{\circ}\text{C}$	21.6 $^{\circ}\text{C}$	20.8 $^{\circ}\text{C}$
Mass (g) room temperature water (density = 1.0 g/mL)	25 g	25 g	25 g
Initial temperature of warm water from thermometer, T_i ($^{\circ}\text{C}$)	68.8 $^{\circ}\text{C}$	65.0 $^{\circ}\text{C}$	69.0 $^{\circ}\text{C}$
Mass (g) warm temperature water (density = 1.0 g/mL):	25 g	25 g	25 g
Maximum temperature observed over 3 minutes, T_f ($^{\circ}\text{C}$)	43.3 $^{\circ}\text{C}$	42.1 $^{\circ}\text{C}$	44.5 $^{\circ}\text{C}$
ΔT_{lost} (warm water) ($^{\circ}\text{C}$)	-25.5 $^{\circ}\text{C}$	-22.9 $^{\circ}\text{C}$	-24.5 $^{\circ}\text{C}$
q_{lost} (warm water) (J)	-2664.75 J	-2397.5 J	-2560.25 J
ΔT_{gain} (room T water) ($^{\circ}\text{C}$)	20.7 $^{\circ}\text{C}$	20.5 $^{\circ}\text{C}$	19.5 $^{\circ}\text{C}$
q_{gain} (room T water) (J)	2163.15 J	2142.25 J	2037.75 J
q_{cal} (J)	501.6 J	250.8 J	522.5 J
C_{cal} (J/ $^{\circ}\text{C}$)	24.23 J/ $^{\circ}\text{C}$	12.23 J/ $^{\circ}\text{C}$	26.79 J/ $^{\circ}\text{C}$
Average C_{cal} for calorimeter #1 (J/ $^{\circ}\text{C}$)	$(24.23 + 12.23 + 26.79) / 3 = 21.08 \text{ J}/^{\circ}\text{C}$		

Show sample calculations done on one of the trials for one Calorimeter. Define the variables of the equations and include units.

Trial 1

$$\Delta T_{\text{lost}} = 43.3 - 68.8 = -25.5^{\circ}\text{C}$$

$$\Delta T_{\text{gain}} = 43.3 - 22.6 = 20.7^{\circ}\text{C}$$

$$q_{\text{lost}} = 4.18 (-25.5) (25) = -2664.75 \text{ J}$$

$$q_{\text{gain}} = 4.18 (20.7) (25) = 2163.15 \text{ J}$$

$$q_{\text{cal}} = -(2163.15 - 2664.75) = 501.6 \text{ J}$$

$$C_{\text{cal}} = \frac{501.6}{20.7} = 24.23 \text{ J}/^{\circ}\text{C}$$

Heat Capacity of Calorimeter #2:

	Trial 1	Trial 2	Trial 3
Initial temperature of room temperature water from temperature probe, T_i ($^{\circ}\text{C}$)	24.2 $^{\circ}\text{C}$	24.2 $^{\circ}\text{C}$	23.4 $^{\circ}\text{C}$
Mass (g) room temperature water (density = 1.0 g/mL)	25g	25g	25g
Initial temperature of warm water from thermometer, T_i ($^{\circ}\text{C}$)	72.0 $^{\circ}\text{C}$	70.1 $^{\circ}\text{C}$	68.5 $^{\circ}\text{C}$
Mass (g) warm temperature water (density = 1.0 g/mL):	25g	25g	25g
Maximum temperature observed over 3 minutes, T_f ($^{\circ}\text{C}$)	44.1 $^{\circ}\text{C}$	44.2 $^{\circ}\text{C}$	43.7 $^{\circ}\text{C}$
ΔT_{lost} (warm water) ($^{\circ}\text{C}$)	-27.9 $^{\circ}\text{C}$	-25.9 $^{\circ}\text{C}$	-24.8 $^{\circ}\text{C}$
q_{lost} (warm water) (J)	-2915.55J	-276.5J	-2591.6J
ΔT_{gain} (room T water) ($^{\circ}\text{C}$)	19.9 $^{\circ}\text{C}$	20.1 $^{\circ}\text{C}$	20.9 $^{\circ}\text{C}$
q_{gain} (room T water) (J)	2079.55J	2100.5J	2184.05J
q_{cal} (J)	836.2J	6061J	4070.5J
C_{cal} (J/ $^{\circ}\text{C}$)	42.01J/ $^{\circ}\text{C}$	30.15J/ $^{\circ}\text{C}$	19.5J/ $^{\circ}\text{C}$
Average C_{cal} for calorimeter #1 (J/ $^{\circ}\text{C}$)	$(42.01 + 30.15 + 19.5) / 3 = 30.55 \text{ J}/^{\circ}\text{C}$		

Trial 1:

$$\Delta T_{\text{lost}} = T_f - T_i = 44.1 - 72 = -27.9^{\circ}\text{C}$$

$$\Delta T_{\text{gain}} = T_f - T_{\text{room}} = 44.1 - 24.2 = 19.9^{\circ}\text{C}$$

$$q_{\text{lost}} = 4.18(-27.9)(25) = -2915.55\text{J}$$

$$q_{\text{gain}} = 4.18(19.9)(25) = 2079.55\text{J}$$

$$q_{\text{cal}} = -(-2915.55 + 2079.55) = 836\text{J}$$

$$C_{\text{cal}} = \frac{836.2}{19.9} = 42.01\text{J}/^{\circ}\text{C}$$