

ACDA0514: THERMOCHEMISTRY

Risk Assessment

95

Before starting the experiment, you need to carry out a safety check and respond to the following statements.

I Zoe Cummins

Hereby agree to the following statements:

- I have taken part in the lab induction session with Mark and Ewa
- I agree to follow all rules and instructions therein
- I have received my PPE
- I understand that I must wear safety goggles, gloves and fastened lab coat for the duration of the entire experiment.
- I understand not to touch my face and/or eyes while wearing gloves as they can be contaminated with chemicals.
- I am aware of the risk associated with the handling of laboratory glassware such as cuts from broken or damaged glass and potential burns from hot glassware/ Bunsen burners.
- I understand the COSHH hazards associated with the chemicals but if I am unsure, I will ask Mark or Ewa.
- I understand that should I have an issue that may prevent me from doing the practical's (such as illness, pregnancy or injury) I will inform Mark or Ewa in good time before the session so alternate arrangements can be made.
- That I will report unsafe behaviour in a confidential and professional manner.
- I also understand that should I fail to adhere to instructions/ guidance, I will be putting myself and others at risk and could be removed from the practical which may affect my course grades. This removal will also be reported to the Academic Liaison Officer and, by extension possibly your parent company.

Signed 

Date 10/11/22

Lab Quiz

- The hazard(s) associated with the chemicals/equipment used in this experiment are:
hot liquid, compressed gases
hot metals, compounds
- Where would I find the hazard information for a chemical? (2 answers)
MSD SDS, COSHH
- If there is a fire, what are my (your) responsibilities?
make safe
follow evacuation procedures
- Why must glassware be labelled (2 reasons):
safe identification
disposal
- Name 5 instructions for clothing and hair in the lab:
hair tied back, closed lab coat, beard
covered, no open shoes, no shorts/skirts
- What are the precautions when working with Bunsen burners?
heat, flame, gas

Student name & number: 2114725 Zoe Cummins

Student signature:  Lab assistant: _____

Write in the following box your student number and full name:

STUDENT NUMBER & NAME: ~~2113351~~ 2114725 Zoe Cummins
PARTNERS' NAMES: ~~Zoe Cummins~~ Steve mcAngus Natalie
Cotton

REPORT IS DUE NOVEMBER 22, 2022 by mail

1. Measure the value of the heat capacity of the calorimeter ($HC_{\text{calorimeter}}$)

Use these entries to record your experimental data, results, and calculations.

$$\begin{aligned} T_{\text{HOT}} &= 60^{\circ}\text{C} & m_{\text{HOT-WATER}} &= 50.0 & \Delta T_{\text{HOT-WATER}} &= -20 \\ T_{\text{COLD}} &= 24^{\circ}\text{C} & m_{\text{COLD-WATER}} &= 50.0 & \Delta T_{\text{COLD-WATER}} &= +16 \\ T_{\text{MAX}} &= 40^{\circ}\text{C} & T_{\text{final}} &= 40^{\circ}\text{C} & \Delta T_{\text{CALORIMETER}} &= +16 \\ &+ 3348.8 & - 4186 & & & \\ Q_{\text{COLD-WATER}} &= & Q_{\text{HOT-WATER}} &= - & Q_{\text{CALORIMETER}} &= + 836.8 \\ HC_{\text{CALORIMETER}} &= 41.86 \text{ J}^{\circ}\text{C}^{-1} \end{aligned}$$

Write the calculations for $Q_{\text{HOT-WATER}}$, $Q_{\text{COLD-WATER}}$, $Q_{\text{CALORIMETER}}$, and $H_{\text{CALORIMETER}}$:

(hot)

$$4.186 = \frac{Q}{50(40-60)}$$

$$Q = -4186 \text{ J} \quad \checkmark$$

(cold)

$$4.186 = \frac{Q}{50(40-24)}$$

$$Q = 3348.8 \text{ J} \quad \checkmark$$

(cup)

$$Q_{\text{cal}} = -Q_{\text{hot}} - Q_{\text{cold}}$$

$$Q_{\text{cal}} = 4186 + 3348.8$$

$$4186 - 3348.8 = 837.2 \quad \checkmark$$

$$H_{\text{cal}} = \frac{837.2}{20(60-40)}$$

$$H_{\text{cal}} = 41.86$$

$$\Delta T_{\text{cal}} = 40 - 24 = 16^\circ\text{C}$$

$$52.3 \text{ J/}^\circ\text{C}$$

(-5p)

2. Measure the specific heat capacity of a metal ($c_{p \text{ metal}}$)

Use these entries to record your experimental data, results, and calculations.

Type of metal = Aluminium

$$T_{\text{hot}} = 85^\circ\text{C} \quad m_{\text{metal}} = 18.49 \text{ g} \quad \Delta T_{\text{metal}} = -52.5$$

$$T_{\text{cold}} = 28^\circ\text{C} \quad m_{\text{water}} = 30.0 \text{ g} \quad \Delta T_{\text{water}} = +4.5$$

$$T_{\text{max}} = 32.5 \quad T_{\text{final}} = 32.5 \quad \Delta T_{\text{calorimeter}} = +4.5$$

(didn't increase initially).

$$c_{p \text{ metal}} = 0.776$$

time (s)	$T_{\text{WATER}} (^\circ\text{C})$
10	30
20	31
30	31
40	31.5
50	31.5
60	32

time (s)	$T_{\text{WATER}} (^\circ\text{C})$
70	32
80	32
90	32.5
100	32.5
110	32.5
120	32.5

time (s)	$T_{\text{WATER}} (^\circ\text{C})$
130	32.5
140	32.5
150	32.5
160	32.5
170	32.5
180	32.5

Write the calculations for $c_{p, \text{metal}}$

$$Q_{\text{cold}} + Q_{\text{cal}} = -Q_{\text{metal}}$$

(cold)

$$4.186 = \frac{Q}{30(32.5-28)}$$

$$Q = 565.11 \text{ J} \checkmark$$

 $c_{p, \text{metal}}$

$$c_p = \frac{Q}{18.49 \times (32.5-28)}$$

$$Q = -970.725 c_p \text{ J}$$

$$Q_{\text{cal}} = \cancel{4.186} \times (28 \cancel{-} 32.5)$$

$$Q_{\text{cal}} = -188.37 \text{ J} \quad 235.5 \text{ J}$$

$$\therefore 565.11 + 188.37 = +970.725 c_p$$

$$c_p = 0.776$$

$$0.825 \text{ J/g}^\circ\text{C}$$