**1**

**PART 1 CALCULATIONS: Calorimeter Calibration**

Concentration of standardised HCl: _____ mol/L

Volume of standardised HCl in graduated cylinder: _____ mL

Calculate and report the **number of moles of HCl** used:
(Report your answer to at least 4 significant digits and carry this through to the calculation for $C_{cal}$)

using above two numbers

_____ mol HCl

Initial temperature of calorimeter + contents: $T_{init}$ = _____ °C

Extrapolated instantaneous temperature: $T_{inst}$ = _____ °C

$\Delta T$ = _____ K

$C_{cal}$

Calculate and report the **calorimeter co**
(Report your answer to at least 4 significant digit

using above two numbers

**CALORIMETER CONSTANT** = _____ kJ/K

**2**

**PART 1 CALCULATIONS: Calorimeter Calibration**

Concentration of standardised HCl: _____ mol/L

Volume of standardised HCl in graduated cylinder: _____ mL

Calculate and report the **number of moles of HCl** used:
(Report your answer to at least 4 significant digits and carry this through to the calculation for $C_{cal}$)

_____ mol HCl

Initial temperature of calorimeter + contents: $T_{init}$ = _____ °C

Extrapolated instantaneous temperature: $T_{inst}$ = _____ °C

$\Delta T$ = _____ K

p. 84

$C_{cal}$

Calculate and report the **calorimeter constant**:
(Report your answer to at least 4 significant digits and carry this through to the calculations in Part 2.)

*given in manual*

$$C_{cal} = \frac{-(\Delta H_{molar})(\#\ moles\ H^+)}{\Delta T}$$

**CALORIMETER CONSTANT** = **0.6 – 0.7**

**3**

**PART 2 CALCULATIONS: Catalytic Decomposition of $H_2O_{2(aq)}$**

Concentration of $H_2O_{2(aq)}$: _____ g/100mL

Volume of $H_2O_{2(aq)}$ used: _____ mL

Calculate and report the **number of moles of $H_2O_2$** used:
(Molar Mass $H_2O_2$ = 34.016 g/mol. Report the result of this calcula to at least 4 significant digits and carry this through to your subsequent calculations.)

using above three numbers

p. 84 last paragraph _____ mol $H_2O_2$

Initial temperature of calorimeter + contents: $T_{init}$ = _____ °C

Extrapolated instantaneous temperature: $T_{inst}$ = _____ °C

$\Delta T$ = _____

using above two numbers

Calculate and report the **value of $\Delta H_{exp}$** for t
(Report to 1 decimal place and with the correct sign.)

$H_2O_{2(aq)} \rightarrow H_2O_{(l)} + \frac{1}{2}O_{2(g)}$ $\Delta H_{exp}$ = _____ kJ/mol

**4**

**PART 2 CALCULATIONS: Catalytic Decomposition of $H_2O_{2(aq)}$**

Concentration of $H_2O_{2(aq)}$: _____ g/100mL

Volume of $H_2O_{2(aq)}$ used: _____ mL

Calculate and report the **number of moles of $H_2O_2$** used:
(Molar Mass $H_2O_2$ = 34.016 g/mol. Report the result of this calculation to at least 4 significant digits and carry this through to your subsequent calculations.)

_____ mol $H_2O_2$

Initial temperature of calorimeter + contents: $T_{init}$ = _____ °C

Extrapolated instantaneous temperature: $T_{inst}$ = _____ °C

$\Delta T$ = _____ K

Calculate and report the **value of $\Delta H_{exp}$** for this reaction:
(Report to 1 decimal place and with the correct sign.)

from p.2

$$\Delta H_{exp} = \frac{-(\Delta T)(C_{cal})}{moles\ H_2O_2}$$

p. 84

$H_2O_{2(aq)} \rightarrow H_2O_{(l)} + \frac{1}{2}O_{2(g)}$ $\Delta H_{exp}$ = _____ kJ/mol

**5**

**PART 2 CALCULATIONS: Hess's Law**

The following theoretical $\Delta H$ values have been obtained from the chemical literature:

$H_2O_{2(l)} \rightarrow H_2O_{(l)} + \frac{1}{2}O_{2(g)}$ $\Delta H_1$ = -98.0 kJ/mol

$H_2O_{2(l)} \rightarrow H_2O_{2(aq)}$ $\Delta H_2$ = -3.47 kJ/mol

**Use Hess's Law to calculate $\Delta H_{theor}$:**
(Report to 1 decimal place and with the correct sign.)

$H_2O_{2(aq)} \rightarrow H_2O_{(l)} + \frac{1}{2}O_{2(g)}$

*might need to reverse some of the above equations and flip signs to cancel appropriate terms…*

see p. 85

$H_2O_{2(aq)} \rightarrow H_2O_{(l)} + \frac{1}{2}O_{2(g)}$ $\Delta H_{theo}$ _____ from above

$H_2O_{2(aq)} \rightarrow H_2O_{(l)} + \frac{1}{2}O_{2(g)}$ $\Delta H_{exp}$ _____ from p.3

Calculate and report the **% difference between $\Delta H_{exp}$ and $\Delta H_{theo}$**:
(Report to 1 decimal place and with the correct sign.)

**Percent Difference** = _____ %

**6**

**PART 2 CALCULATIONS: Hess's Law**

The following theoretical $\Delta H$ values have been obtained from the chemical literature:

$H_2O_{2(l)} \rightarrow H_2O_{(l)} + \frac{1}{2}O_{2(g)}$ $\Delta H_1$ = -98.0 kJ/mol

$H_2O_{2(l)} \rightarrow H_2O_{2(aq)}$ $\Delta H_2$ = -3.47 kJ/mol

Use Hess's Law with the above $\Delta H$ values to **calculate a theoretical value for $\Delta H$**:
(Report to 1 decimal place and with the correct sign.)

use equation in lab manual and these values

$H_2O_{2(aq)} \rightarrow H_2O_{(l)} + \frac{1}{2}O_{2(g)}$ $\Delta H_{theo}$ _____ kJ/mol

$H_2O_{2(aq)} \rightarrow H_2O_{(l)} + \frac{1}{2}O_{2(g)}$ $\Delta H_{exp}$ _____ kJ/mol

**Calculate and report the % difference between $\Delta H_{exp}$ and $\Delta H_{theo}$:**
(Report to 1 decimal place.)

Can be positive or negative % Diff…use correct sign.

p. 85

**Percent Difference** = _____ %