

Reaction Stoichiometry Worksheet

As you work through the steps in the lab procedure, record your experimental values and the results on this worksheet. Use the exact values you record for your data to make later calculations.

Complete the following tables.

Data Table A. Initial concentrations of HCl, H₃PO₄ and NaOH

[HCl]	<i>M</i>
[H ₃ PO ₄]	<i>M</i>
[NaOH]	<i>M</i>

Data Table B. Temperature data for combinations of NaOH and HCl(aq)

Expt #	mL NaOH	mmol NaOH	mL H ₂ O	mL HCl	mmol HCl	Initial <i>T</i> , to the 0.01 °C	Final <i>T</i> , to the 0.01 °C	Δ <i>T</i> , °C
1	20.		20.	10.				
2	20.		10.	20.				
3	20.		0	30.				

Data Table C. Temperature data for combinations of NaOH and H₃PO₄

Expt #	mL NaOH	mmol NaOH	mL H ₂ O	mL H ₃ PO ₄	mmol H ₃ PO ₄	Initial <i>T</i> , to the 0.01 °C	Final <i>T</i> , to the 0.01 °C	Δ <i>T</i> , °C
4	15.		30.	15.				
5	30.		15.	15.				
6	45.		0	15.				

Show your calculation for the mmol of base and the mmol of acid in mixing experiment 1. (The values you enter for your sample calculation should exactly match the corresponding values you entered above.)

$$\text{_____ mmol/mL HCl} \times \text{_____ mL HCl} = \text{_____ mmol HCl}$$

$$\text{_____ mmol/mL NaOH} \times \text{_____ mL NaOH} = \text{_____ mmol NaOH}$$

Construct a reaction table for experiment #1, the addition of 20. mL each of NaOH and H₂O with 10. mL of HCl. (All entries should be in **millimoles**.)

	HCl(aq)	+ NaOH(aq)	→ NaCl(aq)	+ H₂O(l)
initial			0	-----
change (Δ)				-----
final				-----

For experiment #1, which is the limiting reagent?

Which experiments from 1-3 have the same change in temperature?

For the experiments from 1-3 with the same temperature change, what other parameters are the same?

Which experiments from 4-6 have the same change in temperature?

For the experiments from 4-6 with the same temperature change, what other parameters are the same?