= Copy and compete the following into your lab notebook =

Lab: Acid-Base Titration of an Egg Shell

Objective: What is the percentage of $CaCO_3$ in an egg shell?

Data Table

	Trial 1	**Trial 2**
Mass of ground egg shell, sample (≈ 1.50 g)		
Volume 1.00 M HCl added	50.0 mL	
Final solution (+ ≈ 200 mL D.I. water)	250.0 mL	

Titration	**Trial 1**	**Trial 2**
Volume of solution	10.0 mL	10.0 mL
Concentration of NaOH titrant	0.100 M	0.100 M
Buret Readings		
Initial volume		
Final volume		
Volume used		

Calculations (Include the <u>underlined</u> headings given.)
Show all work with correct units and sig figs. Box all answers.

1. <u>Total moles of HCl</u> (added to egg shell).

   Write a balanced chemical equation NaOH + HCl neutralization (titration) reaction.

2. <u>Concentration of HCl in final solution</u>. (use $V_AM_A = V_BM_B$)
3. <u>Moles of unreacted HCl</u>
4. <u>Moles of reacted HCl.</u>

   Write a balanced chemical equation for the HCl + $CaCO_3$ reaction.

5. <u>Mass of $CaCO_3$ in egg shell.</u>
6. <u>Percent of $CaCO_3$ in egg shell.</u>
7. <u>Average percent of the two trials.</u>

PROCEDURE:

1. Carefully wash the shell of an egg to remove any dirt and organic matter attached to it. Dry the shell either in an drying oven or let it sit overnight.

2. Grind the shell to a near powder using a mortar and pestle. Place 1.50 grams into a 250 mL volumetric flask, recording the exact mass on your lab sheet.

3. Use a 100-mL graduated cylinder to measure exactly 50.0 mL of 1.00 M hydrochloric acid and slowly add the acid to the flask, swirling it as you go to help the reaction proceed.

4. Once the reaction has completely subsided, add about 50 mL of distilled water to the flask, stopper and invert to throughly mix its contents. Repeat until the volume is exactly at the 250-mL mark on the flask. Again, stopper and invert to throughly mix the solution.

5. Taking 10.0 mL aliquots of this solution, titrate each with standard 0.100 M sodium hydroxide solution to the phenolphthalein endpoint.