

Analysis of an Antacid Tablet

The purpose of this experiment is to analyze an antacid tablet to determine the amount of acid (presumably stomach) that can be neutralized. Stomach acid is largely HCl, which is the acid to be used in this experiment.

Due to complications in the direct analysis of carbonate weak acids (which are well understood but not covered in CHM 112), a slightly round-about method will be used. The antacid tablet will be reacted with a known amount of acid, which will be an excess. The amount of the excess is then determined; this is called a "back titration."

Remember the rules: Use 4 significant figures for the volume of "volumetric" glassware (pipet and buret).

Procedure

Work in pairs.

Obtain from the stockroom: 10 mL and 3 mL pipets, bulb

1. First prepare some NaOH, which will be used as the titrant. For this experiment 0.13 M NaOH should be appropriate. Prepare about 1 liter of this solution, in your brown bottle, by diluting the stock 1 M NaOH. Be sure to shake the solution vigorously to mix thoroughly.
1. Obtain about 45 mL of the known HCl solution in a clean, dry 50 mL beaker.
2. Next get the antacid tablets dissolving. Weigh three antacid tablets; place each in a 250 mL Erlenmeyer flask, add 50 mL de-ionized water, and pipet 10.0 mL of the HCl into the flask.
3. Standardize your NaOH solution. Rinse your buret and fill it with the NaOH solution; be sure to remove any air bubbles from the tip. Use a pipet to transfer 3.0 mL of your HCl solution to about 50 mL de-ionized water in a titrating flask. Use methyl red, which is yellow in base and red in acid, as the indicator (5 drops should be sufficient) and titrate with the NaOH solution. As usual, you should do at least three trials; determine the average molarity of the NaOH and the precision of your trials.
4. Analysis of the antacid tablets. If a tablet has not dissolved, use a stirring rod to break-up the tablet. (The antacid tablet may contain some insoluble inert ingredients.) Heat the flask gently for a few minutes; do not boil. Allow to cool; add about 5 drops methyl red indicator; and titrate with your NaOH. Repeat the analysis with the other samples.
5. For each trial, calculate the amount of excess HCl remaining; then the amount of HCl neutralized by the antacid tablet. Finally, find the mmol of HCl neutralized per gram of antacid tablet. Determine the average value and precision for your trials.