Prelab Assignment: Evaluating the Cost-Effectiveness of Antacids

Show all calculations clearly. A student dissolves 0.326 g of a powdered antacid in an excess of 32.36 mL of 0.1034 M HCl. The student boils the mixture and then allows it to cool. Finally, the student adds bromophenol blue indicator to the mixture, which turns yellow.

1. Calculate the total number of moles of HCl added to the antacid.

2. Boiling the mixture helps get rid of dissolved CO$_2$. What is the source of most of this CO$_2$?

3. Suppose that 11.72 mL of 0.1506 M NaOH is required to turn the solution from yellow to blue. Calculate the number of moles of HCl neutralized by the NaOH added.

4. How many moles of HCl were neutralized by the antacid?

5. The number of moles of HCl that are neutralized by the antacid (see #4) equals the number of equivalents of antacid present. Determine the number of equivalents of antacid present per gram of antacid used.

6. Given that the antacid costs $5.99 per 100 tablet bottle and that the average mass of a tablet is 650 mg, calculate the cost per equivalent (in $/eq) of this antacid.