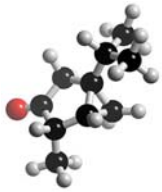
AS 1.2/E

ANALYSIS OF INDIGESTION TABLETS (A BACK TITRATION)



Aim

The aim of this experiment is to find the mass of calcium carbonate in one *Tums* tablet. The manufacturer claims that there is 500 mg in each tablet.

You will do this by a back titration. Back titrations are used for reactions between acids and insoluble bases. The insoluble base is reacted with a known amount of excess acid and then the amount of left over acid is measured by titration with sodium hydroxide solution.

$$CaCO_3 + 2\,HCl \rightarrow CaCl_2 + H_2O + CO_2$$

$$NaOH + HCl \rightarrow NaCl + H_2O$$

Safety

sodium hydroxide
hydrochloric acid

Method

1) Crush up one *Tums* tablet and transfer all of the solid into a volumetric flask.

2) Add 25 cm^3 of 0.500 mol dm^{-3} hydrochloric acid to the tablet in the volumetric flask. This is an excess.

3) Make the mixture up to 250 cm^3 with water in the volumetric flask.

4) Titrate 25 cm^3 samples of the stock solution against 0.100 mol dm^{-3} sodium hydroxide using phenol red as indicator. Phenol red is yellow in acid and red in alkali. Record your results in a suitable table.

Analysis

5) Calculate the moles of acid added to the indigestion tablet. ……

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6) Calculate the moles of sodium hydroxide that reacted in each titration.

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7) Calculate the total moles of left over acid in the stock solution.

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8) Calculate the moles of acid that reacted with the calcium carbonate in the tablet.

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9) Calculate the moles of calcium carbonate in the tablet.

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10) Calculate the mass of calcium carbonate in the tablet.

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11) Calculate the maximum percentage apparatus error in the final result. Standard errors in apparatus are as follows:

volumetric flask	$\pm$ 0.1 cm^3
25 cm^3 pipette	$\pm$ 0.1 cm^3
burette (start & end readings and end point)	$\pm$ 0.15 cm^3

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Evaluation

12) Write down the mean class value for the mass of calcium carbonate in each tablet (we shall assume that the class mean is the correct value).

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13) Find the percentage difference between your value and the class mean value.

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14) Comment on the accuracy of your result. ……

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15) The manufacturer states that the mass of calcium carbonate in each tablet is 500 mg. Is the manufacturer's figure accurate?

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16) Why is it important that the ingredients in medicines is analysed by independent sources?

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17) If you failed to transfer all of the tablet into the volumetric flask, explain how it would have affected your final value of the mass of calcium carbonate.

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