

# Vinegar samples



**ASSIGN  
BUSTER**

I have been asked to find out if four fish and chip shops have been diluting their vinegar, to save more money. I do this by carrying out a few experiments, testing on the separate fish and chip shops vinegar samples.

### Apparatus

- \* Vinegar samples
- \* Distilled Water
- \* Sodium Hydroxide
- \* Phenolphthalein
- \* Conical Flask
- \* Volumetric Flask
- \* Burette + Stand
- \* Pipette
- \* Balance
- \* Tile

### Method

To carry out this experiment, I first had to get the control vinegar and measure how much ethanoic acid I found in the vinegar, then compare with the fish and chip shops.

So to do this I filled the burette with the sodium hydroxide, I then added 10cm<sup>3</sup> of distilled water to 100 cm<sup>3</sup> of the vinegar to dilute it (this was so when the colour changed I could see it)! After this I got 25 cm<sup>3</sup> of the vinegar and put it in the conical flask, then to this I added the indicator.

I added the sodium hydroxide slowly to the solution in the conical flask until the sample turned pink, I then read the number of cm<sup>3</sup> of sodium hydroxide had gone into the conical flask off the burette and kept the reading.

I repeated this experiment three more times, to get more results for a better average. Then with all the results collected I had to calculate the average.

\* Add all readings, then divide by three. The result was 37.75 cm<sup>3</sup>

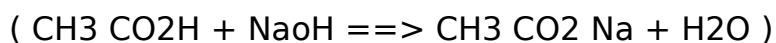
Equation

M = Molar cone

V = Volume used

N = Number of molars reacting

$$M_1 = M_2 \left( \frac{V_2}{N_1} \right) \left( \frac{N_2}{V_1} \right) = 0.1 \left( \frac{37.75}{25} \right) \left( 1 \right) = 0.151$$



$$2\text{C} = 2 \left( 12 \right) = 24$$

$$4\text{H} = 4 \left( 1 \right) = 4$$

$$2\text{O} = 2 \left( 16 \right) = 32$$

$$24 + 4 + 32 = 60$$

Then to get my control results I had to multiply 37.75 by 60 and then I have to multiply that again by 10, which equalled 90.6 g/l.

Now this was done, I had to do the four fish and chip shop samples.

Blue Whale = I carried out the experiment again as shown above. I recorded the results three times and got these readings.

1st 41 cm<sup>3</sup>

2nd 39 cm<sup>3</sup>

3rd 39 cm<sup>3</sup>

I then added all the readings together and divided then by three and got 39.7 cm<sup>3</sup>. I then multiplied it by 0.1 after this I divided it by 25 and I got 0.1588. Then I multiplied it by 60 and got 9.528, then multiplied this by 10. Then after this long equation my final result came out as 95.28 g/l. This concludes that the Blue Whale fish and chip shop do not dilute their vinegar.

Fish Frier = I did the experiment again but with the different sample and got these results.

$$31 + 29 + 27 / 3 = 29$$

$$0.1 ( 29 ( 1 / 25 ( 1 = 0.116 ( 60 = 9.96 ( 10 = 69.6 \text{ g/l}$$

This concludes that the Fish Frier fish and chip shop dilute their vinegar a lot.

Frying Tonight = I did the experiment again this time I got these results.

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$$16 + 17 + 15 / 3 = 16$$

$$16 ( 0.1 ( 1 / 25 ( 1 = 0.064 ( 60 = 3.84 ( 10 = 38.4 \text{ g/l}$$

This concludes that the Frying Tonight fish and chip shop dilutes their vinegar a great deal more than they do at the Fish Frier fish and chip shop.

Frier Tuck = finally I did the experiment one last time and got these result.

$$21 + 21 + 21 / 3 = 21$$

$$21 ( 0.1 ( 1 / 25 ( 1 = 0.084 ( 60 = 5.04 \text{ g/l}$$

These results conclude that the Frier Tuck fish and chip shop do also dilute their vinegar.

## RESULTS TABLE

Vinegar

Concentration of CH<sub>3</sub>COOH g/l

Control

90.6

Blue Whale

95.28

Fish Frier

69.6

Frying Tonight

38. 4

Frier Tuck

50. 4

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Mr R Roberts,

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Dear Sir,

You contacted me to find out whether your local fish and chip shops have been watering down the vinegar used on customer's food, In the attempt to save money.

I have carried out many tests, and analysed the vinegar from the four fish and chip shops with the control.

The tests that I carried out were that I measured 25 cm<sup>3</sup> of each vinegar sample and added an indicator (phenolphthalein) to them. I then measured the amount of sodium hydroxide I added to the vinegar solution until it turned to the colour pink.

These are the test results:

Vinegar

Concentration of CH<sub>3</sub>COOH g/l

Control

90. 6

Blue Whale

95. 28

Fish Frier

69. 6

Frying Tonight

38.4

Frier Tuck

50.4

These results conclude that the following fish and chip shops dilute their vinegar: Fish Frier, Frying Tonight and Frier Tuck. The results also include that Blue Whale fish and chip shop don't water down their vinegar.

I hope that my investigation has been of help.