

## G620: Science at Work – Sample Assignment D

<b>Unit Name:</b> Science at Work	<b>Unit Number:</b> G620
<b>Assignment Title:</b> Vinegar Analysis	<b>Assignment:</b> G620 Sample Assignment D
<b>Date Set:</b>	<b>Due Date:</b>
<b>Assessment Objective(s):</b> AO3 & possible AO2(b)	

### Vocational Brief:

Quantitative analysis can be used to determine the concentration of active ingredients in foods. Vinegar is a weak acid. The concentration of acid present in samples of vinegar can be analysed by a titration of the acid using a base.

You have been provided with two samples of vinegar, one removed from a restaurant and one removed from a take-away. Trading Standards suspect these two establishments of watering down the vinegar. They need evidence that the samples contain less acid than the standard vinegar sample provided.

### Task :

#### Vinegar Analysis – AO3

The aim of this task is to safely complete the analysis of the vinegar samples, record and process the results and write a report to Trading Standards of the outcome.

- complete a risk assessment for the practical work
- follow the standard procedure given on the *Scientist Information Sheet – ‘Performing a Titration’*
- appropriately record all your results so they can be examined by the Trading Standards Agency
- repeat your experiments where necessary and calculate the concentrations of the vinegar samples provided
- use the results to summarise your findings in a report to Trading Standards.

#### Evaluation of Analysis

Evaluate the experimental work and suggest any improvements that will enable your evidence to be more reliable in the future.

*This task should be marked to a maximum of 21 and will need to be divided by two and the mark added to that of the second practical task.*

#### Note:

In addition you can gain AO2(b) if you complete the:

- treatment of results.

**Resources / Notes:**


Any basic volumetric experimental work can be completed as support before the task (acid / alkali).

## G620: Science at Work – Sample Assignment D

### Scientist Information Sheet

#### Performing a Titration: Vinegar Analysis

##### Hazard Information

Sodium hydroxide solution	Irritant	
---------------------------	----------	---

##### Scientist Information Sheet

1. Wash out a 25 cm<sup>3</sup> graduated pipette with the sodium hydroxide solution provided.
2. Use the pipette and the pipette filler to measure out 25 cm<sup>3</sup> sodium hydroxide solution into a clean 250 cm<sup>3</sup> conical flask which has been washed with distilled water.
3. Add 3 – 4 drops of the indicator provided.
4. Secure the burette on a clamp and stand and wash twice with a few cm<sup>3</sup> of the vinegar solution whose concentration is to be analysed.
5. Carefully pour the vinegar solution into the burette.

**Caution:** bring the burette to your eye level and use a filter funnel lifted slightly from the top of the burette to allow for air escape.

6. Fill the burette to about 1 cm<sup>3</sup> above the 0 cm<sup>3</sup> mark. Run a little through the top until the level is on 0 cm<sup>3</sup>. If the level falls below this, record the precise volume (to the nearest 0.05 cm<sup>3</sup>).
7. Titrate slowly with the sodium hydroxide solution, constantly swirling, adding 2 – 3 cm<sup>3</sup> at a time.
8. When the indicator has reached the required colour (your supervisor will tell you this), stop adding the vinegar and record the volume.
9. Repeat, recording the volume each time, until you have **three** suitable values.

## Trading Standards Report Form

Vinegar sample collected from: .....

Analyst's Name: ..... Date Analysed: .....

Burette Reading	Titration 1	Titration 2	Titration 3
Final reading			
Initial reading			
Volume used			

**Result:** .....of the vinegar sample ..... was needed to neutralise

.....of the sodium hydroxide supplied.

**Calculation:**

The concentration of the vinegar sample was found to be.....

**Report on findings of analysis:**

**Analyst's Name:** ..... **Date:**.....

**Signature** .....

## G620: Science at Work – Sample Assignment D

### Teacher and Technician's Guidance

#### Performing a Titration: Vinegar Analysis

##### Teacher's Guidance:

Candidates should be advised that their write up should be suitable to be presented to Trading Standards.

**Suggestion:** Candidates should be able to record their results in a suitable format – one used in AS chemistry volumetric tasks would be acceptable.

This task should be marked to a maximum of 21 and will need to be divided by two and the mark added to that of the second practical task.

##### Technician's Guidance:

- Vinegar samples can be made using 0.05 / 0.1 mol dm<sup>-3</sup> ethanoic acid – can be coloured with a little tea solution.
- Standard vinegar solution for comparison 0.1 mol dm<sup>-3</sup> ethanoic acid.
- Sodium hydroxide solution - 0.05 / 0.1 mol dm<sup>-3</sup> (prefer less concentrated – safety wise).
- Indicator: (strong alkali / weak acid) phenolphthalein.