Results of the vitamin-C titration investigation.

This worksheet refers to the vitamin-C investigation at this link .
Link to revise experimental method.

Questions to be answered.
Does boiling food, such as vegetables, reduce the food's vitamin-C content?

What is the dependent variable (DV)? *The amount of vit-C in each tablet.*

What is the independent variable(IV)? *Different tablets from the same bottle.*

State 4 controlled variables
i. *Type of tablet*

ii. *Same standard solution*

iii. *Same burette used in every trial*

iv *Same starch solution as indicator*
Any other plausible controlled variable.

Procedure

Write a detailed procedure for the completion of this investigation. (Logical and sequential set of numbered steps)

Results

Time at 90°C (min)	Trial	1	2	3
0	Start (mL)			
	Finish(mL)			
	Total(mL)			
5	Start (mL)			
	Finish(mL)			
	Total(mL)			
15	Start (mL)			
	Finish(mL)			
	Total(mL)			
20	Start (mL)			
	Finish(mL)			
	Total(mL)			
40	Start (mL)			
	Finish(mL)			
	Total(mL)			

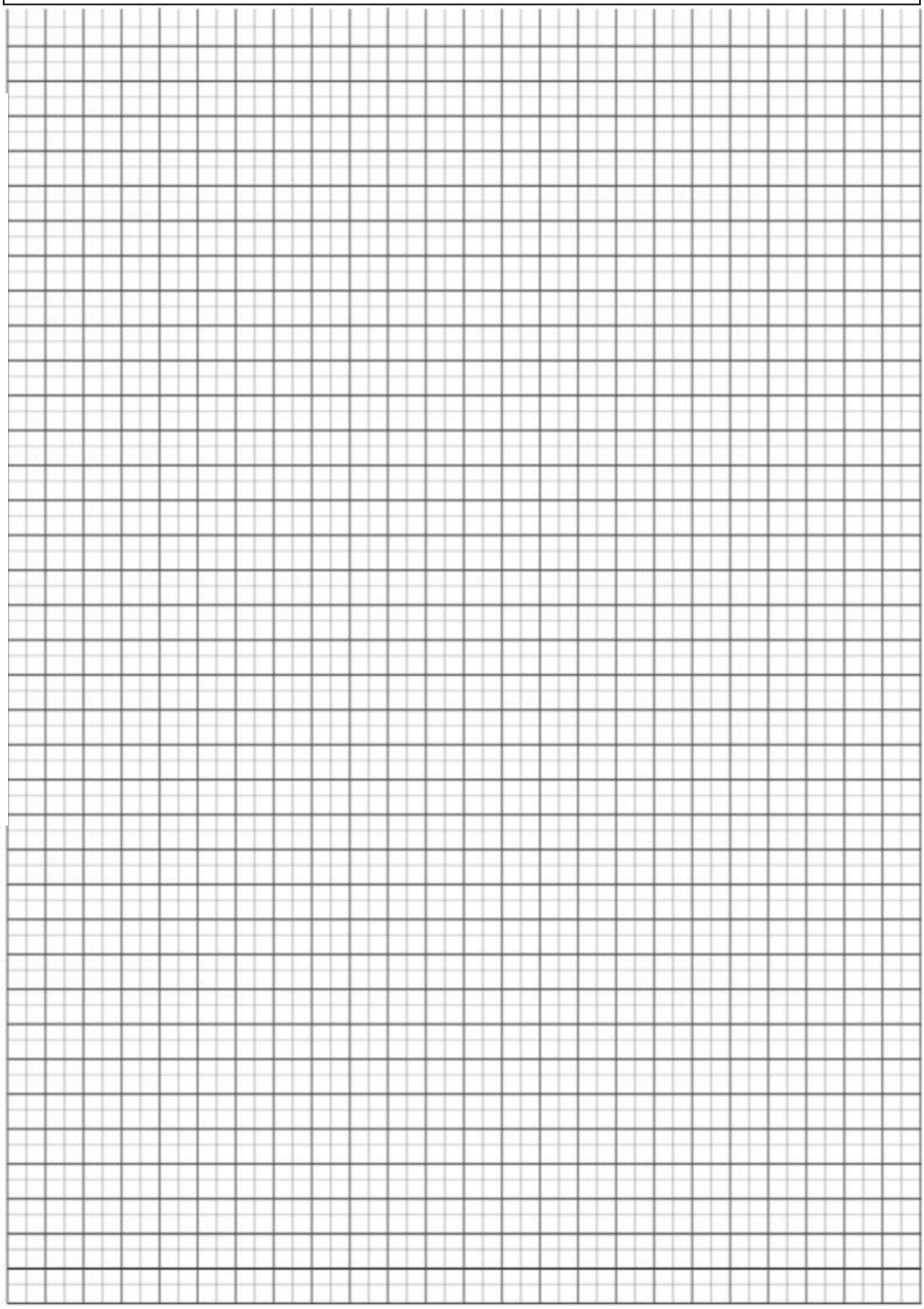
Table 1

1. Calculate the concentration of the I_2 solution used as the titrant.
   3.0 grams of I_2 is added to 1.00 L of distilled water.

2. Given that one mol of I_2 reacts completely with 1 mol of vitamin-C and using the information shown below of one titration of 20.0 mL of vitamin-C solution calculate the:
   - the titre used to reach the end-point.
   - calculate the concentration, in mol/L, of vitamin-C in the 20.0 mL sample.

3. Complete the table below and graph the results on an appropriate set of axes using the graph paper on the next page.

Time at 90^{o}C (min)	Concentration of vit-C in the 20 mL sample mol/L
0	
5	
15	
20	
40	



4. Consider the results in table 1

   a. Are the results repeatable? Explain

   For the results to be classified as repeatable several trials must be conducted by the same group, using the same method and equipment to achieve similar results.

   b. What needs to take place to label the results as reproducible? Explain

   For the results to be classified as reproducible other groups must achieve similar results using the same method but different equipment and environments.

   c. Complete the sentence below.

   " *For results to be reliable they must reproducible and repeatable*"

5. i. Define validity.

   If the results are valid than we are measuring the amount of vit-C with the prescribed method.

   ii. Are the results of this investigation valid? Explain

   Are we measuring the amount of the vit-C? Is there any other substance in the tablet that may react with I_2? If not and we are sure that vit-C is the only compound that reacts with the I_2 in the titre then the results may be deemed to be valid.

6. Discuss one way that the accuracy of the investigation can be improved.

   Use a more dilute iodine solution or a more concentrated vitamin-c solution to make sure the average titre has a greater value so that the percentage error inherent in reading the burette (+/- 0.05mL) is as low as possible.
   To obtain the value of the titre two readings must be taken from the burette. This gives an error of 0.10 mL.
   The % error is therefore (0.10/4.5) X 100 = 2.2%
   If the titre was, say, 20.0 mL then the % error would be (0.10/20.0) X 100 = 0.50%.

7. Discuss the results .
   i. Summarise the key findings and identify any trends between the DV and IV. Refer to specific results from your investigation to justify your findings and trends.
   ii. Identify any unexpected results (outliers), offer a possible explanation for any outlier identified.
   iii. Suggest one possible investigation that can be conducted and explain how this would benefit increase our understanding of vitamins and nutritional content and processed food.

8. Write your conclusion.

   When writing a conclusion you should:
   - *never introduce any new material or results*
   - *restate the research question and the main findings that help answer the question.*
   - *Summarise what the experimental findings have contributed to the broader question of processing food and the impact of the nutritional content.*