

2022

Year 11 Integrated Science – Unit 2

Task 6: Separating Solutions Investigation - VALIDATION

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| **Assessment Type:** |  | Name: |  |
| Validation |  |
| **Duration & Conditions:** |  | Teacher: |  |
|  |  |  |  |
| **Assessment weighting:**  12.5 % of year mark |  | Date: |  |
| Weighting of this assessment in Task 6 Investigation: 6.25% | | | |

|  |  |
| --- | --- |
| **Total Mark** |  |

Please see SEQTA for Teacher feedback and comments

I acknowledge that all the information contained in this task is my own work and not taken from other sources. If other sources have been used, they have been acknowledged in my references.

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(Student Signature)

Due to the flammability and toxicity of ethanol, there are some safety instructions that MUST be followed.

1. Safety glasses and gloves MUST always be worn.
2. DO NOT inhale any of the fumes produced and keep lids/stoppers on all containers when not in use.
3. DO NOT EAT OR DRINK ANYTHING DURING THIS EXPERIMENT!
4. Wash hands thoroughly after completing the experiment and before eating anything.
5. No open flames, sparks, or hot surfaces.

To prepare for the students doing the experiment, Mr McPherson and Mrs Agnew decided to do the experiment themselves. They used 100mL of the alcohol mixture and ended up with 16mL of ethanol at the end. The rate of distillate that they recorded over 10 minutes is detailed below.

|  |  |  |
| --- | --- | --- |
| Time (minutes) | Temperature of mixture °C | Drops of distillate |
| 0.00 | 63 | 0 |
| 0.30 | 65 | 0 |
| 1.00 | 67 | 0 |
| 1.30 | 69 | 0 |
| 2.00 | 70 | 0 |
| 2.30 | 72 | 1 |
| 3.00 | 73 | 1 |
| 3.30 | 75 | 2 |
| 4.30 | 76 | 2 |
| 5.00 | 78 | 3 |
| 5.30 | 78 | 5 |
| 6.00 | 78 | 7 |
| 6.30 | 79 | 10 |
| 7.00 | 79 | 14 |
| 8.30 | 79 | 16 |
| 9.00 | 79 | 16 |
| 9.30 | 80 | 16 |
| 10.00 | 80 | 15 |

## **EXPERIMENT ANALYSIS:**

Using the data from the distillation experiment you have conducted and the above information, complete the following questions.

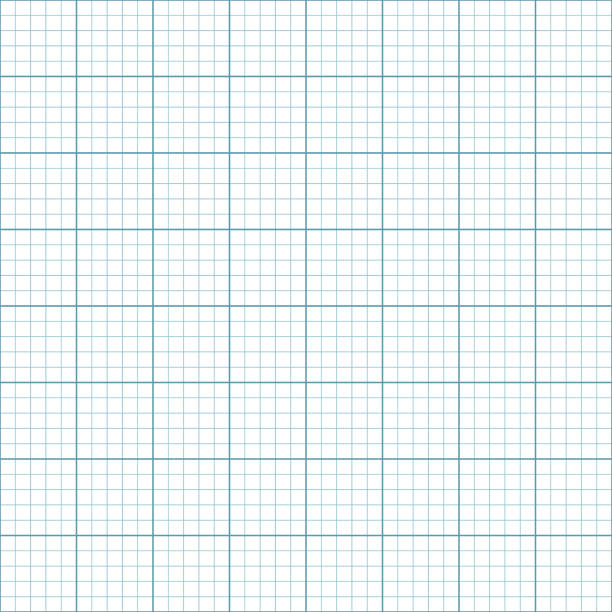
1. What was the aim of this experiment? (1 mark)

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1. List the safety requirements that were required to conduct this experiment and why they were necessary. (4 marks)

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1. Create an appropriate graph of the time and temperature using the data collected by Mr McPherson and Mrs Agnew. (5 marks)



1. What was the temperature at which the mixture first starts to boil? (1 mark)

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1. Explain how the water bath was at 100°C (the water was boiling) but the ethanol/water mixture only reached approximately 80°C? (2 marks)

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1. Why do you think we used a water bath for the distillation process? Was it necessary? (2 marks)

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1. Describe the process of distillation and explain why we can utilise the separation technique to purify our alcohol and water mixture? (4 marks)

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1. After completing the analysis of the alcohol, write a statement for the detectives working this case about the strength of the alcohol that you analysed and if it is useful evidence for the investigation. (2 marks)

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