**GENERAL INTEGRATED SCIENCE**

**UNIT 2**

**Task 8 – Separation Techniques Practical**

NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ WEIGHTING: 7 % MARK: \_\_\_\_\_ /35

**Introduction**

The body of a woman was found early this morning in an alley way in Kalgoorlie. Local detectives have identified the woman as 24-year-old Janet Lewis, a reporter from the Kalgoorlie Miner. Janet was a happy and well-liked member of the community. She played hockey for a local team and had recently joined the local ‘Pain and Relaxation’ Centre, which specialised in magnesium baths, aromatherapy and coconut-oil scrubs.

Preliminary tests on Janet reveal that she was murdered at approximately 4pm on Wednesday afternoon. Because of the severe bruising on her neck and shoulders, and the presence of water in her lungs, it appears that Janet was drowned, and her body was moved.

When trying to identify which body of water Janet was drowned in, detectives discovered the presence of a magnesium salt, flaked coconut, iron filings and coconut oil mixed in with the water in her lungs. This led the detectives to two possible murder locations; Janet’s home or the ‘Pain and Relaxation’ Centre.

When investigating Janet’s home, detectives saw that the bath had been filled but was not drained. There was an empty sample pack from the spa that contained magnesium salt and a coconut-oil scrub, which was sitting next to the bath. They collected a 30mL sample of the water, and measured the amount of all the substances present in the 30mL:

*Iron Filings = 1g*

*Flaked coconut = 2g*

*Magnesium Chloride (salt): 10g*

*Coconut oil: 10mL*

When investigating the ‘Pain and Relaxation Centre’, detectives learned that much stronger concentrations of the magnesium were used in their baths. They collected a 30mL sample of the bath water that Janet typically bathed in and measured the amount of all the substances present in the 30mL.

*Iron Filings = 3g*

*Flaked coconut = 4g*

*Magnesium Chloride (Salt): 80g*

*Coconut oil: 18mL*

The detectives have now given you, the forensic analyst in Kalgoorlie, the sample from Janet’s lungs so that you can determine the concentration of the substances in this sample, and therefore the murder location. To do this, you must find a way to separate each of the substances from the mixture. In order to decide which separation techniques to use, you will need to determine some physical or chemical properties of each substance. Fill in the table below by investigating the materials you have been given.

**Part 1: Testing properties of matter**

You must explore the properties of these substances and record your findings in the table below.

|  |  |
| --- | --- |
| **Substance** | **Physical Properties** |
| **Iron Filings** |  |
| **Coconut Oil** |  |
| **Coconut** |  |
| **Magnesium Chloride (salt)** |  |

***(8 marks)***

**Part 2: Experimental Design**

Using your knowledge of the properties of these substances, design an experiment that would allow you to separate the mixture to determine the concentrations found in Janet’s lungs and therefore the location that she drowned.

***Materials (2 mark)***

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***Method (5 marks)***

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In the space below, outline all the safety precautions relevant to this practical. ***(3 marks)***

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***Conducting the lab (2 marks).***

You are being marked on conducting your experiment appropriately.

***Table (4 marks).***

Record your data, along with the data you’ve been given by the police, in a labelled table below

**Analysis and Validation Questions (11 marks)**

1. Where did the murder occur? Use your data to justify your decision. *(3 marks)*

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1. State one way that you could improve this experiment and explain why it would make the data more reliable. *(2 marks)*

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1. Describe why the magnesium salt and the water made a solution, but the water and the coconut would make a heterogeneous mixture. *(2 marks)*

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1. What is decanting, and how does it relate to the physical properties of the substances it can be used on?

(*2 marks)*

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1. What is distillation, and how does it relate to the physical properties of the substances it can be used on?

*(2 marks)*

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