Surname	Centre Number	Candidate Number
First name(s)		0

GCSE

S24-3445UD0-1H

MONDAY, 6 NOVEMBER 2023 – FRIDAY, 22 DECEMBER 2023

APPLIED SCIENCE (Double Award)

TASK BASED ASSESSMENT – UNIT 4 (3445UD0)

PACK B

ACTIVITY 3

HIGHER TIER

1 hour

3445UD01H
01

For Examiner's use only		
Skill Area	**Maximum Mark**	**Mark Awarded**
Risk assessment	**10**	
Total	**10**	

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.
Write your name, centre number and candidate number in the spaces at the top of this page.
Answer **all** questions.
Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

Assessment will take into account the quality of your writing.

NOV233445UD01H01

Background

Food Tests Wales Ltd is a company that monitors the content of foods manufactured by small independent food producers. The company is frequently asked to test local bread products for protein and simple sugars, such as glucose.

What you need to do

In this activity you are going to complete a risk assessment for the company Food Tests Wales Ltd, to investigate if a bread sample contains protein and simple sugars.

You will need to include the following aspects in the risk assessment:

- performing the Biuret (protein) test on a bread sample.
- performing the Benedict's (simple sugar) test on a bread sample.

Apparatus list

- test tubes
- spatula
- plastic pipettes
- water bath set to 90 °C
- thermometer
- test tube holder
- test tube rack
- filter paper and funnel
- bungs to fit test tubes
- stopwatch

Access to the usual safety equipment

Chemical list

- dried powdered bread
- Biuret solution:
  a mixture of:
  0.15 mol/dm^3 sodium hydroxide
  0.5 mol/dm^3 copper(II) sulfate
- Benedict's solution:
  containing
  0.01 mol/dm^3 copper(II) sulfate
- distilled water

Access to CLEAPSS Student Safety Sheets: 31 Sodium hydroxide (page 4); 40 Copper and its compounds (page 5)

Instructions

Stage 1: Performing the Biuret (protein) test

1. Add 1 heaped spatula of dried powdered bread to a test tube.

2. Add 3 cm^3 of distilled water to the bread sample, put a bung on the test tube and shake well. Place in a test tube rack, remove the bung.

3. Pour the bread solution through a filter, collecting the filtrate in a clean test tube.

4. Add 3 cm^3 of Biuret solution to the filtrate.

5. Observe the colour of the solution. If the pale blue Biuret solution turns lilac, then protein is present in the bread sample.

Stage 2: Performing the Benedict's (simple sugar) test

1. Add 1 heaped spatula of dried powdered bread to a test tube.

2. Add 3 cm^3 of distilled water to the bread sample, put a bung on the test tube and shake well. Place in a test tube rack, remove the bung.

3. Pour the bread solution through a filter, collecting the filtrate in a clean test tube.

4. Add 3 cm^3 of Benedict's solution to the filtrate and place the sample test tube in a water bath at 90 °C, for 10 minutes.

5. Use a test tube holder to remove the sample test tube and place in the test tube rack.

6. Observe the colour of the sample solution. If the pale blue Benedict's solution has changed colour to yellow, orange or red, then simple sugars are present in the bread sample.

CLEAPSS

Student safety sheets 31

Sodium hydroxide

also applies to **Soda lime** and **Potassium hydroxide**

Substance	Hazard	Comment
Sodium or **potassium hydroxide** solid Also known as **caustic soda** and **caustic potash**. **Soda lime** contains about 5 % sodium hydroxide, 1 % potassium hydroxide, 0.2 % silicon dioxide, 14 – 19 % water and the remainder calcium hydroxide (it is used to absorb carbon dioxide). **Carbosorb** in addition contains an indicator.	 **CORROSIVE**  **HARMFUL**	DANGER: causes severe skin burns and eye damage. Potassium hydroxide is also harmful if swallowed. It gives out heat when added to water which can cause boiling or create a choking mist. It is used in the home for clearing drains.
Sodium or **potassium hydroxide solution** (if 0.5 mol / dm^3 or more Sodium hydroxide; 0.4 mol / dm^3 or more potassium hydroxide)	 **CORROSIVE**  **HARMFUL**	DANGER: causes severe skin burns and eye damage. Potassium hydroxide is also harmful if swallowed if 3 mol / dm^3 or more. Fehling's solution contains sodium hydroxide of this concentration. It is used in the home as an oven cleaner.
Dilute sodium or **potassium hydroxide solution** (if less than 0.5 mol / dm^3 but 0.1 mol / dm^3 or more sodium hydroxide; if less than 0.4 mol / dm^3 but 0.1 mol / dm^3 or more potassium hydroxide)	 **IRRITANT**	WARNING: irritating to the eyes and skin.
Very dilute sodium or **potassium hydroxide solution** (if less than 0.125 mol / dm^3 sodium hydroxide; if less than 0.1 mol / dm^3 potassium hydroxide).	**Currently not classified as hazardous**	It may still cause harm in the eyes or in a cut.

Typical control measures to reduce risk

- Use the lowest concentration possible; avoid using the solid if possible.
- Use the smallest amount possible.
- **Wear eye protection**, including when making or disposing of solutions. Protect the face when transferring/dispensing large quantities of corrosive substance.
- If possible, use a safer alternative, e.g. sodium carbonate when making salts or Benedict's solution rather than Fehling's solution for food tests.

Assessing the risks

- What are the details of the activity to be undertaken? What are the hazards?
- What is the chance of something going wrong?
  e.g. Solution spurting out of test tubes when being heated.
- How serious would it be if something did go wrong?
  Note – alkali in the eye causes more damage than acid of equivalent concentration.
- How can the risk(s) be controlled for this activity?
  e.g. Can it be done safely? Does the procedure need to be altered? Should goggles or safety spectacles be worn?

Emergency action

In all emergency situations, alert the responsible adult immediately. Be aware that actions may include the following:

• In the eye	Irrigate the eye with gently-running tap water for at least 20 minutes. Call 999/111. If it is necessary to go to hospital, continue washing the eye during the journey in an ambulance.
• In the mouth/ swallowed	Do no more than rinse and spit with drinking water. Do **not** induce vomiting. Call 999/111.
• Spilt on the skin or clothing	Remove contaminated clothing. Quickly use a dry cloth or paper towel to wipe as much liquid off the skin as possible. Irrigate the affected area with gently-running tap water for at least 20 minutes. If a large area is affected or symptoms occur, call 999/111. Rinse clothing.
• Spilt on the floor, bench, etc.	Wipe up small amounts with a damp cloth and rinse it well. For larger amounts, and especially for (moderately) concentrated solutions, cover with mineral absorbent (e.g. cat litter) and scoop into a bucket. Neutralise with citric acid. Rinse with plenty of water.

Student safety sheets 40

Copper and its compounds

including **Copper oxides, carbonate, sulfate, chloride, nitrate**

Substance	Hazard	Comment
Copper (metal)	Currently not classified as hazardous	Sharp edges can present a risk of cuts. Granulated copper may be classified by some suppliers as toxic to aquatic life with long lasting effects.
Copper(I) oxides (Cuprous oxides) **Copper(II) oxides** (Cupric oxides)	 CORR.* IRRITANT ENVIR.	DANGER. Copper(I) oxide: *causes serious eye damage; skin irritant; harmful if swallowed/inhaled; toxic to aquatic life. WARNING. Copper(II) oxide: causes serious eye irritation; skin irritant; harmful if swallowed/ inhaled; toxic to aquatic life.
Copper(II) carbonate hydroxide (Basic copper carbonate, malachite)	 IRRITANT ENVIRONMENT	WARNING. Copper(II) carbonate hydroxide: causes serious eye irritation; skin irritant; harmful if swallowed/inhaled, toxic to aquatic life. Also known as malachite.
Copper(II) sulfate **Copper(II) nitrate** Solids and concentrated solutions	 CORR. IRRITANT ENVIR.*	DANGER. Solids and solutions (≥ 1.0 mol / dm^3 **sulfate**, ≥ 1.3 mol / dm^3 **nitrate**): cause serious eye damage; skin irritant; harmful if swallowed (especially saturated solutions for crystal-growing). *Solid only: very toxic to aquatic life. Water added to anhydrous solid copper(II) sulfate(VI) produces heat.
Copper(II) sulfate **Copper(II) nitrate** Dilute solutions	 CORROSIVE IRRITANT	DANGER. **Sulfate** (< 1.0 mol / dm^3 and ≥ 0.2 mol / dm^3) and **nitrate** (<1.3 mol / dm^3 and ≥ 0.2 mol / dm^3: skin irritant; cause serious eye damage. WARNING. **Sulfate** (< 0.2 mol / dm^3 and ≥ 0.02 mol / dm^3) and **nitrate** (< 0.15 mol / dm^3 and ≥ 0.05 mol / dm^3): skin and eye irritant. Currently not classified as hazardous. **Sulfate** (< 0.02 mol / dm^3) and **nitrate** (< 0.05 mol / dm^3). Benedict's solution and Fehling's solution both contain dilute copper(II) sulfate but Fehling's solution has other hazards.
Copper(II) chloride Solid	 IRRITANT ENVIRONMENT	WARNING. eye and skin irritant; harmful if swallowed; toxic to aquatic life.
Copper(II) chloride Solutions (if 0.8 mol / dm^3 or more)	 IRRITANT	WARNING. Eye and skin; harmful if swallowed (≥ 1.8 mol / dm^3).
Copper(II) chloride Solution (if less than 0.8 mol / dm^3)	Currently not classified as hazardous	

Typical control measures to reduce risk

- Wear eye protection.
- Use the lowest concentration possible.
- Avoid raising dust, e.g. by dampening powders.
- Take care if evaporating solutions to dryness.

Assessing the risks

- What are the details of the activity to be undertaken? What are the hazards?
- What is the chance of something going wrong?
  e.g. Solutions spurting out of test tubes when heated or solutions decomposing to toxic products when heated to dryness.
- How serious would it be if something did go wrong?
  e.g. Are there hazardous reaction products (such as chlorine from the electrolysis of copper chloride)?
- How can the risk(s) be controlled for this activity?
  e.g. Can it be done safely? Does the procedure need to be altered? Should goggles or safety spectacles be worn?

Emergency action

In all emergency situations, alert the responsible adult immediately. Be aware that actions may include the following:

- **In the eye** Irrigate the eye with gently-running tap water for at least 20 minutes. Call 999/111.
- **In the mouth/swallowed** Do no more than rinse and spit with drinking water. Do **not** induce vomiting. Call 999/111.
- **Dust breathed in** Remove the casualty to fresh air. Consult a medic if breathing is difficult.
- **Spilt on the skin or clothing** Remove contaminated clothing. Irrigate the affected area with gently-running tap water for at least 20 minutes. Call 999/111 as appropriate. Rinse clothing.
- **Spilt on the floor, bench, etc** Scoop up solid (take care not to raise dust). Wipe up small solution spills or any traces of solid with cloth; for larger spills use mineral absorbent (e.g. cat litter).

Examiner only

Complete the risk assessment.

Stage 1: Performing the Biuret (protein) test

Hazard	Risk	Control Measure
.....	.....	i. Wear goggles
.....	.....	ii. .....
.....	.....	
.....	.....	i. Wear goggles
.....	.....	ii. .....
.....	.....	

Examiner only

Stage 2: Performing the Benedict's (simple sugar) test

Hazard	Risk	Control Measure
.....	.....	i. Wear goggles
.....	.....	ii. .....
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....
is a low hazard	.....	.....

10

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