Heating chocolate and egg

Learning objectives

1 Safely heat egg white and chocolate using a Bunsen burner and record observations.

2 Describe and explain observations from a chemical reaction.

3 Categorise statements as relating to chemical or physical changes.

4 Distinguish whether a change is chemical or physical from given observations.

Introduction

Changes can occur in chemicals which may be physical or chemical. A chemical change is one where new substances are formed which have a different chemical structure. Observations of colour change, temperature change or sometimes a change of state could be a sign of this. Often these are irreversible. Physical changes, on the other hand, are reversible and are often associated with changes of state. An example is ice melting. The liquid water can then be frozen to reverse this.

In this experiment, you will use a Bunsen burner and water bath to investigate the different effects of heat on chocolate and egg white to determine whether they undergo a chemical or a physical change on heating.

Equipment

Apparatus

- Safety glasses
- Test tubes, x 2
- Beaker, 250 cm^3
- Bunsen burner
- Heat resistant mat
- Tripod
- Gauze
- Test tube rack
- Test tube holder

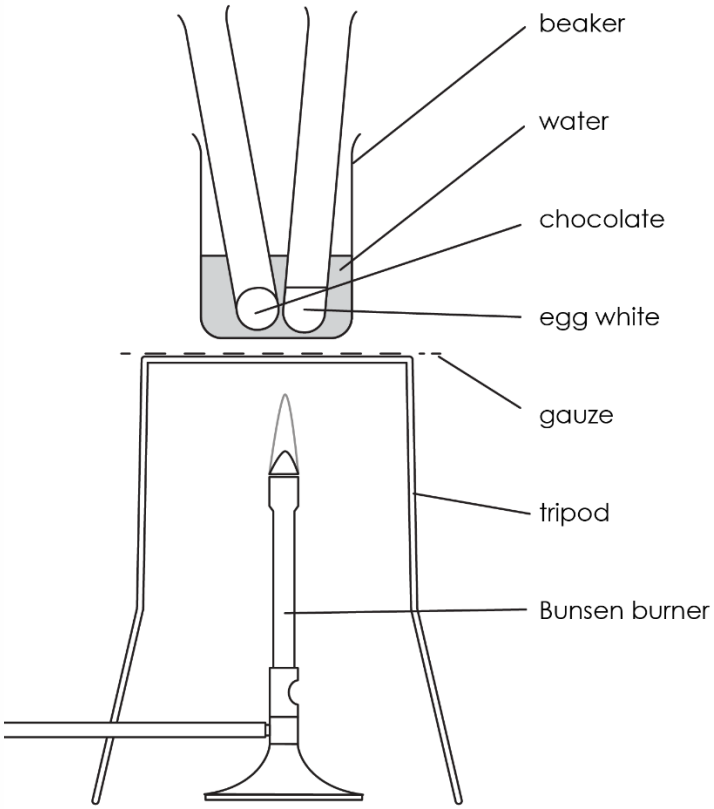
Chemicals

- Chocolate, a few grams
- Egg albumen (egg white), about 4 cm^3

Health, safety and technical notes

- Wear eye protection throughout.
- Do not sit down while heating the beaker or handling the hot test tubes.
- Do not taste foods in a laboratory. The food or the apparatus may be contaminated.

Diagram



Method

1. Add cold water to the beaker until it is about one-third full and place it on the tripod and gauze.
2. Place a test tube containing egg white and a second test tube containing chocolate in the beaker.
3. Heat the beaker of water with the test tubes carefully until the water in the beaker boils. Allow the water to boil gently for about 5 minutes.
4. Watch what happens to the egg white and the chocolate in the tubes while they are being heated.
5. Turn off the Bunsen burner and use the test tube holder to transfer the tubes to the rack to cool.
6. Watch what happens to the egg white and the chocolate in the tubes as they cool.

Results

Use the following table to record your observations before and during the practical.

Substance	Stage of practical	Observation
Egg white	Before	
	Immediately after heating	
	After cooling	
Chocolate	Before	
	Immediately after heating	
	After cooling	

Follow-up questions

1. In the table below there are a series of statements. Tick the correct box to show whether they typically relate to chemical changes or physical changes.

Statement	Chemical change	Physical change
Can easily be undone (reversible)		
Cannot easily be undone (irreversible)		
No new material formed		
New materials formed that are different to the starting materials		
Heat or light given off		
Colour change (permanent)		
Change of state		

2. This question looks at the observations your made when you heated chocolate.

(a) Delete the incorrect answer to state whether heating chocolate is a chemical or physical change.

Heating chocolate is a **chemical/physical** change.

(b) Circle the letter of observation which explains your answer.

A Heat is given off
B There is a colour change
C There is a reversible change of state
D New material is formed

3. This question looks at the observations your made when you heated egg white.

(a) Delete the incorrect answer to state whether heating egg white is a chemical or physical change.

Heating egg white is a **chemical/physical** change.

(b) Circle the letter of the observation which explains your answer.

A Heat is given off
B There is a colour change
C There is a reversible change of state
D New material is formed

4. For each of the scenarios given below, determine whether this represents a chemical change or a physical change. Tick the correct column.

Scenario	Chemical change	Physical change
Bread being toasted	✓	
Making ice cubes		
Boiling water in a kettle		
Iron rusting		
Baking a cake		
Driving a car		
Ice cream melting		
Fireworks		

5. When an acid reacts with an alkali we can write a chemical equation. For example:

hydrochloric acid + sodium hydroxide → sodium chloride + water

(a) Name the reactants in this equation (these are found before the arrow).

_____

(b) Name the products in this equation (these are found after the arrow).

_____

(c) Circle the letter for the observation which explains how you know this is a chemical change.

A New products are formed
B There is a colour change
C Heat is released

(d) A student wants to write a chemical equation for ice melting. Complete the sentence to explain why this isn't possible.

This is a _____ change.

6. A student adds white zinc oxide powder to a test tube and heats it strongly using a blue Bunsen burner flame. They observe a colour change to yellow, however when this solid cools down to room temperature it changes back to a white colour. Delete the correct words to complete the sentence below to state whether this is a chemical or physical change and explain your answer.

This is a **chemical/physical** change as although there is a **colour/mass/state** change this is **irreversible/reversible** on heating and cooling.

7. Many homes own candles. A student suggests that when you light a candle this is an example of both a chemical change and a physical change. Add the following words to the diagram to show this:

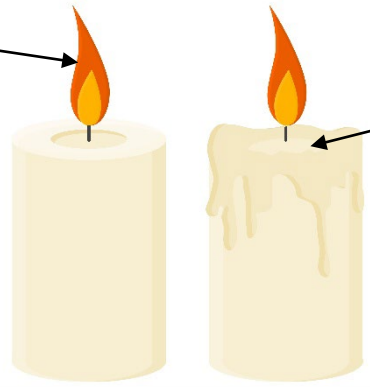
burning **chemical** **melting** **physical**

_____ change:

_____

_____ change:

_____



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