25SCHOOLS
FREE LEARNING NOTES FOR ZAMBIA

FORM 1 · TERM 1

Chemistry

Physical and chemical changes

Lesson notes for learners · Competence-Based Curriculum

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Matter changes all the time. Ice melts in a cup, sugar disappears in your tea, and a piece of paper becomes ashes when it burns. Some of these changes can be turned back and some cannot. In this note you learn to tell physical changes from chemical changes by asking one question: was a new substance formed?

AFTER THESE NOTES YOU SHOULD BE ABLE TO

- Say what a physical change is and give examples
- Say what a chemical change is and give examples
- Tell the two kinds of change apart
- Describe simple experiments that show each kind of change

KEY WORDS

physical change	a change in which no new substance is formed
chemical change	a change in which a new substance is formed
change of state	a physical change such as melting, evaporation, condensation or freezing
reversible	able to be changed back to how it was
solute	a substance that dissolves in a liquid
solvent	the liquid in which a solute dissolves

1 Physical changes

In a physical change a substance keeps its chemical nature, so no new substance is formed. Physical changes include changes of state (melting, evaporation, condensation and freezing), changes in shape and size, and the dissolving of a solute in a solvent.

Physical changes are generally reversible and involve little or no energy. Melted ice can freeze again, and a piece of wire that has been folded is still the same wire.

WORKED EXAMPLE

Is melting ice a physical change or a chemical change?

Ice melts to form water, so the substance only changes state

No new substance is formed

So melting ice is a physical change

2 Chemical changes

In a chemical change the nature of the substance changes and a new substance is formed. Burning paper is an example. Ask yourself: can the ashes be turned back into paper? They cannot, because ash is a new substance.

Another example is mixing baking soda with vinegar. The two substances react to make new substances, so this is also a chemical change.

Feature	Physical change	Chemical change
New substance formed	No	Yes
Usually reversible	Yes	No, ashes cannot become paper again
Examples	Melting ice, melting wax, cutting paper, folding wire, grinding salt, dissolving sugar	Burning paper, baking soda with vinegar

Figure 1. Physical and chemical changes compared

3 Investigating the changes

You can investigate both kinds of change safely with materials around the school. For physical changes, weigh a piece of ice, melt it and weigh the water; heat wax until it melts; cut paper into small pieces; fold wire many times; grind salt crystals into powder; and dissolve sugar in water. For chemical changes, weigh a piece of paper, burn it completely and weigh the ashes, and mix baking soda with vinegar in a beaker on a balance, recording the mass before and after.

Record your observations in a table. After each task ask: did the substance change into a different substance, can the change be reversed, and did the mass change? Work carefully, and take extra care when you burn paper.

TRY THIS

In groups, do three of the tasks above that your teacher allows, such as melting wax, dissolving sugar in water and mixing baking soda with vinegar. Make a table with the headings what you did, what you saw, and physical or chemical change. Present your table to the class and explain how you decided.

REMEMBER

- A physical change forms no new substance
- A chemical change forms a new substance
- Physical changes include changes of state, changes in shape and size, and dissolving
- Physical changes are generally reversible with little or no energy involved
- Burning paper and mixing baking soda with vinegar are chemical changes

? Check yourself

1. What is a physical change?
2. What is a chemical change?
3. Name four changes of state.
4. Classify as physical or chemical: grinding salt into powder.
5. Classify as physical or chemical: burning paper.
6. A learner at a school in Luangwa stirs sugar into hot tea, then melts a candle in a dish, and later burns a piece of paper to light a fire. (a) Which of these are physical changes? (b) Which one is a chemical change? (c) Explain how you decided for the chemical change.
7. In the laboratory a group mixes baking soda with vinegar in a beaker standing on a balance and records the mass before and after. (a) Is this a physical or a chemical change? (b) Say what the group should record and why. (c) Name one safety rule the group should follow.

ANSWERS

1. A change in which no new substance is formed.
2. A change in which a new substance is formed.
3. Melting, evaporation, condensation and freezing.
4. Physical, because the salt is still salt and no new substance is formed.
5. Chemical, because ashes are a new substance.
6. (a) Dissolving the sugar and melting the candle wax. (b) Burning the paper. (c) The ashes are a new substance and cannot be turned back into paper, so a new substance was formed.
7. (a) Chemical change. (b) The mass at the start and at the end, and their observations, so they can compare and present the data. (c) Work carefully and safely, for example wear eye protection and keep the beaker away from the edge of the table.

Written by 25Schools to follow the Form 1 Chemistry syllabus of the Zambian competence-based curriculum. Free for learners to read, download and share. More notes and quizzes at 25schools.com.