AP CHEMISTRY • EXERCISE SHEET

4.4 Physical Changes versus Chemical Changes

Name: _____ Class: _____ Date: _____ **Total: 11 marks**

Objective

Build the skills to answer exam questions on **physical versus chemical changes**.

You must be able to:

- classify a change as **physical** 物理变化 or **chemical** 化学变化
- justify with whether **new substances** form
- recognise state changes as physical

1 Worked examples

Study these first. Each one shows the method for a question type used later —follow the steps and you can do the Practice and Exam-style questions yourself.

The key test

A **chemical change** makes **new substances** with new properties (and is usually hard to reverse). A **physical change** keeps the same substance, only its form or state changing.

Physical changes

Melting, boiling, dissolving, crushing, and mixing (without reacting) are physical — the substance's identity is unchanged and often easily reversed.

Chemical changes

Burning, rusting, digestion, and reactions producing a gas or precipitate are chemical —new substances form and bonds are rearranged.

A worked judgement

Boiling water: liquid → gas, still H_2O → **physical**. Burning wood: makes CO_2, ash, water → new substances → **chemical**.

2 Practice

Now apply the methods above.

2.1 Classify melting ice as physical or chemical. [1]

2.2 Classify iron rusting, with a reason. [2]

2.3 What is the single best test for a chemical change? [1]

3 Exam-style questions

3.1 Which is a **chemical** change? [1]

- **A** boiling water
- **B** dissolving salt
- **C** burning paper
- **D** breaking glass

3.2 A student heats sugar until it turns black and gives off a smell.

(a) State whether this is physical or chemical. [1]

(b) Justify your answer. [2]

3.3 Classify each and give a one-word reason: (a) evaporating alcohol, (b) a battery discharging, (c) tearing paper. [3]

4 Go further

You are now ready for the real exam questions on this subtopic:

- work through the **4.4 Physical Changes versus Chemical Changes** lesson on the **Learn** page;
- read the **Physical Changes versus Chemical Changes** section of the AP Chemistry handout on the **Know** page.

Solutions

2.1 Physical.

2.2 Chemical —a new substance (iron oxide) forms.

2.3 Whether new substances (with new properties) form.

3.1 C —burning paper forms new substances.

3.2 (a) Chemical. (b) New substances form (the black solid and the smell are different materials), so it is a chemical change.

3.3 (a) physical (state change); (b) chemical (reaction); (c) physical (shape).