AP CHEMISTRY • EXERCISE SHEET

4.1 Recognizing a Chemical Reaction

Name: _____ Class: _____ Date: _____ **Total: 12 marks**

Objective

Build the skills to answer exam questions on **recognizing a chemical reaction**.

You must be able to:

- spot evidence of a **chemical change** 化学变化 (gas, precipitate, color, temperature, light)
- distinguish a chemical change from a physical one
- link the evidence to new substances forming

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.

■ Signs of a chemical reaction

A chemical reaction makes **new substances**. Common evidence:

- a **gas** is produced (bubbles);
- an insoluble **precipitate** 沉淀 forms;
- a **color change**;
- a **temperature change** (heat released or absorbed);
- light or a flame.

■ One sign is a clue, not proof

A single sign (like bubbles) suggests a reaction, but could be physical (boiling makes bubbles too). Look for new substances with different properties.

■ A worked judgement

Mixing two clear solutions that turn cloudy → a **precipitate** formed → a chemical reaction. Ice melting to water → same substance, only a **physical** change.

■ Energy as evidence

A reaction that gets hot (or cold) is exchanging energy as bonds break and form — evidence of a chemical change.

2 Practice

Now apply the methods above.

2.1 List two signs that a chemical reaction has occurred. [2]

2.2 Cloudiness forms when two solutions mix. What has formed? [1]

2.3 Is dissolving sugar in water a chemical change? Give a reason. [2]

3 Exam-style questions

3.1 Which is the best evidence of a **chemical** reaction? [1]

- **A** water evaporating
- **B** a precipitate forming from two clear solutions
- **C** ice melting
- **D** sugar dissolving

3.2 A student adds a metal to acid and observes bubbling and warming.

(a) State the two signs of a chemical reaction. [2]

(b) Explain why bubbling alone is not conclusive. [1]

3.3 Classify each as physical or chemical: (a) iron rusting, (b) crushing a can, (c) a

firework exploding. [3]

4 Go further

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

- work through the **4.1 Recognizing a Chemical Reaction** lesson on the **Learn** page;
- read the **Recognizing a Chemical Reaction** section of the AP Chemistry handout on the **Know** page.

Solutions

2.1 Any two: gas produced, precipitate, color change, temperature change, light.

2.2 A precipitate (an insoluble solid).

2.3 No —it is physical; the sugar keeps its identity and can be recovered by evaporation.

3.1 B —a precipitate forming is a new substance, evidence of a chemical reaction.

3.2 (a) Bubbling (gas produced) and warming (temperature change). (b) Bubbling can also be physical (e.g. boiling), so it is not conclusive on its own.

3.3 (a) chemical; (b) physical; (c) chemical.