AP ENVIRONMENTAL SCIENCE • EXERCISE SHEET

9.2 Reducing Ozone Depletion

Name: _____ Class: _____ Date: _____ **Total: 9 marks**

Objective

Build the skills to answer exam questions on **reducing ozone depletion**.

You must be able to:

- describe the **Montreal Protocol** 蒙特利尔议定书
- explain the switch from CFCs to substitutes
- evaluate the recovery of the ozone layer

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 Montreal Protocol

The **Montreal Protocol** (1987) was an international agreement to **phase out CFCs** and other ozone-depleting substances. It is often called the most successful environmental treaty.

Substitutes

CFCs were replaced with **HCFCs** and then **HFCs**, which do far less (or no) ozone damage. (Some HFCs are strong greenhouse gases, now also being phased down.)

Recovery

Because CFCs persist, the ozone layer recovers slowly, but the ozone hole is now **shrinking** and is expected to heal over decades —showing global cooperation can work.

A worked evaluation

The Montreal Protocol shows that a coordinated global ban on a harmful chemical can reverse an environmental problem, given time for the long-lived pollutant to decline.

2 Practice

Now apply the methods above.

2.1 What did the Montreal Protocol do? [1]

2.2 What replaced CFCs? [1]

2.3 Is the ozone layer recovering? [1]

3 Exam-style questions

3.1 The Montreal Protocol is considered successful because it [1]

- **A** increased CFC use
- **B** phased out ozone-depleting substances globally
- **C** banned all refrigerators
- **D** had no effect

3.2 After the Montreal Protocol, CFC use fell sharply.

(a) Explain why the ozone layer still took decades to recover. [2]

(b) State one lesson this treaty offers for other global problems. [1]

3.3 Explain one drawback of some CFC substitutes (HFCs). [2]

4 Go further

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

- work through the **9.2 Reducing Ozone Depletion** lesson on the **Learn** page;

- read the **Reducing Ozone Depletion** section of the AP Environmental Science handout on the **Know** page.

Solutions

2.1 Phased out CFCs and other ozone-depleting substances.

2.2 HCFCs / HFCs.

2.3 Yes (slowly).

3.1 B —phased out ozone-depleting substances globally.

3.2 (a) CFCs are persistent, so those already in the atmosphere kept destroying ozone for decades before declining. (b) Global cooperation can solve a shared environmental problem.

3.3 Some HFCs, though ozone-safe, are potent greenhouse gases that contribute to climate change.