Exercise walk-through

Reducing Ozone Depletion ▪ 9.2

eXercise

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

Method — 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.

Method — 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.)

Method — 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.

Method — 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.

Practice 2.1 ▪ 1 mark

What did the Montreal Protocol do?

Solution 2.1

Worked steps

Phased out CFCs and other ozone-depleting substances B1.

Practice 2.2 ▪ 1 mark

What replaced CFCs?

Solution 2.2

Method: Substitutes

Worked steps

HCFCs / HFCs B1.

Practice 2.3 ▪ 1 mark

Is the ozone layer recovering?

Solution 2.3

Method: Recovery

Worked steps

Yes (slowly) B1.

Exam-style 3.1 ▪ 1 mark

The Montreal Protocol is considered successful because it

A increased CFC use

B phased out ozone-depleting substances globally

C banned all refrigerators

D had no effect

Solution 3.1

Method: The Montreal Protocol

A increased CFC use

B phased out ozone-depleting substances globally ✓

C banned all refrigerators

D had no effect

Worked steps

B — phased out ozone-depleting substances globally.

Exam-style 3.2 ▪ 2 marks

After the Montreal Protocol, CFC use fell sharply.
(a) Explain why the ozone layer still took decades to recover.
(b) State one lesson this treaty offers for other global problems.

Solution 3.2

Method: The Montreal Protocol

Worked steps

(a) CFCs are persistent, so those already in the atmosphere kept destroying ozone for decades before declining M1 A1. (b) Global cooperation can solve a shared environmental problem B1.

Exam-style 3.3 ▪ 2 marks

Explain one drawback of some CFC substitutes (HFCs).

Solution 3.3

Method: Substitutes

Worked steps

Some HFCs, though ozone-safe, are potent greenhouse gases that contribute to climate change M1 A1.