

Exercise walk-through

9.7

Ocean Acidification

AP Environmental Science

Ocean warming and acidification

The ocean absorbs $>90\%$ of the extra heat and much of the CO_2 .

- heat $\Rightarrow$ coral bleaching + thermal expansion
- $\text{CO}_2 \Rightarrow$ carbonic acid, lower pH

Ocean acidification dissolves shells of calcifying organisms.



Coral bleaching from ocean heat stress

Ocean acidification

the cause

the ocean absorbs about a **quarter** of our CO_2 , which forms carbonic acid

the effect

pH falls – **ocean acidification**

who it hits

corals, shellfish and plankton, which build shells and skeletons from **calcium carbonate**

and warming

warmer water bleaches coral and expands, so **sea levels** rise even before ice melt is counted

Acidification and warming come from the **same** CO_2 and hit the same organisms twice over.

Exercises 2.1-2.3

2.1 What gas dissolving in the ocean causes acidification?

[1]

2.2 What acid forms when CO_2 dissolves in seawater?

[1]

2.3 Which organisms are most harmed by acidification?

[1]

Exercises 2.1-2.3

2.1 What gas dissolving in the ocean causes acidification? [1]

2.1

- Carbon dioxide (CO_2)
-

2.2 What acid forms when CO_2 dissolves in seawater? [1]

2.2

- Carbonic acid
-

2.3 Which organisms are most harmed by acidification? [1]

2.3

- Shell-building organisms (corals, shellfish, plankton)

Exercise 3.1

3.1 Ocean acidification makes it harder for organisms to

[1]

☐

A swim

B build calcium carbonate shells

C photosynthesize on land

D breathe air

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3.1 Ocean acidification makes it harder for organisms to

[1]

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3.1 B

- build calcium carbonate shells

Exercise 3.2 (a)

3.2 Rising atmospheric CO_2 is acidifying the ocean.

(a) Explain the chemistry linking CO_2 to lower ocean pH.

[3]

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3.2 Rising atmospheric CO_2 is acidifying the ocean.

(a) Explain the chemistry linking CO_2 to lower ocean pH.

[3]

(a)

- The ocean absorbs CO_2 ; it reacts with water to form carbonic acid; this lowers the ocean's pH (makes it more acidic)

Exercise 3.2 (b)

3.2 Rising atmospheric CO_2 is acidifying the ocean.

(b) State one consequence for marine food webs.

[1]

Exercise 3.2 (b)

3.2 Rising atmospheric CO₂ is acidifying the ocean.

(b) State one consequence for marine food webs.

[1]

(b)

- Harm to shelled plankton at the base of the food web disrupts the whole web/fisheries

Exercise 3.3

3.3 Explain why ocean acidification and ocean warming are both caused by rising CO₂ but are different problems. [2]

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3.3

- Both come from extra CO_2 , but warming is heat trapped by CO_2 in the air, while acidification is CO_2 dissolving into the water and lowering its pH – different mechanisms and effects