

GCSE Chemistry

Worksheet: Corrosion and its prevention

TIME 30 min	TOTAL 28 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
-----------------------	--------------------------	------------------------------	-----------------------------------

Topics: Corrosion and its prevention

NAME	CLASS	DATE
-------------	--------------	-------------

- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer all questions in the spaces provided.
- In all calculations, show clearly how you work out your answer.
- The marks for questions are shown in brackets.

0	1
---	---

0	1	.	1
---	---	---	---

Explain why a layer of grease or oil prevents rusting.

.....

.....

[1 mark]

0	1	.	2
---	---	---	---

Name one situation where using grease, rather than paint, would be the more suitable barrier method, and explain why.

.....

.....

.....

.....

[2 marks]

0 2

0 2 . 1

Which method of rust prevention acts **only** as a barrier, without also providing sacrificial protection?

Tick (✓) **one** box.

Galvanising with zinc

☐

Painting

☐

Attaching a block of magnesium

☐

Attaching a block of zinc

☐

[1 mark]

0 3

0 3 . 1

What is corrosion?

.....

.....

[1 mark]

0 3 . 2

Name the **two** substances that are needed for iron to rust.

.....

.....

.....

.....

[2 marks]

0 3 . 3

Which method of preventing rusting provides sacrificial protection?

Tick (✓) **one** box.

Greasing

☐

Painting

☐

Galvanising with zinc

☐

Plating with tin

☐

[1 mark]

0 4

0 4 . 1

Which condition(s) must be present for iron to rust?

Tick (✓) **one** box.

Air only

☐

Water only

☐

Both air and water

☐

Neither air nor water

☐

[1 mark]

0 4 . 2

Name the brown / orange compound formed when iron rusts.

.....

.....

.....

[1 mark]

0 5

A student put an iron nail in a test tube of salt water, open to the air. Every 2 days the student removed the nail, dried it and weighed it, without removing any of the rust.

Table 1 shows the results.

Table 1

Time in days	0	2	4	6	8
Mass of nail in g	4.500	4.511	4.525	4.535	4.548

0 5 . 1

Calculate the mean rate of increase in the mass of the nail over the 8 days.

Give your answer in mg per day.

.....

.....

.....

.....

Rate = mg per day

[2 marks]

0 5 . 2

Explain why the mass of the nail increases as it rusts.

.....

.....

.....

.....

[2 marks]

0 6

A student places identical iron nails in four test tubes with different conditions and records the mass of rust formed after one week.
Table 2 shows the results.

Table 2

Test tube	Conditions	Mass of rust in mg
1	distilled water, boiled to remove air, sealed with a layer of oil	0
2	tap water, open to the air	15
3	salt water, open to the air	42
4	dry air only (no water)	0

0 6 . 1

Compare the results for tubes 2 and 3, and suggest why they differ.

.....

.....

.....

.....

[2 marks]

0 6 . 2

Explain why tubes 1 and 4 produced no rust.

.....

.....

.....

.....

[2 marks]

0 7

Corrosion can be prevented by applying a coating that acts as a barrier.

0 7 . 1

Suggest the most suitable barrier method to prevent rusting of:

- a bicycle chain
- the body of a car.

.....

.....

.....

.....

[2 marks]

0 7 . 2

Explain how painting prevents iron from rusting.

.....

.....

[1 mark]

0 7 . 3

Aluminium is more reactive than iron, but aluminium objects do not corrode easily.
Explain why.

.....

.....

.....

.....

[2 marks]

0 8

A student set up three test tubes, each containing an iron nail.

- Tube A: the nail in tap water, open to the air.
- Tube B: the nail in water that had been boiled and cooled, with a layer of oil on top.
- Tube C: the nail in air with anhydrous calcium chloride, with a stopper in the tube.

After one week, only the nail in tube A had rusted.

0 8 . 1

Why was the water in tube B boiled?

.....

.....

[1 mark]

0 8 . 2

Why was a layer of oil put on top of the water in tube B?

.....

.....

[1 mark]

0 8 . 3

What was the purpose of the anhydrous calcium chloride in tube C?

.....

.....

[1 mark]

0 8 . 4

What do the results show about rusting?
Explain your answer.

.....

.....

.....

.....

[2 marks]

END OF QUESTIONS

Original practice questions written to match the specification. Not produced by, affiliated with or endorsed by AQA.

Mark scheme

GCSE Chemistry · Worksheet: Corrosion and its prevention · 28 marks

Question 1 (3 marks)

01.1 [1 mark]

- it forms a barrier that keeps air / oxygen and water away from the metal surface (1)
-

01.2 [2 marks]

- a moving part, e.g. a bicycle chain or a hinge (1)
 - because grease stays effective while parts move / slide against each other, whereas paint could crack, flake off or hinder movement (1)
-

Question 2 (1 mark)

02.1 [1 mark]

Correct: Painting

Question 3 (4 marks)

03.1 [1 mark]

- the destruction of materials by chemical reactions with substances in the environment (1)
-

03.2 [2 marks]

- air / oxygen (1)
 - water (1)
-

03.3 [1 mark]

Correct: Galvanising with zinc

Question 4 (2 marks)

04.1 [1 mark]

Correct: Both air and water

04.2 [1 mark]

Answer: hydrated iron(III) oxide

- hydrated iron(III) oxide (allow iron oxide) (1)

Notes: Do not accept 'rust' on its own.

Question 5 (4 marks)

05.1 [2 marks]

Answer: 6.0 mg per day

- increase in mass = $4.548 - 4.500 = 0.048 \text{ g} = 48 \text{ mg}$ (1)
- $48 \div 8 = 6.0$ (mg per day) (1)

Notes: 0.006 (in g per day) scores 1 mark.

05.2 [2 marks]

- iron reacts with oxygen (and water) from its surroundings to form rust (hydrated iron(III) oxide) (1)
 - the oxygen (and water) become part of the solid on the nail, so its mass increases (mass is conserved) (1)
-

Question 6 (4 marks)

06.1 [2 marks]

- tube 3 (salt water) produced more rust (42 mg) than tube 2 (tap water, 15 mg) (1)
 - dissolved salt increases the rate of rusting, e.g. by increasing the conductivity of the water (1)
-

06.2 [2 marks]

- tube 1 has no oxygen (air) present, and tube 4 has no water present (1)
 - both air (oxygen) and water are needed for rusting, so removing either one prevents it (1)
-

Question 7 (5 marks)

07.1 [2 marks]

- bicycle chain: greasing / oiling (1)
 - car body: painting (1)
-

07.2 [1 mark]

- the paint is a barrier that keeps air / oxygen and water away from the iron (1)
-

07.3 [2 marks]

- aluminium has an oxide coating / layer on its surface (1)
 - which protects the metal from further corrosion (1)
-

Question 8 (5 marks)

08.1 [1 mark]

- to remove dissolved air / oxygen (1)
-

08.2 [1 mark]

- to stop air / oxygen dissolving in the water again (1)
-

08.3 [1 mark]

- to absorb water (vapour) / to keep the air dry (1)
-

08.4 [2 marks]

- both air / oxygen and water are needed for rusting (1)
 - the nail with both air and water (A) rusted, but the nail without air (B) and the nail without water (C) did not (1)
-