

(The reactivity series)

Q1. (2018)

Nickel is extracted from nickel oxide by reduction with carbon.

Explain why carbon can be used to extract nickel from nickel oxide.

[2 marks]

Q2. (2019)

Which of the following pairs of metals would produce the greatest voltage when used as the electrodes in the cell?

Use **Table 4**.

[1 mark]

Tick (✓) **one** box.

Magnesium and cobalt

☐

Magnesium and tin

☐

Nickel and cobalt

☐

Nickel and tin

☐

Q3. (2020)

A student added copper metal to colourless silver nitrate solution.

The student observed:

- pale grey crystals forming
- the solution turning blue.

Explain how these observations show that silver is less reactive than copper.

[3 marks]

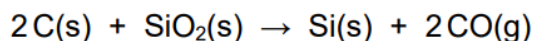
Q4. (2022)

This question is about silicon and compounds of silicon.

The reactivity series sometimes includes non-metals such as carbon, hydrogen and silicon.

Silicon can be extracted by reducing silicon dioxide with different substances.

The equation for one possible reaction is:



Explain what this reaction shows about the position of silicon in the reactivity series.

[2 marks]

Q5. (2022)

Aluminium also reduces silicon dioxide.

Carbon is used rather than aluminium to reduce silicon dioxide because carbon is cheaper than aluminium.

Carbon can be obtained by heating coal.

Aluminium is obtained from aluminium oxide.

Explain why aluminium is more expensive than carbon.

[2 marks]

Q6. (2023)

Cryolite contains Na^+ ions as well as Al^{3+} ions.

Suggest **one** reason why sodium is **not** a product of the electrolysis.

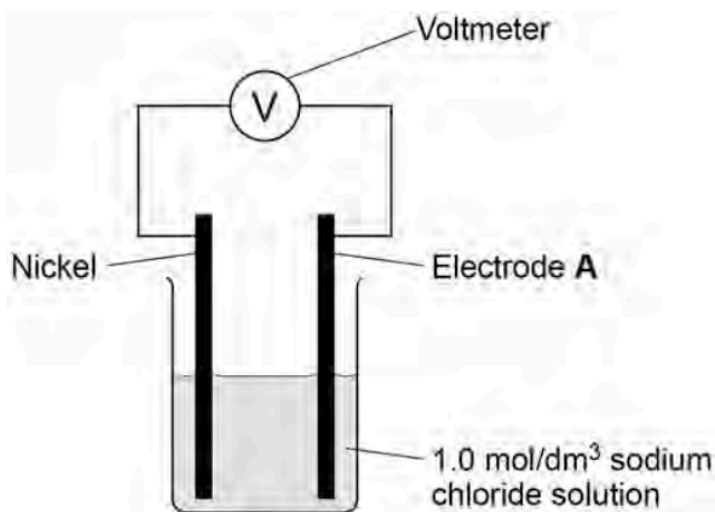
[1 mark]

Q7. a). (2024)

A student investigated the voltage produced by different pairs of metal electrodes in a chemical cell.

Figure 6 shows the apparatus.

Figure 6



This is the method used.

1. Place a nickel electrode and an electrode made from a different metal (electrode **A**) in 1.0 mol/dm^3 sodium chloride solution.
2. Measure the voltage produced.
3. Repeat using different metals for electrode **A**.

Table 3 shows the results.

Table 3

Electrode A	Symbol of metal	Voltage in volts
Copper	Cu	-0.59
Magnesium	Mg	2.12
Nickel	Ni	0.00
Silver	Ag	-1.05
Zinc	Zn	0.51

Write the symbols of the five metals in **Table 3** in order of reactivity.

Justify your answer.

[3 marks]

Most reactive _____ Least reactive

Justification _____

The voltage produced by a chemical cell depends on the concentration of the electrolyte solution.

Plan an experiment to investigate how the voltage produced by a chemical cell varies with the **concentration** of the electrolyte solution.

The following substances are available:

- the metal electrodes in **Table 3**
- 1.0 mol/dm^3 sodium chloride solution
- pure water.

[6 marks]
