

# CAIE Chemistry A-level

## Topic 6 - Electrochemistry

### Flashcards

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# What are the rules for assigning oxidation states?



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Element	Oxidation number
Group 1 metals	+1
Group 2 metals	+2
Oxygen	-2 (usually)
Hydrogen	+1 (usually)
Fluorine	-1
Oxygen with fluorine	+2

- Uncombined elements have an oxidation state of 0.
- In neutral compounds, the sum of oxidation states is 0.
- The oxidation state of common basic ions is equal to their charge.
- For highly electronegative species, the more electronegative element is negative.



What are some exceptions to the rule for oxidation states?



## What are some exceptions to the rule for oxidation states?

- Hydrogen in metal hydrides has an oxidation state of  $-1$  (instead of  $+1$ ).
- Oxygen in peroxides has an oxidation state of  $-1$  (instead of  $-2$ ).



Calculate the oxidation state of sulfur in  
 $\text{H}_2\text{SO}_4$



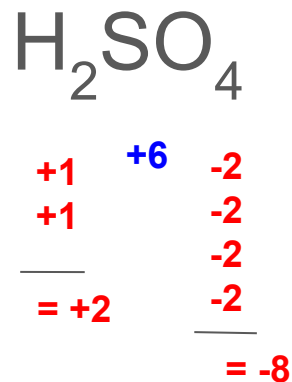
# Calculate the oxidation state of sulfur in $\text{H}_2\text{SO}_4$

- Oxidation state of oxygen = -2  
4 oxygen atoms so  $-2 \times 4 = -8$
- Oxidation state of hydrogen = +1  
2 hydrogen atoms so  $+1 \times 2 = +2$
- Overall charge on the compound is 0 so the sum of oxidation states must equal 0.
- X is the oxidation state of sulfur:  

$$+2 + X + -8 = 0$$

$$X - 6 = 0$$

$$X = 6$$
- Oxidation state of S in  $\text{H}_2\text{SO}_4$  is +6.



# What is oxidation?





# What is oxidation?

Oxidation involves the loss of electrons.

Leads to an increase in oxidation number.



# What is reduction?



# What is reduction?

Reduction involves the gain of electrons.

Leads to a decrease in oxidation number.



# What is disproportionation?



## What is disproportionation?

A reaction when a substance is simultaneously oxidised and reduced to form two different products with different oxidation states.



# What is an oxidising agent?



# What is an oxidising agent?

A species which brings about oxidation by gaining electrons. The oxidising agent is itself reduced.



# What is a reducing agent?





# What is a reducing agent?

A species which brings about reduction by losing electrons. The reducing agent is itself oxidised.

