

# Electrolysis in Water

27 January 2020 09:28

Sometimes it is easier to dissolve in water to separate out a metal than it is to heat it and then electrolyse it

In water you have:



- Potassium
- Sodium
- Lithium
- Calcium
- Magnesium
- Carbon
- Zinc
- Iron
- Hydrogen
- Copper

## Cathode Reactions

We have  $H^+$  and metal ions. What happens then depends on the relative reactivity of the  $H^+$  and the metal ions

Cathode  
metal ions

Less reactive than  $H^+$

↓  
layer of solid metal

more reactive than  $H^+$

↓  
 $H_2(g)$

Anode

if  $OH^-$  & halide

↓  
 $Cl_2, Br_2, I_2$

$OH^-$  (ie no halide)

↓  
 $O_2(g)$

Example 1 Copper Sulphate solution:

Ions present:  $Cu^{2+}$   $SO_4^{2-}$   $OH^-$   $H^+$

Cathode

Cu less reactive than  $H_2$  so get Cu metal

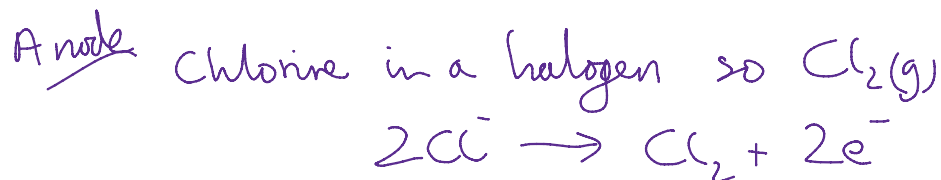
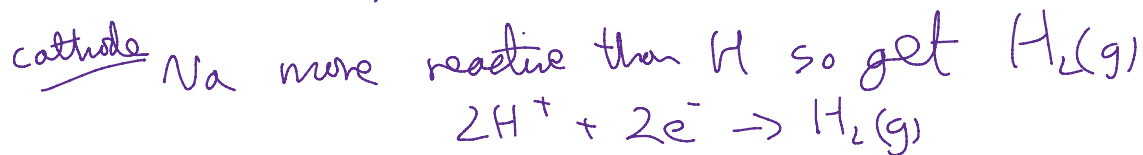
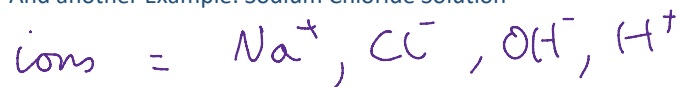


Anode

No halide so  $O_2(g)$

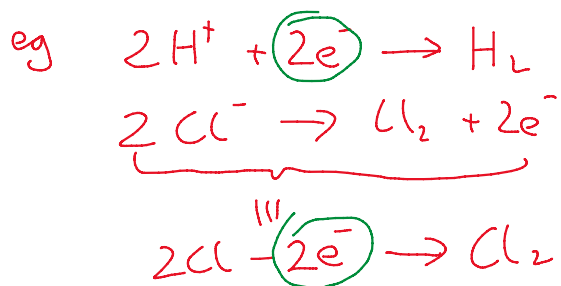


And another Example: Sodium Chloride Solution

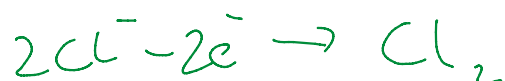


#### Half Equations

A half equation shows what happens at each electrode. You need to ensure that the number of electrons at each electrode balance.



We can add these:



ionic equation