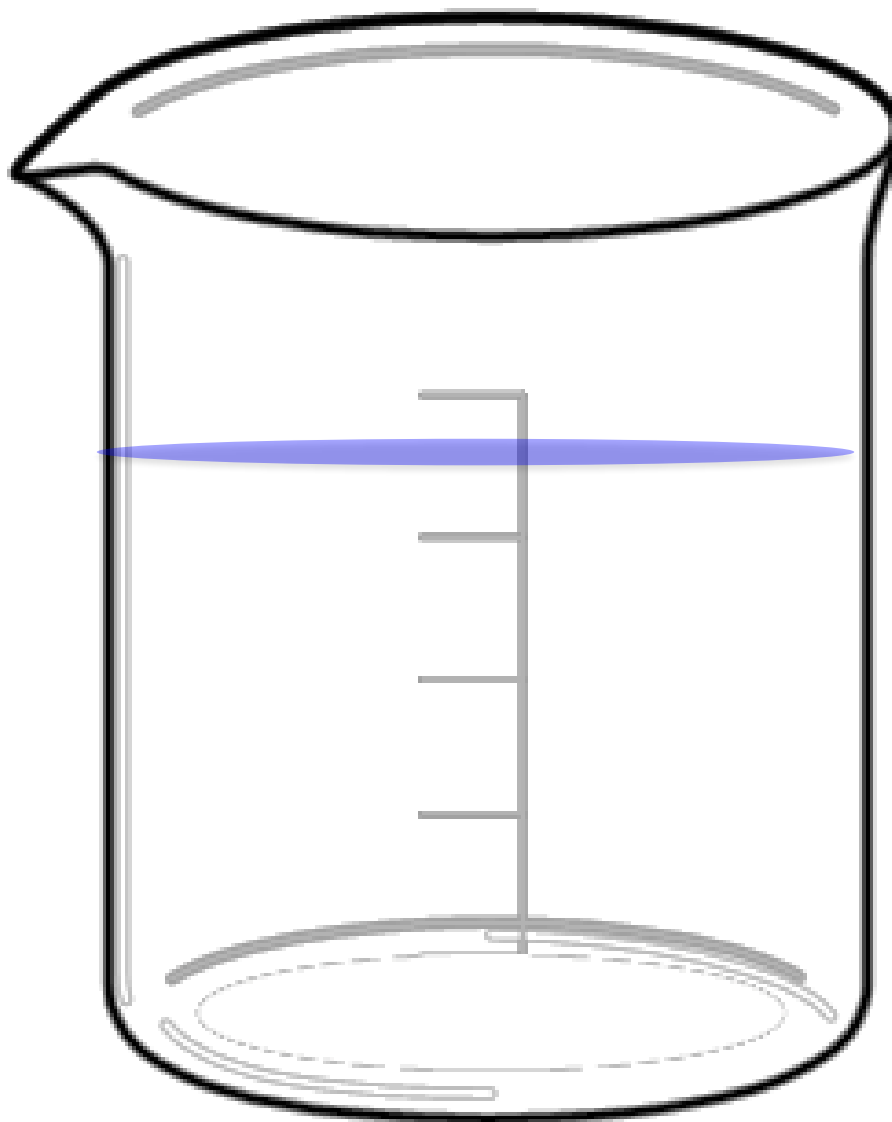
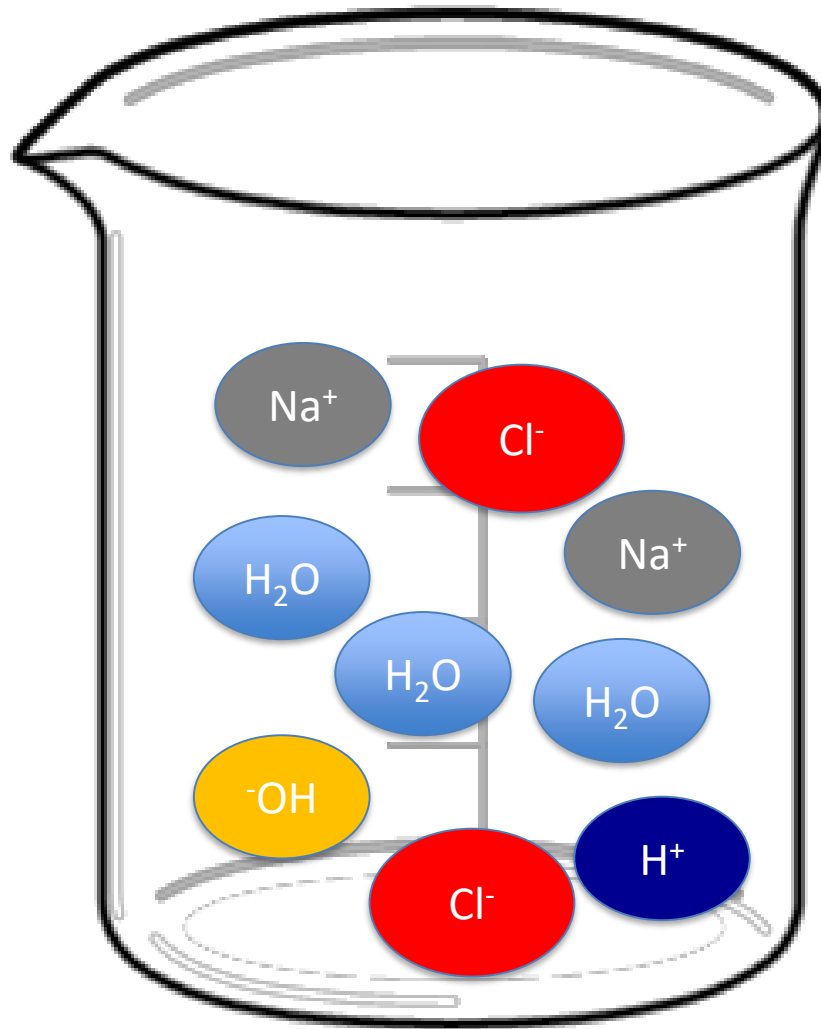
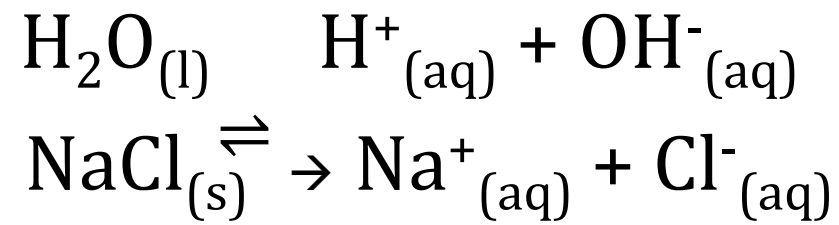


Topic	Electrolysis of aqueous solutions	Level	Key Stage 4 (or any course for students aged 11-16)
Outcomes	<ol style="list-style-type: none"> 1. Students can predict what products are made during the electrolysis of metal halides 2. Students can explain why hydrogen and not the metal ions are discharged at the cathode 3. Students can draw dot and cross diagrams to represent the changes in electronic configuration that take place during electrolysis 		
Information for teachers	<p>To understand electrolysis of aqueous solutions, students first need to understand exactly what ions are floating around in an aqueous solution. Then, it's important that they understand the less reactive element will get discharged – that's because the more reactive element will be stable existing as an ion. Finally, they need to understand that the remaining solution contains a valuable product – sodium hydroxide.</p>		

Draw what is **actually** inside this beaker of $\text{NaCl}_{(aq)}$

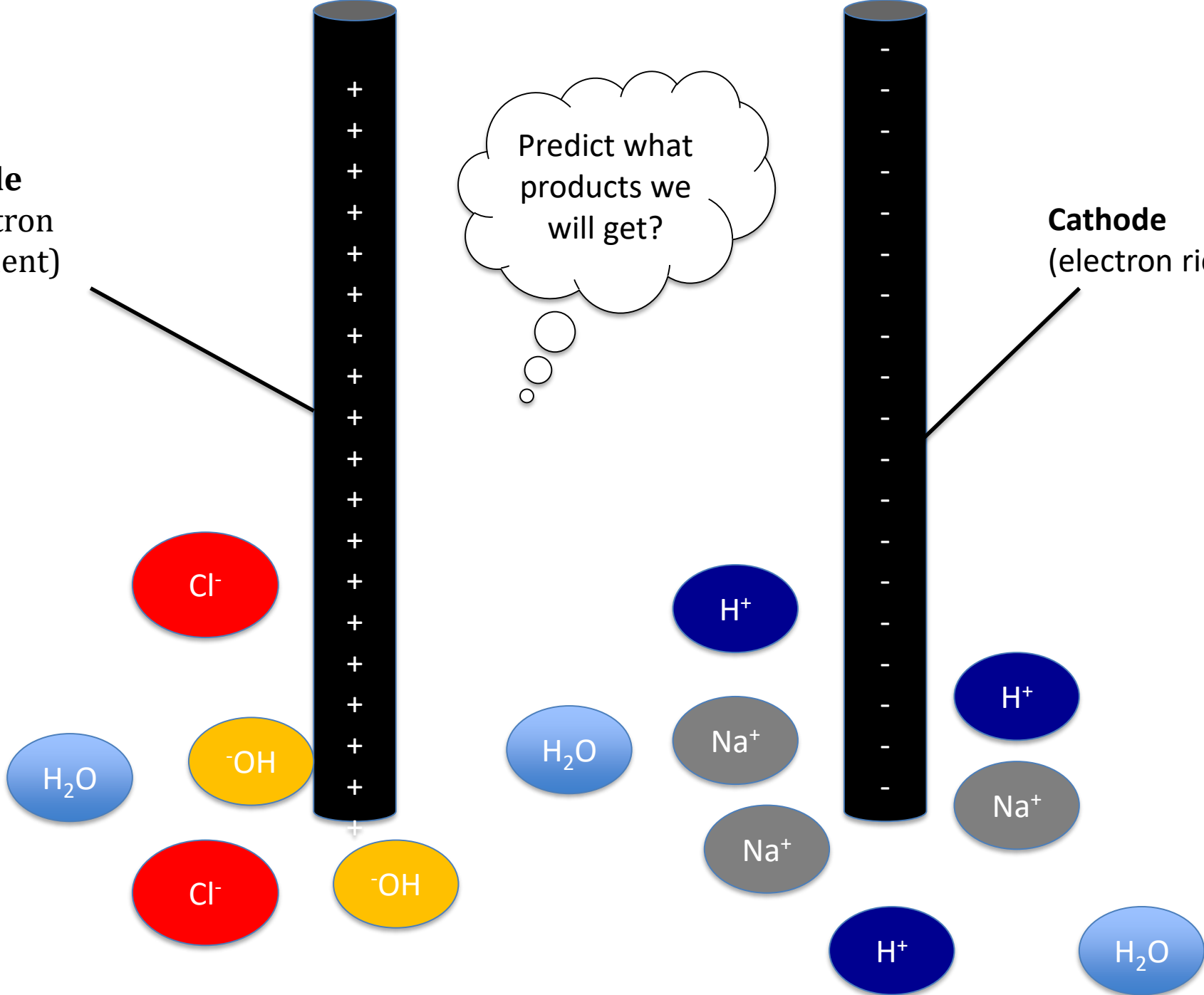




Anode
(electron deficient)

Predict what products we will get?

Cathode
(electron rich)



Draw the electronic structure of a:

sodium ion (Na^+)

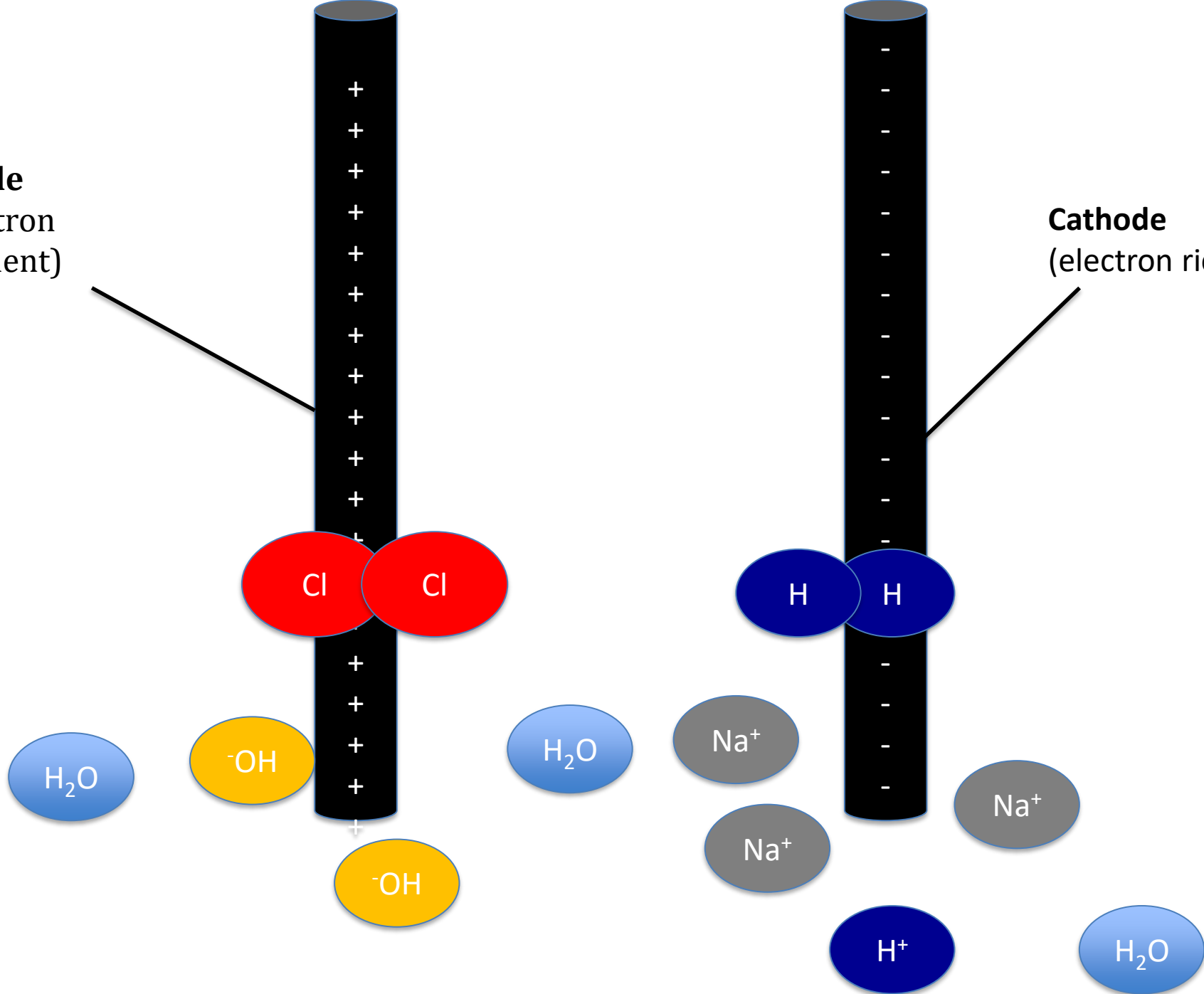
hydrogen ion (H^+)

Look at your diagrams.
Which ion is more stable?

Or, we can think of this in
another way – which ion has
a greater ability to gain an
electron and so be
discharged at the cathode?
Who wants an electron
more?!

Anode
(electron deficient)

Cathode
(electron rich)



Drawing what happens during the electrolysis of $\text{NaCl}_{(\text{aq})}$

What happens at the cathode?

1. Draw a dot and cross diagram to show:
 - two hydrogen ions gaining an electron from the cathode
 - the hydrogen molecule that is produced.
2. Write the half equation for the reaction that takes place at the cathode.

What happens at the anode?

1. Draw a dot and cross diagram to show:
 - two chloride ions losing an electron to the anode
 - the chlorine molecule that is produced.
2. Write the half equation for the reaction that takes place at the anode.

What is left?

1. What ions remain after electrolysis and suggest the pH of the solution.
2. Once all the water is evaporated, what compound will be left?

Substance	Product at the cathode	Product at the anode	Remaining product?
KBr(aq)			
NaCl(s)			
NaNO ₃ (aq)			

Compare and contrast the electrolysis of aqueous sodium chloride to that of molten sodium chloride. In your answer refer to:

- the ions present
- the products formed
- the energy required for each process
- the half-equations