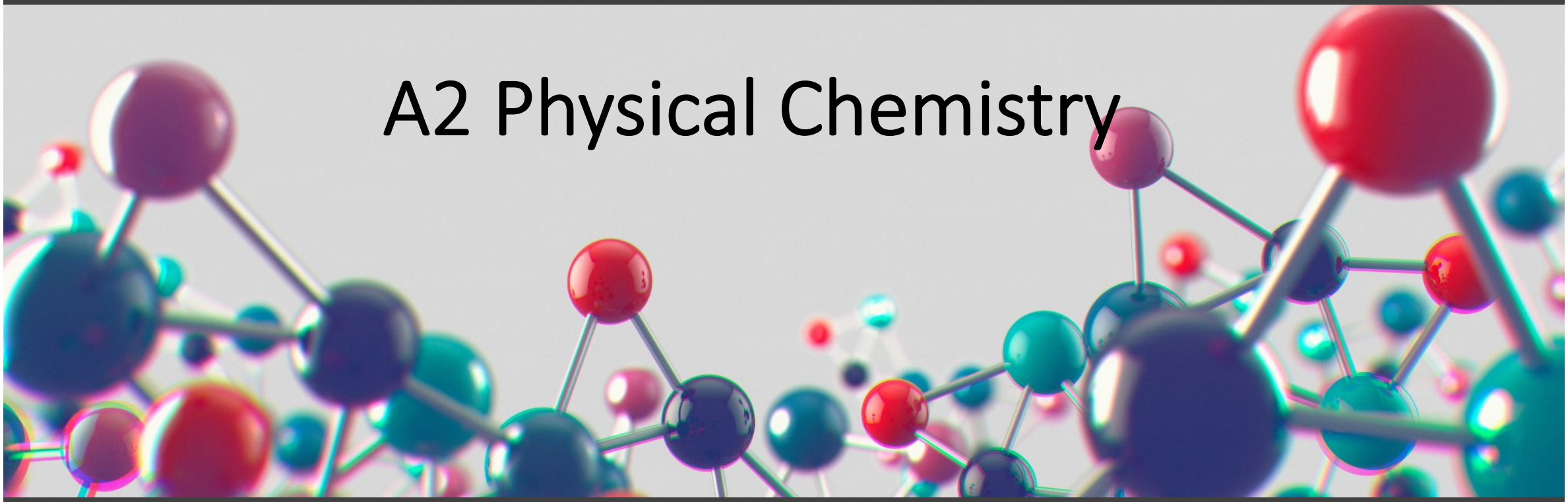

A2 Physical Chemistry

Electrode Potentials

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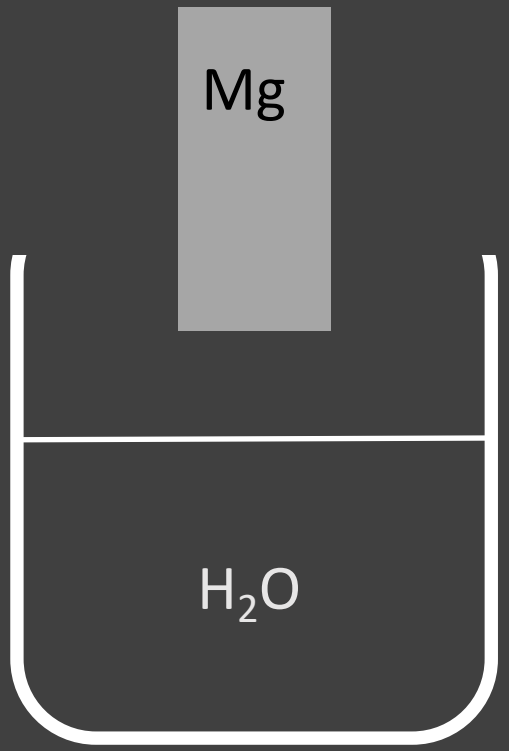
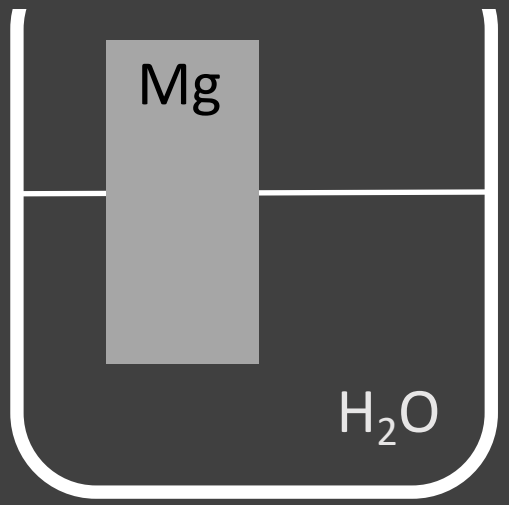
Electrode Potentials



If you place a piece of magnesium metal in water, some of the magnesium atoms will leave their electrons on the metal and into solution as magnesium ions.

Electrode Potentials



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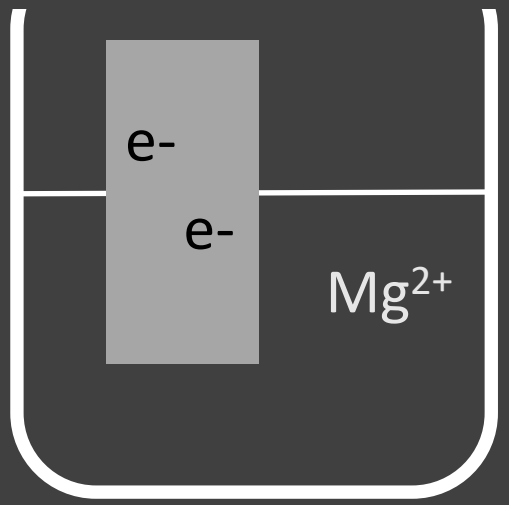
Electrode Potentials



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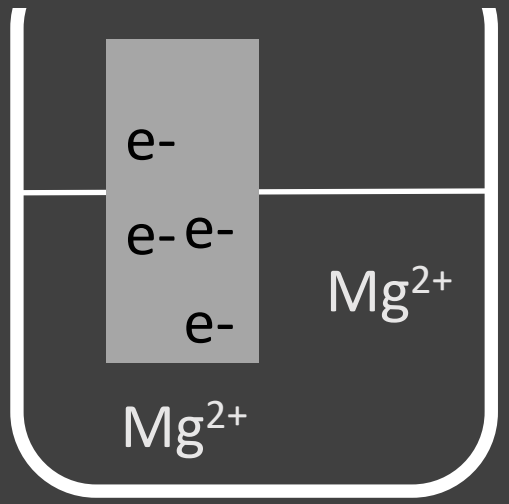
Electrode Potentials



As the negative charge on the magnesium metal increases, magnesium ions are attracted back onto the metal.

In time, an equilibrium is set up.

Electrode Potentials

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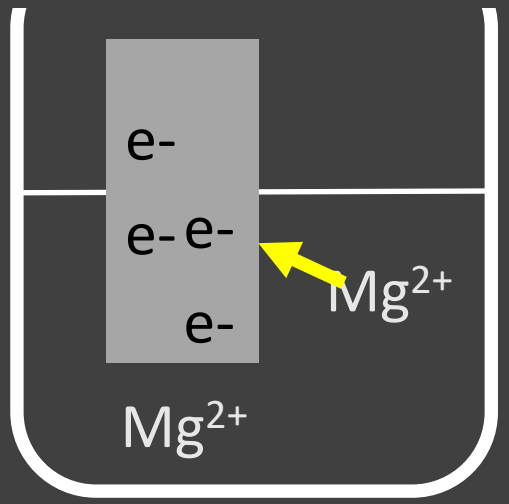

Electrode Potentials

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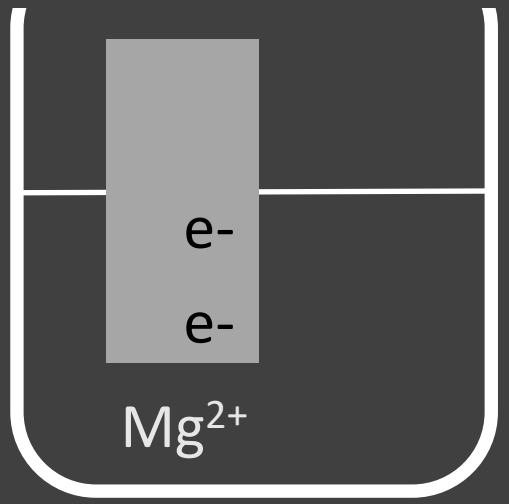
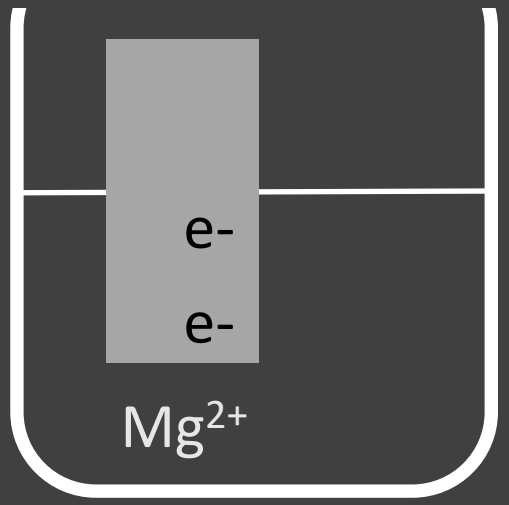


Electrode Potentials

In time, an equilibrium is set up.

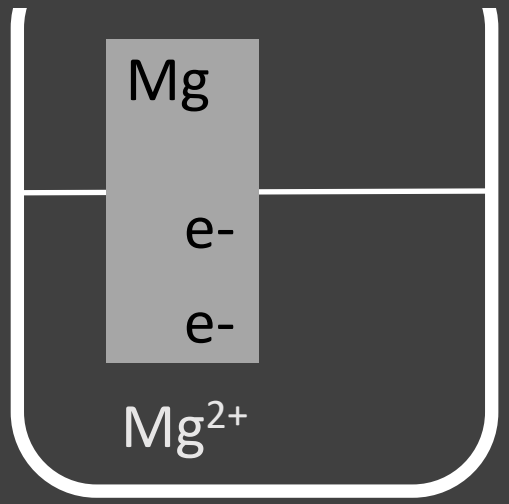
$$Mg^{2+}_{(aq)} + 2e^- \Rightarrow Mg_{(s)}$$



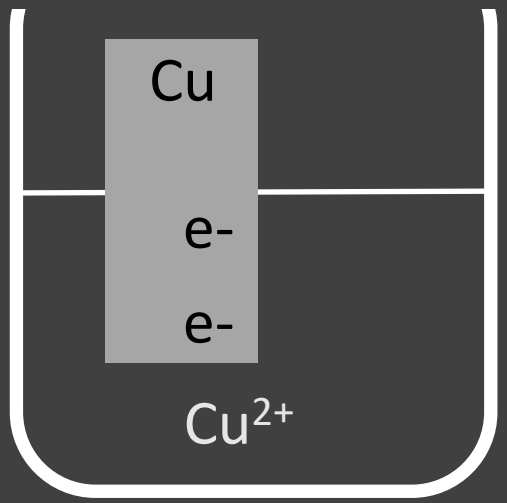
Comparing Electrode Potentials

This process will occur for other metals

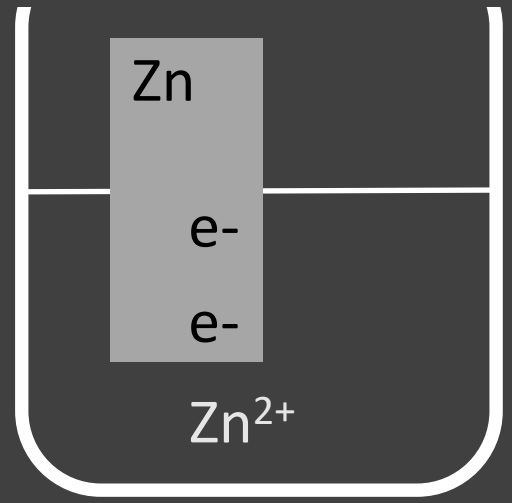
$Mg^{2+}_{(aq)} + 2e^- \rightleftharpoons Mg_{(s)}$



$Cu^{2+}_{(aq)} + 2e^- \rightleftharpoons Cu_{(s)}$

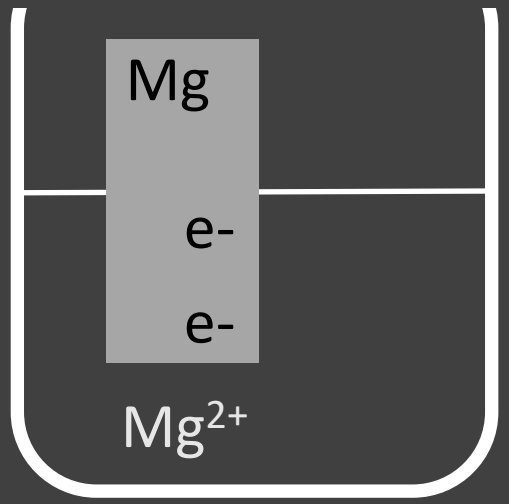


$Zn^{2+}_{(aq)} + 2e^- \rightleftharpoons Zn_{(s)}$



How will the charge on each metal differ?
Which one will have the highest negative charge at equilibrium?

$Mg^{2+}_{(aq)} + 2e^- \rightleftharpoons Mg_{(s)}$



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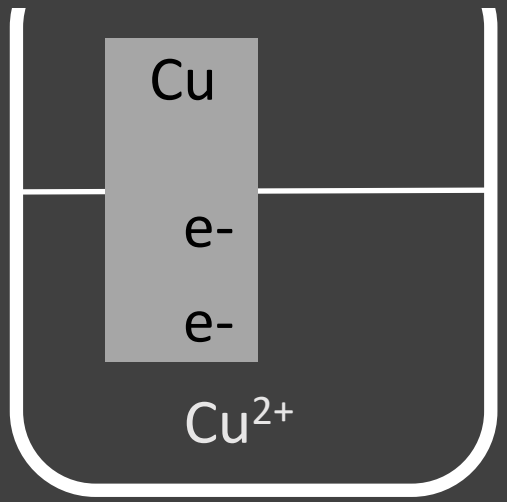
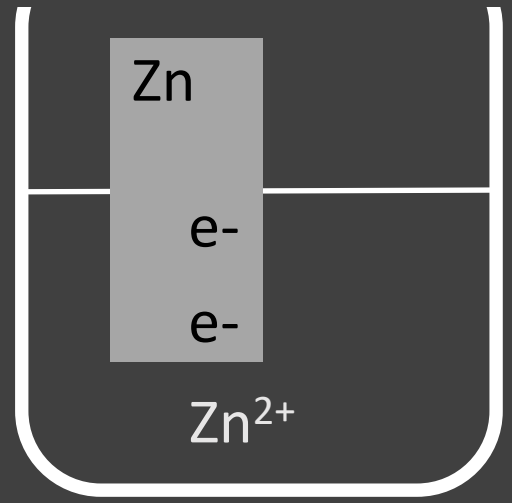
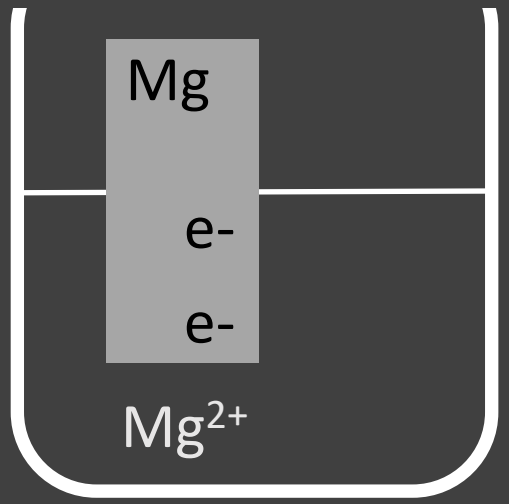


$Zn^{2+}_{(aq)} + 2e^- \rightleftharpoons Zn_{(s)}$



Our knowledge of the metal reactivity series and relative ease at which different metals lose electrons can allow us to place them in order of increasing negativity.

$Mg^{2+}_{(aq)} + 2e^- \Rightarrow Mg_{(s)}$



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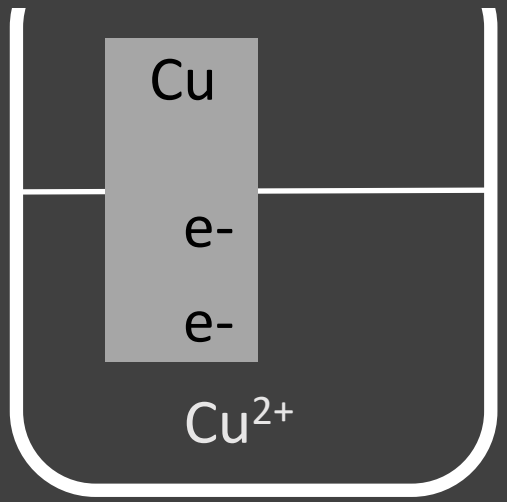

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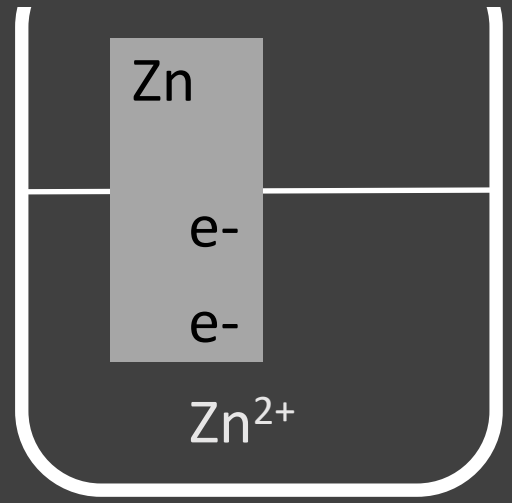


Reactivity series

Magnesium Most reactive
Zinc
Copper Least reactive

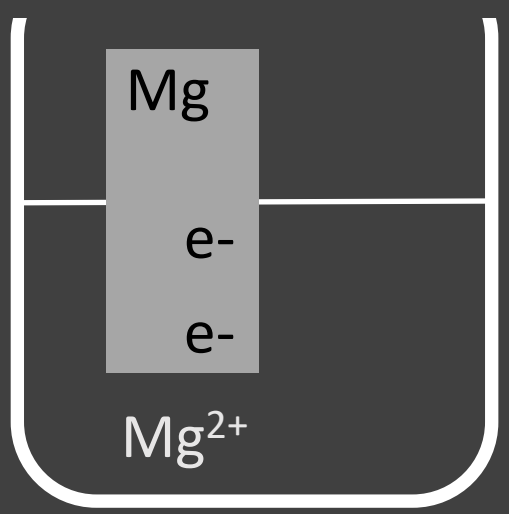
Most negative

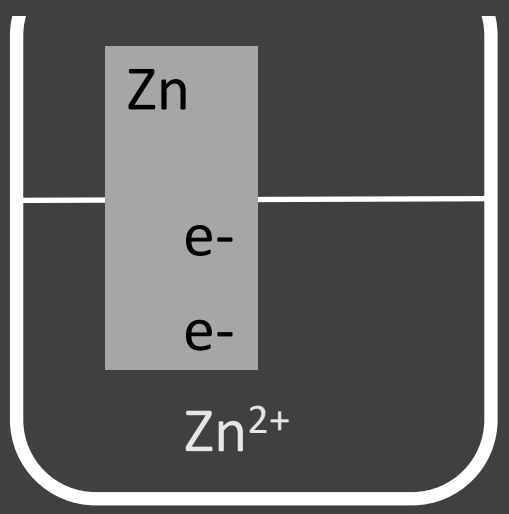
Least negative

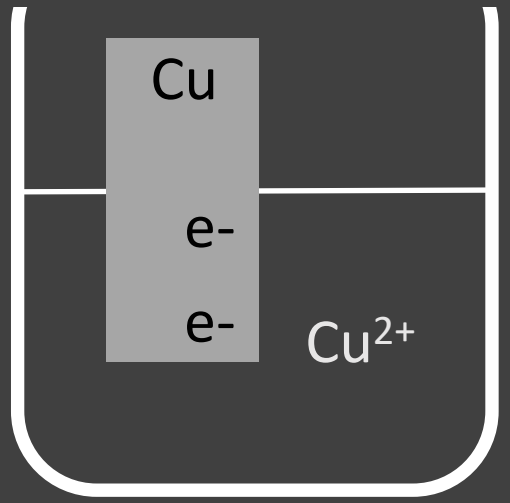
$Mg^{2+}_{(aq)} + 2e^- \rightleftharpoons Mg_{(s)}$

$Zn^{2+}_{(aq)} + 2e^- \rightleftharpoons Zn_{(s)}$

$Cu^{2+}_{(aq)} + 2e^- \rightleftharpoons Cu_{(s)}$



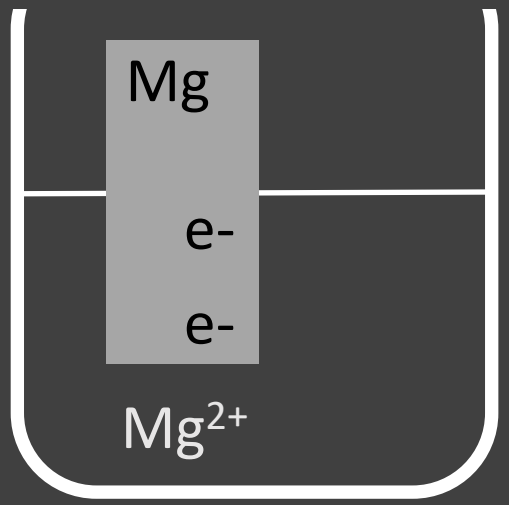




Reactivity series	Magnesium	Most reactive
	Zinc	
	Copper	Least reactive

Equilibrium most shifted to left

$Mg^{2+}_{(aq)} + 2e^- \rightleftharpoons Mg_{(s)}$



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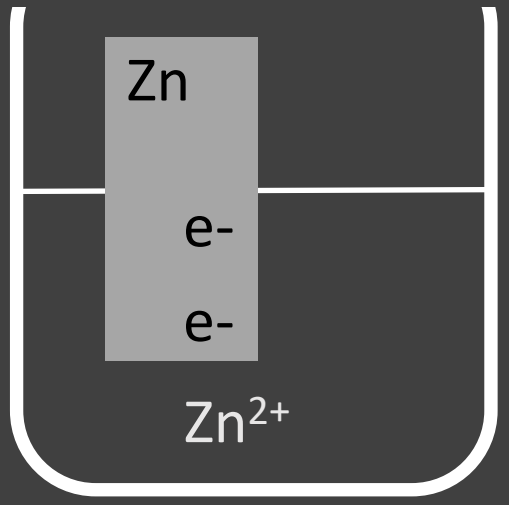

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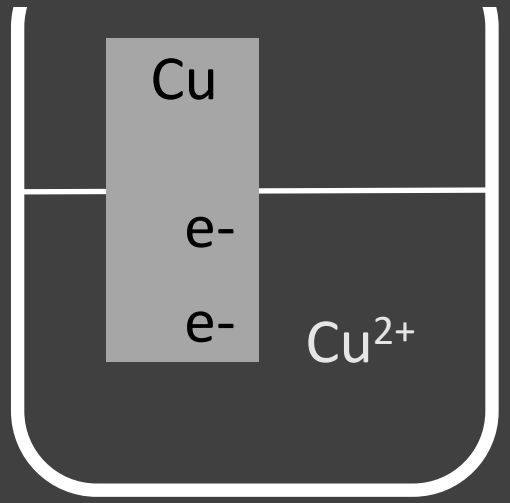

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