

Redox Calculations (Pilot Version)

Aims

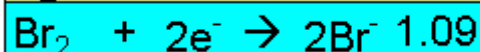
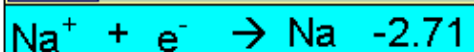
This spreadsheet is for use when teaching the principles of predicting if a reaction is feasible and for calculating emf values for cells.

Prior Knowledge

Students should have been introduced to the principle of standard electrode potential and half equations. They should understand that half equations can be related to half cells and that combining of half cells produces an overall cell. They must also be able to calculate E° cell for any pair of half cells.

How to use the spreadsheet

Start with a pair of half cells such as:



Discuss with the students which of Na and Br^- is most readily oxidised. When they have decided which of these is most readily oxidised they select the oxidation button next to the relevant half equation. This will then appear in the oxidation half equation box. Select the reduction box next to the other species, this will appear in the reduction half equation box.

If the correct species have been chosen then the bottom of the spreadsheet will show that the reaction is feasible.

Reduction half equation			Oxidation half equation		
$\text{Br}_2 + 2\text{e}^- \rightarrow 2\text{Br}^- \quad 1.09$			$\text{Na} \rightarrow \text{Na}^+ + \text{e}^- \quad -2.71$		
	$E^{\circ} \text{ (V)}$			$E^{\circ} \text{ (V) - for reduction}$	
$\text{K}^+ + \text{e}^- \rightarrow \text{K}$	-2.92	Reduction	$\text{K} \rightarrow \text{K}^+ + \text{e}^-$	-2.92	Oxidation
$\text{Na}^+ + \text{e}^- \rightarrow \text{Na}$	-2.71	Reduction	$\text{Na} \rightarrow \text{Na}^+ + \text{e}^-$	-2.71	Oxidation
$\text{Fe}^{2+} + 2\text{e}^- \rightarrow \text{Fe}$	-0.44	Reduction	$\text{Fe} \rightarrow \text{Fe}^{2+} + 2\text{e}^-$	-0.44	Oxidation
$\text{Sn}^{2+} + 2\text{e}^- \rightarrow \text{Sn}$	-0.14	Reduction	$\text{Sn} \rightarrow \text{Sn}^{2+} + 2\text{e}^-$	-0.14	Oxidation
$\text{Sn}^{4+} + 2\text{e}^- \rightarrow \text{Sn}^{2+}$	0.15	Reduction	$\text{Sn}^{2+} \rightarrow \text{Sn}^{4+} + 2\text{e}^-$	0.15	Oxidation
$\text{I}_2 + 2\text{e}^- \rightarrow 2\text{I}^-$	0.54	Reduction	$2\text{I}^- \rightarrow \text{I}_2 + 2\text{e}^-$	0.54	Oxidation
$\text{Ag}^+ + \text{e}^- \rightarrow \text{Ag}$	0.80	Reduction	$\text{Ag} \rightarrow \text{Ag}^+ + \text{e}^-$	0.80	Oxidation
$\text{Br}_2 + 2\text{e}^- \rightarrow 2\text{Br}^-$	1.09	Reduction	$2\text{Br}^- \rightarrow \text{Br}_2 + 2\text{e}^-$	1.09	Oxidation
$\text{Cl}_2 + 2\text{e}^- \rightarrow 2\text{Cl}^-$	1.36	Reduction	$2\text{Cl}^- \rightarrow \text{Cl}_2 + 2\text{e}^-$	1.36	Oxidation
E° cell		3.8	Feasible		

Once the students are confident with this process they should then go on to calculate the E° cell value for the pairs of reagents. They can then compare their calculated value with that given at the bottom of the sheet.

Adapting the Resource

It is not intended that the content of this resource should be adapted but the colours schemes can readily be altered to suit particular students needs.

