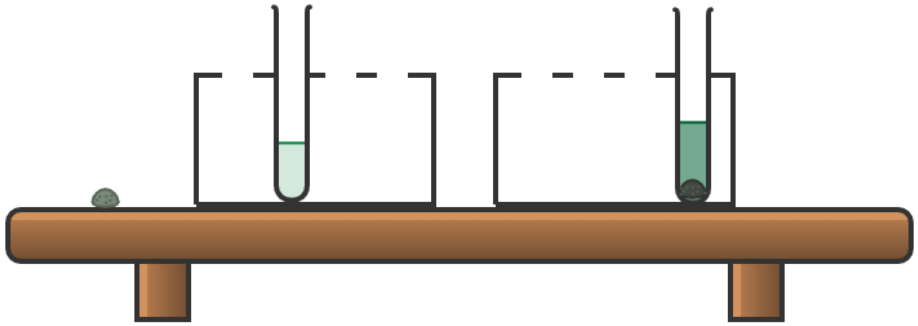
Practice questions

$Cr(s) + Fe^{2+}(aq) \rightarrow Cr^{3+}(aq) + Fe(s)$	(unbalanced)

Step #1: What colour are the 4 species?
Step #2: Balance the half equations
Step #3: Identify which half reaction is oxidation and which is reduction – and WHY you knew this.
Step #4: Combine the half equations to produce the overall balanced equation. Remember the number of e^- in each side MUST be the same so that they cancel out.

Write a description of what would be observed at the start and end of this reaction:
A piece of shiny grey metal was ….

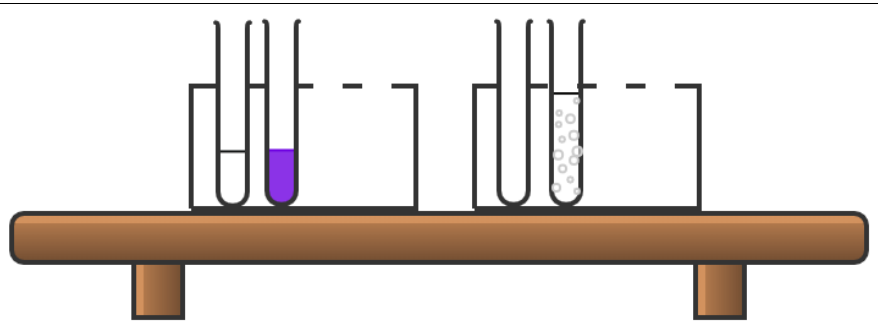


Unbalanced half equations:	$Fe^{2+} \rightarrow Fe$	$Cr \rightarrow Cr^{3+}$	Species Colours
Balanced half equation:			Fe^{2+} =
Oxidation / Reduction:			Fe =
This is because….			Cr =
Overall equation:			Cr^{3+} =

$HCOOH(aq) + MnO_4^-(aq) \rightarrow CO_2(g) + Mn^{2+}(aq)$ (unbalanced)

Step #1: What colour are the 4 species?
Step #2: Separate out the species and balance the half equations
Step #3: Identify which half reaction is oxidation and which is reduction – and WHY you knew this.
Step #4: Combine the half equations to produce the overall balanced equation. Remember the number of e^- in each side MUST be the same so that they cancel out.

Write a description of what would be observed at the start and during/end of this reaction:



Unbalanced half equations:	→	→	Species Colours
Balanced half equation:			MnO_4^- =
Oxidation / Reduction:			Mn^{2+} =
This is because….			HCOOH =
			CO_2 =
Overall equation:			

$H_2O_2(aq) + Fe^{2+}(aq) \rightarrow Fe^{3+}(aq) + H_2O(l)$ (unbalanced)

Step #1: What colour are the 4 species?

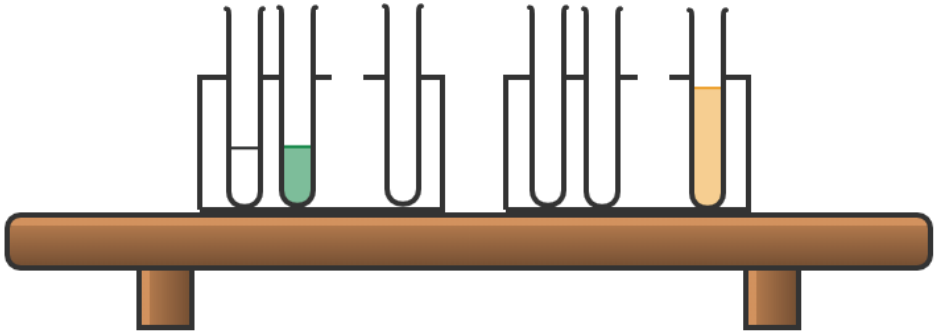
Step #2: Separate out the species and balance the half equations

Step #3: Identify which half reaction is oxidation and which is reduction – and WHY you knew this.

Step #4: Combine the half equations to produce the overall balanced equation. Remember the number of e^- in each side MUST be the same so that they cancel out.

Write a description of what would be observed at the start and end of this reaction:

Hydrogen peroxide solution is mixed with….



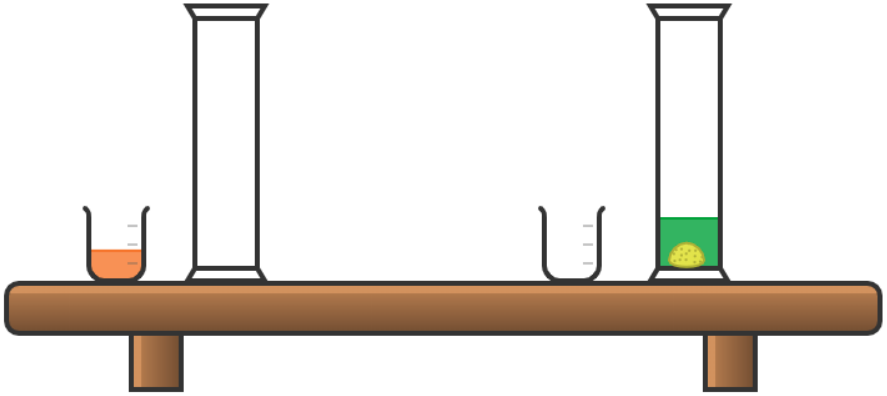
Unbalanced half equations:	→	→	Species Colours
Balanced half equation:			Fe^{2+}=
Oxidation / Reduction:			Fe^{3+} =
This is because….			H_2O_2 =
			H_2O =
Overall equation:			

A pinky-brown metal was added to some concentrated nitric acid. The solution turned from colourless to blue and a large amount of brown gas was released.

Step #1: Identify the species using the observations.
Step #2: Separate them out into two half equations and then balance these half equations
Step #3: Identify which half reaction is oxidation and which is reduction – and WHY you knew this.
Step #4: Combine the half equations to produce the overall balanced equation. Remember the number of e^- in each side MUST be the same so that they cancel out.

Unbalanced half equations:	→	→	Species Colours
Balanced half equation:			HNO_3 =
Oxidation / Reduction:			Cu =
This is because….			=
			=
Overall equation:			

Now for some harder ones……

<table>
<tr><td colspan="4">Acidified dichromate solution was mixed with hydrogen sulfide gas. A dark green solution formed and a yellow solid.</td></tr>
<tr><td colspan="4">  </td></tr>
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=
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<tr><td>Oxidation / Reduction:</td><td></td><td></td></tr>
<tr><td>This is because….</td><td></td><td></td></tr>
<tr><td>Overall equation:</td><td colspan="2"></td></tr>
</table>

SO_2 gas + dilute acidified $Cr_2O_7^{2-}$ solution react together to produce a dark green solution.

Hint: *remember that SO_2 and HSO_3^- both react in similar ways to each other and are converted into the sulfate ion SO_4^{2-} unless a yellow solid is observed – which is sulfur, S.*

<table>
<tr><td colspan="4">SO_2 + $Cr_2O_7^{2-}$ → [you have to work it out]</td></tr>
<tr><td colspan="4">Expected observations. Link these to the species involved.</td></tr>
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