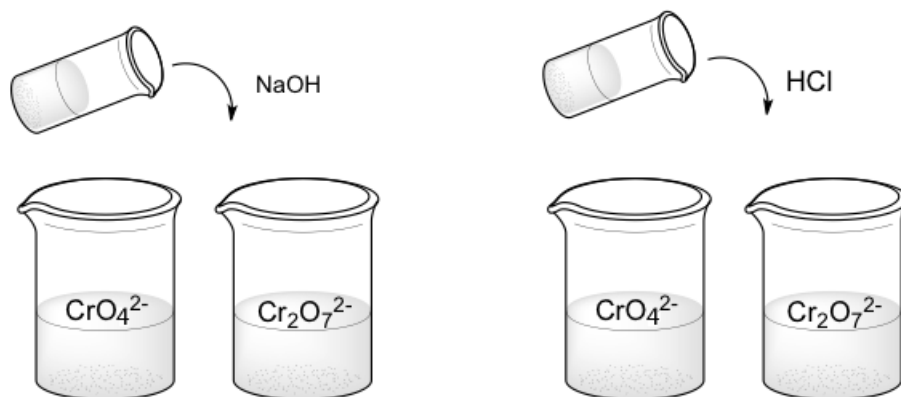


## CHROMATE/DICHROMATE EQUILIBRIUM

In this demonstration, the effect of high and low pH on the equilibrium between chromate and dichromate ions is illustrated. Two solutions each of  $\text{K}_2\text{CrO}_4$  and  $\text{K}_2\text{Cr}_2\text{O}_7$  are prepared – a total of 4 solutions. Acid is added to one of the  $\text{CrO}_4^{2-}$  solutions and base to the other. The same is carried out with the  $\text{Cr}_2\text{O}_7^{2-}$  solutions.



Before:


After:

Before:


After:

### Critical thinking questions

- Balance the following equation for the equilibrium of chromate and dichromate.  

$$\text{CrO}_4^{2-}(\text{aq}) + \text{H}^+(\text{aq}) \rightleftharpoons \text{Cr}_2\text{O}_7^{2-}(\text{aq}) + \text{H}_2\text{O}(\text{l})$$
- Predict the predominant species at high pH. Using this information, can you predict the outcome of each of the four solutions?
- Fill in the following table:

	$\text{CrO}_4^{2-}$	$\text{Cr}_2\text{O}_7^{2-}$										
What is the colour of the ion?												
What is the oxidation number of the chromium?												
What is the <i>d</i> configuration of the chromium?												
What is the electronic arrangement in the <i>d</i> orbitals?	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> </tr> </table>						<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> </tr> </table>					
Is the complex paramagnetic?												