

**TABLE 1**

**Areas of the existing syllabuses where the use of the substance is currently required**

The table below shows where the substances are mentioned in the syllabuses.

Item Number	Chemical: Chromium (Cr)/Cobalt (Co)	Syllabus Ordinary level (OL)/Higher level (HL)	Page of syllabus	Statement from the syllabus	Activity
1	Co	OL	18	Demonstration of the oxidation of potassium sodium tartrate by hydrogen peroxide, catalysed by cobalt (II) salts.	Demonstration by the teacher
2	Cr	OL	21	<p><b>(d) Redox reactions</b></p> <p>Alcohols:</p> <p>Oxidation using <math>\text{KMnO}_4</math> or <math>\text{Na}_2\text{Cr}_2\text{O}_7</math> to (i) aldehydes and (ii) acids (half equations only required)</p> <p>Oxidation of aldehydes to acids (half equations only required).</p>	<p>Mandatory experiment 7.4 Mandatory experiment 7.5</p> <p><b>7.4</b> Preparation and properties of ethanal [properties limited to reactions with (i) acidified potassium manganate (VII) solution, (ii) Fehling's reagent and (iii) ammoniacal silver nitrate].</p> <p><b>7.5</b> Preparation and properties of ethanoic acid (properties limited to reactions with sodium carbonate and magnesium).</p>
3.	Co and Cr	OL	24	Le Chatelier's principle. Effect (if any) on equilibrium position of concentration, pressure, temperature and catalyst.	<p>Mandatory experiment 8.1</p> <p>Simple experiments to illustrate Le Chatelier's principle:</p>

Item Number	Chemical: Chromium (Cr)/Cobalt (Co)	Syllabus Ordinary level (OL)/Higher level (HL)	Page of syllabus	Statement from the syllabus	Activity
					(i) $\text{CoCl}_4^{2-} + 6\text{H}_2\text{O} \rightleftharpoons \text{Co}(\text{H}_2\text{O})_6^{2+} + 4\text{Cl}^-$ (to demonstrate the effects of both temperature changes and concentration changes on an equilibrium mixture).  (ii) $\text{Cr}_2\text{O}_7^{2-} + \text{H}_2\text{O} \rightleftharpoons 2\text{CrO}_4^{2-} + 2\text{H}^+$ } (iii) $\text{Fe}^{3+} + \text{CNS}^- \rightleftharpoons \text{Fe}(\text{CNS})^{2+}$ } (to demonstrate the effects of concentration changes on an equilibrium mixture).
4	Co	HL	53	Demonstration of the oxidation of potassium sodium tartrate by hydrogen peroxide, catalysed by cobalt (II) salts.	Demonstration experiment by the teacher
5	Cr	HL	58	Alcohols:  Oxidation using $\text{KMnO}_4$ or $\text{Na}_2\text{Cr}_2\text{O}_7$ to (i) aldehydes and (ii) acids (half equations only required).  Oxidation of aldehydes to acids (half equations only required)	Mandatory experiment <b>7.4</b> Mandatory experiment <b>7.5</b>  <b>7.4</b> Preparation and properties of ethanol [properties limited to reactions with (i) acidified potassium manganate (VII) solution, (ii) Fehling's reagent and (iii) ammoniacal silver nitrate].  <b>7.5</b> Preparation and properties of ethanoic acid (properties limited to reactions with sodium carbonate, magnesium and ethanol).

Item Number	Chemical: Chromium (Cr)/Cobalt (Co)	Syllabus Ordinary level (OL)/Higher level (HL)	Page of syllabus	Statement from the syllabus	Activity
6	Co and Cr	HL	61	Le Chatelier's principle. Effect (if any) on equilibrium position of concentration, pressure, temperature and catalyst.	<p>Mandatory experiment 8.1</p> <p style="text-align: center;"><b>Mandatory Experiments</b></p> <p>8.1 Simple experiments to illustrate Le Chatelier's principle:</p> <p><math>\text{CoCl}_4^{2-} + 6\text{H}_2\text{O} \rightleftharpoons \text{Co}(\text{H}_2\text{O})_6^{2+} + 4\text{Cl}^-</math> (to demonstrate the effects of both temperature changes and concentration changes on an equilibrium mixture).</p> <p>(ii) <math>\text{Cr}_2\text{O}_7^{2-} + \text{H}_2\text{O} \rightleftharpoons 2\text{CrO}_4^{2-} + 2\text{H}^+</math> } (iii) <math>\text{Fe}^{3+} + \text{CNS}^- \rightleftharpoons \text{Fe}(\text{CNS})^{2+}</math> }</p> <p>(to demonstrate the effects of concentration changes on an equilibrium mixture).</p>

**Areas of the existing JC Syllabus where the use of the substances is required**

Item Number	Chemical: Chromium (Cr)/Cobalt (Co)	Syllabus Ordinary level (OL)/Higher level (HL)	Page of syllabus	Statement from the syllabus	Activity
	Co	OL and HL	19	OC14 use cobalt chloride paper or anhydrous copper sulfate to test for water	Student practical activity