



## Quick facts

The insoluble salts that occur regularly are  $\text{AgCl}(s)$ ;  $\text{BaSO}_4(s)$ ;  $\text{CaCO}_3(s)$ ;  $\text{BaCO}_3(s)$ ;  $\text{AgI}(s)$  and  $\text{AgBr}(s)$ .

## Experiment 18

Date:

**Aim:** To investigate the influence of pH on an equilibrium system.



### Safety measures:

Due to the toxic nature of the chemicals, it is suggested that this investigation is conducted as a demonstration by the teacher.

- $\text{K}_2\text{CrO}_4(aq)$  is a toxic oxidising agent. Avoid skin contact and do not consume the solution under any circumstances. The solution is poisonous to aquatic animals and organisms and harmful to the environment.
- $\text{HCl}(aq)$  is a strong acid. Use a solution of 1 M. Avoid skin contact and contact with eyes. Do not consume the acid. Rinse skin with a large quantity of water and then with a dilute baking soda solution in case of any skin contact.
- $\text{NaOH}(aq)$  is a corrosive alkaline substance. Avoid all skin contact and contact with eyes. Do not consume the solution under any circumstances.
- Do not hold the syringes with the  $\text{HCl}(aq)$  and  $\text{NaOH}(aq)$  pointing upward – some of the solution could accidentally be ejected upwards and cause skin or eye contact.



### Investigative question:

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### Hypothesis:

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### Variable(s):

Independent variable (Which is changed.)	Dependent variable (Which is measured.)	Controlled variable(s) (Which remain(s) the same.)

**Apparatus:**

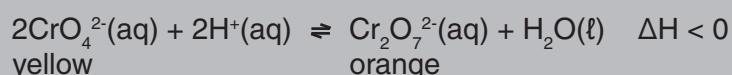
- 0,1 M  $K_2CrO_4(aq)$
- 1 M  $NaOH(aq)$
- Test tube rack
- Two syringes
- 0,1 M  $K_2Cr_2O_7(aq)$
- 1 M  $HCl(aq)$
- Four test tubes
- Safety goggles

**Method:**

1. Pour approximately  $2\text{ cm}^3$   $K_2CrO_4(aq)$  into two test tubes respectively and place the test tubes next to each other in the test tube rack. Mark the test tubes A and B respectively.
2. Clearly mark the syringes with  $HCl(aq)$  and  $NaOH(aq)$  respectively.
3. Use a syringe to add  $\pm 2\text{ cm}^3$  1 M  $HCl(aq)$  to test tube A.
4. Note any colour change.
5. Use the other syringe to add  $\pm 2\text{ cm}^3$  1 M  $NaOH(aq)$  to test tube B.
6. Note any colour change.
7. Repeat steps 1 to 6 with approximately  $2\text{ cm}^3$   $K_2Cr_2O_7(aq)$  in test tubes, which are marked C and D respectively.
8. Tabulate the results.

**Observations:**

	Test tube A $K_2CrO_4(aq)$	Test tube B $K_2CrO_4(aq)$	Test tube C $K_2Cr_2O_7(aq)$	Test tube D $K_2Cr_2O_7(aq)$
Initial colour				
Colour after $HCl(aq)$ is added.				
Colour after $OH^-(aq)$ is added.				

**Results:**

Forward reaction is exothermic.

$HCl(aq)$  with the solutions in test tubes A and C:

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NaOH(aq) with the solutions in test tubes B and D:

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Conclusions:

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## Experiment 19

Date:

**Aim:** To investigate the factors that influence the  $\text{CoCl}_4^{2-}(\text{aq})$  and  $\text{Co}(\text{H}_2\text{O})_6^{2+}$  equilibrium system.



**Safety measures:**

Due to the toxic nature of the chemicals, it is suggested that this investigation is conducted as a demonstration by the teacher.



- The  $\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$  solution is toxic. Avoid skin contact and do not consume the solution under any circumstances.
- $\text{HCl}(\text{aq})$  is a strong acid. Use a solution of 1 M. Avoid skin contact and contact with eyes. Do not consume the acid.
- Ethanol ( $\text{CH}_3\text{CH}_2\text{OH}$ ) is toxic and highly flammable. Do not consume the ethanol and keep the liquid and the fumes out of reach of any flames.
- Carefully heat all solutions in a water bath filled with water from a kettle and only until the colour change is visible.

**Investigative question:**

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