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| Year 12 Chemistry: Lab 1 Assessment  **Application of Le Chatelier's Principle** | |
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| **Name:** | **Mark / 25** |
| **Comment:** | |

Background

This experiment contains two activities concerning chemical equilibrium in aqueous solution. The purpose of the activities is to observe the effect of various changes on these equilibria and to determine whether the observed effects are those expected from an application of Le Chatelier’s Principle.

The two reactions to be investigated are:

* The chromate-dichromate equilibrium
* The equilibrium between hydrated cobalt ions and cobalt tetrachloride ions.

Pre lab (1 mark each)

1. What is the formula for potassium chromate?

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1. What colour is a solution with a high concentration of potassium chromate?

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1. What is the formula for potassium dichromate?

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1. What colour is a solution with a high concentration of potassium dichromate.

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1. Write an equation to represent the equilibrium between chromate and dichromate in an acidified solution.

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1. What is the formula of hydrated Cobalt Chloride?

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1. What is the colour of a solution containing hydrated cobalt chloride?

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1. This colour is due to the presence of which complex ion?

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1. What is the colour of cobalt chloride when dissolved in hydrochloric acid? This colour is due to the presence of which ion?

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1. Write the equilibrium equation for the two ions mentioned in Q 8 and 9 when in the presence of hydrochloric acid.

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Equipment required

Four strips of Cobalt(II) chloride paper

Hydrochloric acid [HCI] 6 mol L-1 (5 mL)

Distilled water

Beaker (100 mL)

Dropper

Forceps or tweezers

Kettle

Beaker (250 mL)

**Procedure**

**Part A: The Chromate-Dichromate Equilibrium**

These chemicals are considered unsafe and so data must be collected from videos of similar experiments.

1. Observe the video from Connect.

* The starting solution is potassium dichromate to which sodium hydroxide is added.
* The secondary solution is potassium dichromate and sodium hydroxide to which hydrochloric acid is added.

2. Record your observations in a suitable table.

Assume there are two starting solutions, one is potassium dichromate (as per the video) and the other is potassium chromate.

**Part B The Equilibrium Between** Co(H2O)62+ **and CoCl42-.**

Safety Note

Concentrated hydrochloric acid is very corrosive and must be handled with extreme care. **If** any concentrated HCl comes in contact with your skin immediately wash it off with copious quantities of water.

1. Using the forceps place a piece of blue cobalt (II) chloride paper into a 100 mL beaker.

2. Add water drop-wise to the blue paper until a definitive colour change is noted. Record your observations.

3. Use the hot water from kettle and the 250 mL beaker to create a water-bath. Place the 100 mL beaker in the water bath.

4. To the same piece of paper add 6.0 mol.L-1 HCl in the fume-hood until a definitive colour change is noted. Record your observations.

**Results (Use this space for suitable tables) (3 marks)**

Processing of results, and questions (3 marks each)

1. Use LCP to explain the observed colour change when NaOH solution is added to the K2Cr2O7 solution.

When NaOH solution is added to a HCl solution, the concentration of H+ ions is

reduced because of the neutralisation reaction H+(aq) + OH-(aq) -» H2O(l)

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2. Use LCP to explain the observed colour change that occurred when HCl solution was added to the secondary solution of K2Cr2O7 to which NaOH had been added.

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3. Explain the colour change that occurredwhen concentrated HCl was added to the solution containing the Co(H2O)62+ ion.

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4. From your observations of the colour change that occurred when the solution containing the Co(H2O)62+ ion was heated predict whether the reaction, **as written on page 29 of STAWA**, is exothermic or endothermic. Provide an explanation for your prediction.

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**Total Lab Mark / 25**