

Name of the Student: _____

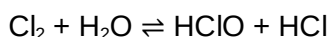
Max. Marks : 14 Marks

Time : 14 Minutes

Q1.

Chlorine is used to decrease the numbers of microorganisms in water.

When chlorine is added to water, there is a redox reaction, as shown by the equation



- (a) Deduce the oxidation state of chlorine in HClO and the oxidation state of chlorine in HCl

Oxidation state of chlorine in HClO _____

Oxidation state of chlorine in HCl _____

(1)

- (b) Give two half-equations to show the oxidation and reduction processes that occur in this redox reaction.

Oxidation half-equation _____

Reduction half-equation _____

(2)

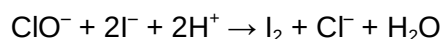
- (c) Chlorine is reacted with cold, aqueous sodium hydroxide in the manufacture of bleach.

Give an equation for this reaction between chlorine and sodium hydroxide.

(1)

- (d) The concentration of ClO^- ions in bleach solution can be found by reaction with iodide ions.

The overall equation for this reaction is shown.



A sample of bleach solution was found to contain ClO^- ions with a concentration of $0.0109 \text{ mol dm}^{-3}$

Potassium iodide is added to a 20.0 cm^3 portion of this bleach solution.

Calculate the mass, in mg, of potassium iodide needed to react with all of the ClO^- ions in the sample of bleach.

Give your answer to the appropriate number of significant figures.

Give **one** observation during this reaction.

Mass of potassium iodide _____ mg

Observation _____

(4)

- (e) Potassium chlorate(VII), KClO_4 , is used in fireworks. When potassium chlorate(VII) decomposes, it produces potassium chloride and oxygen.

Give an equation for the decomposition of potassium chlorate(VII).
Use the data in the table to calculate the enthalpy change for this reaction.

Substance	$\Delta_f H / \text{kJ mol}^{-1}$
$\text{KClO}_4(\text{s})$	– 434
$\text{KCl}(\text{s})$	– 436

Equation _____

Enthalpy change _____ kJ mol^{-1}

(2)

(Total 10 marks)

Q2.

An aqueous solution **Y** is known to contain one type of group 2 metal ion and one type of negative ion.

Aqueous solutions of sulfuric acid and magnesium nitrate are added to separate samples of solution **Y**. The observations are shown in the table.

Solution added	Observation with solution Y
Sulfuric acid	A white precipitate forms
Magnesium nitrate	A white precipitate forms

- (a) Suggest the identity of the group 2 metal ion present in solution **Y**.

Write an ionic equation, including state symbols, for the reaction that takes place when sulfuric acid is added to solution **Y**.

Group 2 metal ion _____

Ionic equation _____

(2)

- (b) Suggest the identity of the negative ion present in solution **Y**.

Write an ionic equation, including state symbols, for the reaction that takes place when magnesium nitrate is added to solution **Y**.

Negative ion _____

Ionic equation _____

(2)

(Total 4 marks)