General Instructions
Working time – 45 minutes
Write your answers using a pen in the spaces provided.
This task is marked out of 30 marks.

Question 1. (2 marks)
A molecule of ozone contains a co-ordinate covalent bond.
(a) Describe the formation of a co-ordinate covalent bond. (1 mark)

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(b) Draw a Lewis electron-dot diagram of ozone, clearly identifying the co-ordinate covalent bond. (1 mark)

Question 2. (3 marks)
Outline how CFCs damage the ozone layer, using appropriate chemical equations.

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Question 3. (2 marks)
A haloalkane has the molecular formula – $C_5H_8Cl_2F_2$.
Draw and name TWO structural isomers (full, rather than condensed) of this compound.

Question 4. (3 marks)
Assess how TWO advances in technology have changed scientific thinking about the impact of CFCs on ozone in the atmosphere.

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Question 5. (3 marks)
Eutrophication is a problem common to many Australian waterways caused by an increase in the nutrient content of the water, leading to excessive algal growth which is followed by death and decay of organisms, resulting in the depletion of oxygen in the water.

(a) Identify TWO ions that would be monitored as indicators of the risk of eutrophication of a waterway. (1 mark)

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(b) Describe the chemistry of ONE test used to identify the presence of one of the ions identified above. (2 marks)

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Question 6. (2 marks)

(a) Identify the catchment area studied. (1 mark)

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(b) Outline TWO possible sources of contamination in this catchment. (1 mark)

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Question 7. (5 marks)

"Society often drives developments in science that result in new technologies".

Analyse this statement with reference to THREE methods used to treat Sydney's water supply.

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Question 8. (10 marks)
The diagram summarises the Solvay process.

(a) Name compound X and identify one use of it. (1 mark)

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(b) Outline what is meant by the term brine. (1 mark)

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(c) Write an equation for the process that occurs in the heating kiln. (1 mark)

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(d) The products of the series of chemical reactions occurring in the carbonating tower are sodium bicarbonate and ammonium chloride. Justify the procedure used to separate these two compounds. (3 marks)

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(e) Solvay Pty Limited is building a new industrial plant where the Solvay process will be carried out. The map shows three sites, labelled A, B and C, being considered for the location of the industrial plant. (4 marks)

Evaluate the suitability of the three sites.

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Marking Guidelines Task 3 2008
Year 12 CHEMISTRY

1.a.

Marking criteria	Marks
States that 'one atom contributes both electrons to a covalent bond'	1

1.b..

Marking criteria	Marks
* Identifies coordinate covalent bond clearly ** Uses only dots or symbols to represent electrons *** Each oxygen atom has 6 electrons but access to 8 ****Electrons around each oxygen are shown in 3 pairs	1
Includes *, ** , *** OR **, ***, ****	0.5

2.

Marking criteria	Marks
Includes * Two correct chemical equations showing different steps in the process **Outlines the steps in the process ***States that the reaction is a chain reaction	3
Includes two correct chemical equations and outlines the process of ozone destruction.	2
Outlines the process of ozone destruction.	1

3.

Marking criteria	Marks
Includes two correct structures and corresponding names	2
Each correct structure and name allocated 0.5 marks	< 2

4.

Marking criteria	Marks
Outlines thoroughly two technologies AND states specific impacts these technologies have on the impact of CFC's on ozone AND makes assessment statements that include quantitative judgements related to how scientific thoughts have changed.	3
Outlines thoroughly two technologies and states the impact of both	2.5
Outlines two technologies and states the impact of one.	2
Outlines two technologies OR Outlines one technology and states its impact.	1.5
Outlines one technology	1
Outlines the impact of CFC on ozone OR names at least one technology	0.5

5a.

Marking criteria	Marks
Names two ions (nitrate, phosphate, nitrogen, phosphorus)	1

5b.

Marking criteria	Marks
*Identifies a specific ion *Outlines the test procedure *Describes the chemistry of the test. (basis of test…)	2
Identifies one ion and describes the chemical basis of the test OR Identifies one ion and outlines the test procedure	1

6a.

Marking criteria	Marks
Names a catchment area	1

6b.

Marking criteria	*Marks*
Outlines TWO sources of contamination	1
Outlines ONE source of contamination	0.5

7.

Marking criteria	Marks
Extensively draws out the implications of society's expectations / needs / demands regarding water quality AND clearly outlines how these expectations / needs / demands have impacted on the technologies used to treat water	4 - 5
Weakly draws out an implication of society's expectations / needs / demands regarding water quality and relates this to methods of water treatment OR Outlines the expectations/ demands/ needs that society has for water quality AND describes methods used to treat water OR Outlines methods used to treat water and relates each method to an aspect of water quality that society expects / needs / demands.	2 - 3
Identifies TWO methods used to treat water	1

8a.

Marking criteria	Marks
Identifies X as sodium carbonate AND Identifies ONE use (eg. glass making)	1
Identifies X as sodium carbonate OR Identifies ONE use (eg. glass making)	0.5

8b.

Marking criteria	Marks
Outlines that brine is a concentrated solution of sodium chloride	1
Identifies that brine is a salt solution	0.5

8c.

Marking criteria	Marks
Writes the correct balanced equation	1
Writes more than one balanced equation. One of them is the correct one.	0.5

8d.

Marking criteria	Marks
Outlines the two steps of the procedure used (cooling and filtering) AND Justifies ONE of the steps (eg. $NaHCO_3$ is much less soluble than NH_4Cl at low temperatures and thus precipitates out of solution).	3
TWO of the three factors required above	2
ONE of the three factors required above	1

8e.

Marking criteria	Marks
Thoroughly assesses all THREE sites by describing at least three pros&/or cons for each AND Makes a judgement that identifies the best site based on the discussion presented	4
Competently assesses all THREE sites by outlining one or more pros &/or cons for each AND Makes a judgement that identifies the best site based on the discussion presented	3
Competently assesses TWO sites by outlining one or more pros&/or cons for each AND Makes a judgement that identifies the best site OR Competently assesses ALL three sites but omits a judgement identifying the best site	2
Outlines pros &/or cons for ONE site	1