Practice Question Set For A-Level
Subject : Chemistry
Paper-1 Topic: Inorganic 1

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Name of the Student:_____
Max. Marks : 23 Marks **Time : 23 Minutes**

Mark Schemes

Q1.

(a) Iodide ion / I^-

Not iodine / I / I_2

$Br_2 + 2\ I^- \rightarrow I_2 + 2\ Br^-$

Allow:
$Br_2 + 3\ I^- \rightarrow I_3^- + 2\ Br^-$
Ignore state symbols;
Accept multiples

2

(b) Bromine not a strong enough oxidising agent to displace chlorine (so no visible change will be observed)

Br_2 unable to oxidise Cl^- (so no visible change will be observed)
Br_2 is a weaker oxidising agent than Cl_2 / Br_2 is only a stronger oxidising agent than I_2

Bromine not a strong enough oxidising agent to displace bromine (so no visible change will be observed)

Br_2 is unable to oxidise Br^- (so no visible change will be observed)
Allow Br_2 has the same oxidising ability as itself
Do not allow references to halides having oxidising ability do not allow bromine reacting with halogens

2

(c) Add <u>dilute</u> ammonia

Allow ecf from (a)

The precipitate containing chloride ions will dissolve/react to form a colourless solution

The precipitate containing bromide ions will show no visible change

Allow does not dissolve

OR

Add dilute ammonia <u>followed</u> by concentrated ammonia

The precipitate containing chloride ions will dissolve/react to form a colourless solution using dilute ammonia

The precipitate containing bromide ions will not dissolve in dilute ammonia but will dissolve in concentrated ammonia.

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Ignore references to precipitates containing iodide ions unless due to ecf from (a)

3

[7]

Q2.

This question is marked using levels of response. Refer to the Mark Scheme Instructions for Examiners for guidance on how to mark this question.	
Level 3 5-6	All stages are covered and the explanation of each stage is generally correct and virtually complete. Answer is well structured with no repetition or irrelevant points. Accurate and clear expression of ideas with no errors in use of technical terms.
Level 2 3-4	All stages are covered but the explanation of each stage may be incomplete or may contain inaccuracies OR two stages are covered and the explanations are generally correct and virtually complete. Answer shows some attempt at structure. Ideas are expressed with reasonable clarity with, perhaps, some repetition or some irrelevant points. Answer shows some attempt at structure. Ideas are expressed with reasonable clarity with, perhaps, some repetition or some irrelevant points. Some minor errors in use of technical terms.
Level 1 1-2	Two stages are covered but the explanation of each stage may be incomplete or may contain inaccuracies, OR only one stage is covered but the explanation is generally correct and virtually complete. Answer includes isolated statements but these are not presented in a logical order or show some confusion. Answer may contain valid points which are not clearly linked to an argument structure. Errors in the use of technical terms.
Level 0 0	Insufficient correct chemistry to gain a mark.

In order to score 6 marks all 4 compounds must be identified in some way

Stage 1: Suggested tests **(3 + virtually 'complete', 1 + 'covered')**

1a: add NaOH
1b: add NaOH (and warm) then hold damp red litmus at mouth of tube (if sequential tests performed NaOH can be scored from 1a)
1c: add nitric acid/hydrochloric acid
1d: add acidified $BaCl_2$ / acidified $Ba(NO_3)_2$
(if sequential tests performed acidified can be scored from 1c)

Stage 2: Observations linked to correct solution and test **(3 + virtually 'complete', 1 + 'covered')**

2a: Mg^{2+} / $Mg(NO_3)_2$ will give a white ppt with NaOH
2b: red litmus (at mouth of the tube) will turn blue for NH_4^+ / NH_4NO_3 with NaOH
(do not award if red litmus is placed in the solution)

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2c: CO_3^{2-} / Na_2CO_3 will effervesce with acid/gas formed turns limewater cloudy
2d: SO_4^{2-} / K_2SO_4 will give a white ppt with $BaCl_2$
2e: the final tube will be the remaining solution (if only three tests have been done).

Stage 3: Equations **(3 + virtually 'complete', 1 + 'covered')**

3a: $Mg^{2+} + 2\ OH^- \rightarrow Mg(OH)_2$

3b: $NH_4^+ + OH^- \rightarrow NH_3 + H_2O$

3c: $CO_3^{2-} + 2\ H^+ \rightarrow CO_2 + H_2O$

3d: $SO_4^{2-} + Ba^{2+} \rightarrow BaSO_4$

(Ignore state symbols; allow multiples)

[6]

Q3.

(a) $Cl_2 + H_2O \rightleftharpoons HCl + HOCl$

Allow →

OR

$2\ Cl_2 + 2\ H_2O \rightarrow 4\ HCl + O_2$

Allow multiples

1

(b) $Cl_2 + 2\ NaOH \rightarrow NaCl + NaOCl + H_2O$

Allow multiples

1

(c) **M1** $2\ Cl^- \rightarrow Cl_2 + 2\ e^-$

Allow multiples

M2 $2\ ClO_3^- + 12\ H^+ + 10\ e^- \rightarrow Cl_2 + 6\ H_2O$

M3 $2\ ClO_3^- + 12\ H^+ + 10\ Cl^- \rightarrow 6\ Cl_2 + 6\ H_2O$

M3 Allow
$ClO_3^- + 6\ H^+ + 5\ Cl^- \rightarrow 3\ Cl_2 + 3\ H_2O$

3

(d) $NaCl + H_2SO_4 \rightarrow HCl + NaHSO_4$

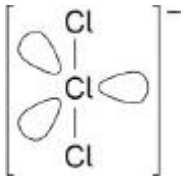
OR

$2\ NaCl + H_2SO_4 \rightarrow 2\ HCl + Na_2SO_4$

Base/proton acceptor

2

(e)



Ignore absence of minus sign

1

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(f) 180°

(2) <u>bond pairs</u> repel to be as far apart as possible

Allow (2) bond pairs repel equally
Ignore linear

2

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