



# **A-Level Chemistry**

**Group 7**

**Mark Scheme**

**Time available: 57 minutes**

**Marks available: 50 marks**

## Mark schemes

- 1.** (a) (Random) movement of electrons in one molecule (creates a dipole) / a (temporary) dipole is formed in one molecule / an imbalance in electron density in one molecule

1

Induces a dipole in a neighbouring molecule.

1

(These) temporary dipoles attract / temporary attraction between  $\delta+$  and  $\delta-$

1

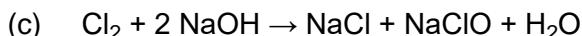


1

Kills bacteria / kills microorganisms / kills microbes / kills pathogens

*Allow sterilise water / disinfect water*

1



1

[6]

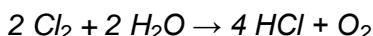
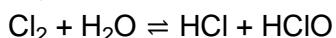
- 2.** (a) Reason: sterilise water / disinfect water / kill bacteria / kill microorganisms / kill microbes

1

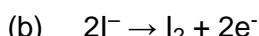
Explanation: health benefit outweighs risk / only used in small quantities/low concentrations

1

Equation:



1

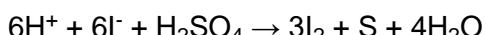


1



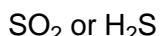
*Allow S<sub>8</sub>*

1



*Allow correct equations using 8H<sup>+</sup> + SO<sub>4</sub><sup>2-</sup>*

1



*Mark independently*

1

- (c) To ensure that all the halide ions (chloride and iodide) are removed from the solution / to ensure that all the halide ions precipitate out of solution

*Must refer either to both halide ions, or to all halide ions.*

1

(d)  $n(\text{AgI}) = 0.315/234.8 = 1.34 \times 10^{-3}$  moles

1

(e)  $n(\text{NaI}) = 1.34 \times 10^{-3}$   
mass of NaI =  $1.34 \times 10^{-3} \times 149.9 = 0.201\text{g}$

*Ans part (d) x 149.9*

1

(f) mass of NaCl =  $600 - 201 = 399\text{mg}$   
 $600 - (\text{Ans part (e)} \times 1000)$

1

$\% \text{NaCl} = 399/600 \times 100 = 66.5\%$   
(66.5 – 68.3)

**M1**/600 x 100

OR

(*Ans part (e) x 1000*) / 600 x 100  
 $100 - \mathbf{M1}$

1

[12]

**3.**

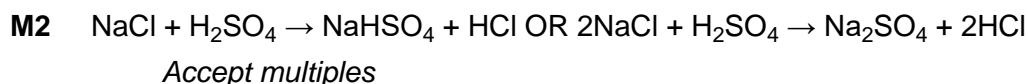
(a) Colourless (solution)

*Allow no (visible) change, no reaction or no ppt (formed)*  
*Ignore none or nothing*

1

(b) **M1** Misty or steamy or white fumes/gas

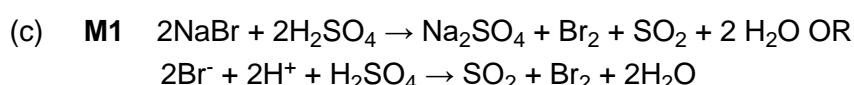
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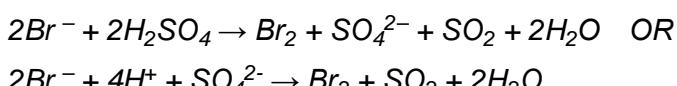
1

**M3** Base OR proton acceptor

1



**M1** Allow ionic equations



1

Br changes oxidation state from -1 to 0 and is oxidised

1

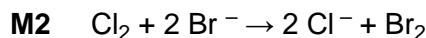
S changes oxidation state from +6 to +4 and is reduced

1

(d) **M1** Yellow or orange solution

**M1** Do not accept brown solution

1

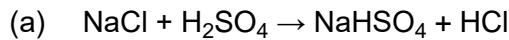


**M2** Accept multiples

1

[9]

4.



Allow  $2 \text{NaCl} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + 2 \text{HCl}$

1

Proton donor

Allow (Bronsted-Lowry) acid

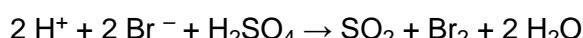
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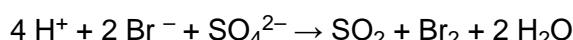
Or



Or



Or



Ignore  $2 \text{NaBr} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + 2 \text{HBr}$

Ignore  $\text{NaBr} + \text{H}_2\text{SO}_4 \rightarrow \text{NaHSO}_4 + \text{HBr}$

1

brown gas or brown fumes or orange gas or orange fumes

Do not accept yellow solid

Ignore fizzing and misty fumes

1

Oxidising agent

Allow electron acceptor

Ignore acid / proton donor

1

(c) (+)5 and -1

1

(d) Is oxidised and reduced

Allow undergoes disproportionation

Allows gains and loses electrons

1

(e) D AgBr

*Ignore state symbols*

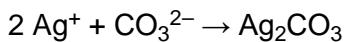
1

E Ag<sub>2</sub>CO<sub>3</sub>

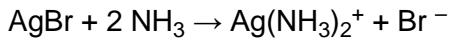
1

F CO<sub>2</sub>

1



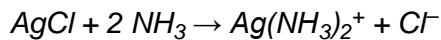
1



*Or*  $\rightarrow \text{Ag}(\text{NH}_3)_2\text{Br}$

*One mark for Ag(NH<sub>3</sub>)<sub>2</sub><sup>+</sup> and 1 mark for equation*

*If D = AgCl, then allow 2 marks for*



2

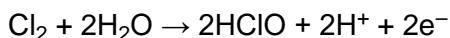
[13]

5.

(a) Two correct Cl ox states: HClO = +1 HCl = -1

1

(b) Oxidation:

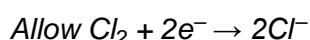
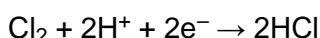


*Accept - 2e<sup>-</sup> on the other side*



1

Reduction:



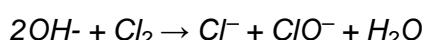
*If both equations correct but incorrect order, allow 1*

*Ignore state symbols*

1

(c) 2NaOH + Cl<sub>2</sub> → NaCl + NaClO + H<sub>2</sub>O

*Allow*



*Allow NaOCl*

*Ignore state symbols*

1

(d)  $\text{mol ClO}^- = \text{conc} \times \text{vol} = 0.0109 \times 0.02$   
 $= \underline{\underline{0.000218 / 2.18 \times 10^{-4} \text{ mol}}}$

1

$\text{mol KI} = 0.000218 \times 2 = 0.000436 \text{ mol}$

$M2 = M1 \times 2$

*If incorrect ratio, M2 & M3 = 0*

1

$\text{mass KI} = \text{Mr} \times \text{mol} = 166.0 \times 0.000436$   
 $= 0.072376 \text{ g}$   
 $= 72.4 \text{ (mg)}$

$M3 = M1 \times 2 \times 166.0 \times 1000$

*Must be to 3 sig figs*

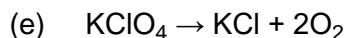
1

black solid/ppt appears/forms (in a colourless solution)  
or (colourless solution) turns brown (solution)

*Not purple. Not red. Not brown ppt/solid*

*Ignore grey.*

1



*Ignore state symbols*

*Allow multiples*

1

$\Delta H = -436 - -434 = -2 \text{ kJ mol}^{-1}$

*Must be negative*

*Mark independently*

*Allow consequential for multiples*

1

[10]