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Level: CIE AS and A Level (9701)

Subject: Chemistry

Topic: CIE Chemistry

Type: Mark Scheme

2002

XVIII

1583

Chemistry CIE AS & A Level
To be used for all exam preparation for 2025+

CHEMISTRY

AS and A

This to be used by all students studying CIE AS and A level Chemistry (9701) But students of other boards may find it useful

Mark Scheme

Answer 1

The correct answer is C because:

- The oxidation number of nitrogen in:
 - $\text{NCl}_3 = +3$
 - $\text{N}_2 = 0$
- So, nitrogen has gained 3 electrons which means that it has been reduced, not oxidised.

A is incorrect as the reaction produces sodium hypochlorite (NaClO , which is a bleaching and disinfection agent found in household bleach.

B is incorrect as nitrogen gas is produced which will be observed as effervescence

D is incorrect as silver nitrate will react with the chloride ions from sodium chloride to produce a white precipitate of silver chloride.

Answer 2

The correct answer is C because:

- The question asks for the correct equation and there are a mix of different equations, full and half so you have to pick out the one that is most relevant to the reaction of hot sodium hydroxide and chlorine
- The correct full equation is:
 - $3\text{Cl}_2 + 6\text{NaOH} \rightarrow 5\text{NaCl} + \text{NaClO}_3 + 3\text{H}_2\text{O}$
- This can be broken down into two half equations showing the simultaneous oxidation and reduction of chlorine
 - Oxidation:



○ Reduction:



- The correct full equation for the reaction with hot sodium hydroxide is:



- Make sure you know the difference between the two reactions

A is incorrect as this is the equation for cold, dilute aqueous sodium hydroxide and chlorine

B is incorrect as this is the half equation for cold, dilute aqueous sodium hydroxide and chlorine

D is incorrect as this has the correct species in but is not balanced

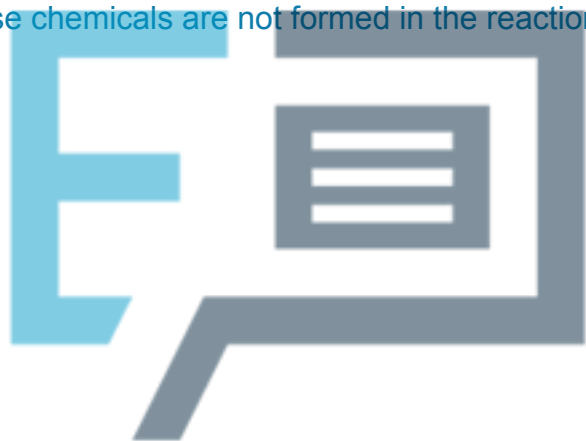
Answer 3

The correct answer is A because:

- The reaction of chlorine with water forms chloric(I) acid and hydrochloric acid
 - $\text{Cl}_2 (\text{aq}) + \text{H}_2\text{O} (\text{l}) \rightarrow \text{HClO} (\text{aq}) + \text{HCl} (\text{aq})$
- Chloric(I) acid disinfects / sterilises water by killing bacteria

B is incorrect as HCl is formed but does not disinfect / sterilise water

C and D are incorrect as these chemicals are not formed in the reaction of chlorine with water



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