AQA Chemistry A-level

Topic 2.3 - Group 7

Flashcards

What is the trend in bpt down group 7? Why?

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Increases down the group

Because: size of atom increases as more occupied electron shells → stronger van der Waals forces of attraction between molecules, take more energy to break

What is the trend in electronegativity down group 7? Why?

What is the trend in electronegativity down group 7? Why?

Decreases

Because: more occupied electron shells → greater atomic radius and outer electrons are further from the positive charge of the nucleus → lower force of attraction between the nucleus and electron pair in the covalent bond

What do you use to test for halide ions?

What do you use to test for halide ions?

Acidified $AgNO_3$

Why do you add HNO_3?

Why not HCl?

Why do you add HNO_3? Why not HCl?

To remove CO_3^{2-}

Adding HCl would add Cl- ions, giving a false positive result

Result and equation for CI-test?

Result and equation for Cl^- test?

white ppt

$Ag^+ + Cl^- \rightarrow AgCl\ (s)$

What is the result and equation for the test for Br^-?

What is the result and equation for the test for Br^-?

Cream ppt

$Ag^+ + Br^- \rightarrow AgBr\ (s)$

What is the result and equation for the test for I^-?

What is the result and equation for the test for I^-?

Yellow ppt

$$Ag^+ + I^- \rightarrow AgI\ (s)$$

What happens (+ equations) to each of the silver halide precipitates when dilute/conc NH_3 are added?

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AgCl- dissolves in both dilute and conc

$$AgCl\ (s) + 2NH_3\ (aq) \rightarrow [Ag(NH_3)_2]^+\ (aq) + Cl^-$$

AgBr- only dissolves in conc

$$AgBr\ (s) + 2NH_3\ (aq) \rightarrow [Ag(NH_3)_2]^+\ (aq) + Br^-$$

AgI- will not dissolve in either

What is the trend in oxidising ability down the group? Why?

What is the trend in oxidising ability down the group? Why?

Decreases down group (Cl best, I worst)

Because: Cl has fewest occupied electron shells, greatest force of attraction between outer electrons and nucleus, easiest to gain electrons and be reduced → best oxidising agent

Write the equation for Cl_2 oxidising $2I^-$

Write the equation for Cl_2 oxidising $2I^-$

$$Cl_2 + 2I^- \rightarrow 2Cl^- + I_2$$

What is the trend in reducing ability of the halides down the group? Why?

What is the trend in reducing ability of the halides down the group? Why?

Increases down the group (Cl^- worst, I^- best)

Because: I^- has the most occupied electron shells, so outer electrons are further from the nucleus, weakest force of attraction between outer electrons and positive charge of nucleus → easiest to be oxidised and lose electrons → best reducing agent

What products are formed when I^- reduces H_2SO_4? Do equations for all 4.

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Do equations for all 4.

$H_2SO_4 + 2I^- \rightarrow SO_4^{2-} + 2HI$

$H_2SO_4 + 2H^+ + 2I^- \rightarrow SO_2 + I_2 + 2H_2O$ (SO_2 is a choking gas with a pungent odour)

$H_2SO_4 + 6H^+ + 6I^- \rightarrow S + 3I_2 + 4H_2O$ (S is a yellow solid)

$H_2SO_4 + 8H^+ + 8I^- \rightarrow H_2S + 4I_2 + 4H_2O$ (H_2S smells of bad/rotten eggs)

What are the products of Br^- + H_2SO_4?

What are the products of Br^- + H_2SO_4?

HBr and SO_2

Does Cl^- reduce H_2SO_4?

Does Cl^- reduce H_2SO_4?

No, not a powerful enough reducing agent; only HCl is formed

Why is chlorine added to drinking water? Why is it safe?

Why is chlorine added to drinking water? Why is it safe?

Forms ClO^- ions which oxidise (kill) all microorganisms in water

Once it has done its job, little remains, and the health benefits outweigh the risks of using it

What are potential risks of adding chlorine to drinking water?

What are potential risks of adding chlorine to drinking water?

Chlorine is toxic and damages the respiratory system in large enough quantities; can form carcinogens with hydrocarbons

Why is ozone not used to purify water in the UK?

Why is ozone not used to purify water in the UK?

More expensive than chlorine, evaporates from water more quickly

What is the equation for the reaction of CI_2 with water?

What is the equation for the reaction of Cl_2 with water?

$$Cl_2\ (g) + H_2O\ (l) \rightarrow HClO\ (aq) + HCl\ (aq)$$

What type of reaction is the reaction of chlorine with water?

What type of reaction is the reaction of chlorine with water?

Disproportionation; chlorine is both oxidised and reduced

What are the two forms of the chlorate ion?

What are the two forms of the chlorate ion?

ClO^- is chlorate (I)

ClO_3^- is chlorate (V)

What is the equation for making bleach?

What is the equation for making bleach?

$Cl_2 + 2NaOH \rightarrow NaCl + NaClO + H_2O$

NaClO is bleach

Give the equation for the reaction of chlorine and water in the presence of sunlight

Give the equation for the reaction of chlorine and water in the presence of sunlight

$2Cl_2 + 2H_2O \rightarrow 4HCl + O_2$ (g)

What is desalination?

What is desalination?

Converts saltwater into clean, potable water

Either by reverse osmosis (using a smart membrane) or by vacuum distillation at low pressure and low temperature

What are the advantages and disadvantages of desalination?

What are the advantages and disadvantages of desalination?

Advantages - safe, clean, drinkable water produced in places where it might not otherwise be available

Disadvantages - uses lots of energy, reverse osmosis has low efficiency, can disturb marine ecosystems