

# AQA Chemistry A-level

## Topic 2.3 - Group 7

### Flashcards

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



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

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  $\text{AgNO}_3$



Why do you add  $\text{HNO}_3$ ?

Why not  $\text{HCl}$ ?





Why do you add  $\text{HNO}_3$ ? Why not  $\text{HCl}$ ?

To remove  $\text{CO}_3^{2-}$

Adding  $\text{HCl}$  would add  $\text{Cl}^-$  ions, giving a false positive result



# Result and equation for Cl- test?



# Result and equation for $\text{Cl}^-$ test?

white ppt



What is the result and equation for the test for  $\text{Br}^-$ ?



What is the result and equation for the test for Br<sup>-</sup>?

Cream ppt

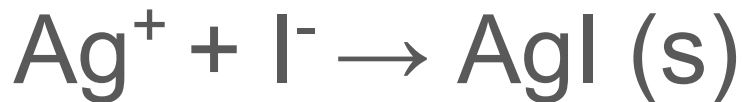


What is the result and equation for the test for  $I^-$ ?



What is the result and equation for the test for I<sup>-</sup>?

Yellow ppt



What happens (+ equations)  
to each of the silver halide  
precipitates when  
dilute/conc  $\text{NH}_3$  are added?





# What happens (+ equations) to each of the silver halide precipitates when dilute/conc $\text{NH}_3$ are added?

AgCl- dissolves in both dilute and conc



AgBr- only dissolves in conc



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  $\text{Cl}_2$   
oxidising  $2\text{I}^-$



Write the equation for  $\text{Cl}_2$  oxidising  $2\text{I}^-$



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 ( $\text{Cl}^-$  worst,  $\text{I}^-$  best)

Because:  $\text{I}^-$  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



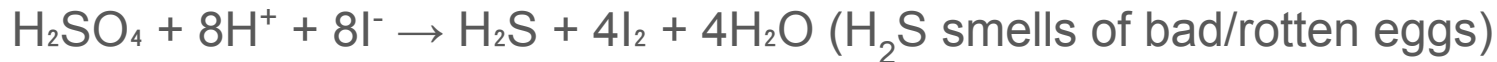
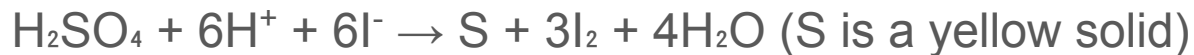
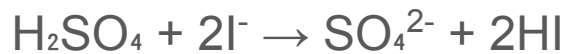
What products are formed  
when  $\text{I}^-$  reduces  $\text{H}_2\text{SO}_4$ ? Do  
equations for all 4.





What products are formed when  $\text{I}^-$  reduces  $\text{H}_2\text{SO}_4$ ?

Do equations for all 4.



What are the products of  $\text{Br}^-$   
+  $\text{H}_2\text{SO}_4$ ?



What are the products of  $\text{Br}^- + \text{H}_2\text{SO}_4$ ?

HBr and  $\text{SO}_2$



Does  $\text{Cl}^-$  reduce  $\text{H}_2\text{SO}_4$ ?



Does  $\text{Cl}^-$  reduce  $\text{H}_2\text{SO}_4$ ?

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  $\text{ClO}^-$  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  $\text{Cl}_2$  with water?



What is the equation for the reaction of  $\text{Cl}_2$  with water?



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?

$\text{ClO}^-$  is chlorate (I)

$\text{ClO}_3^-$  is chlorate (V)



# What is the equation for making bleach?



What is the equation for making bleach?



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



# 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

