

CAIE Chemistry IGCSE 8.3 Group VII properties

Flashcards

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Which group do the elements chlorine, bromine and iodine belong to? What is another name for this group of elements?







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Group VII, the halogens.







Halogens are diatomic. What does this mean?







Halogens are diatomic. What does this mean?

They form molecules consisting of 2 atoms.

E.g. Cl_2 , Br_2 ...







What is the colour and state of chlorine at room temperature?







What is the colour and state of chlorine at room temperature?

Pale green gas







What is the colour and state of bromine at room temperature?







What is the colour and state of bromine at room temperature?

Red-brown liquid







What is the colour and state of iodine at room temperature?







What is the colour and state of iodine at room temperature?

Grey-black solid







Why are the halogens at different states at room temperature? What is the trend down the group?







Why are the halogens at different states at room temperature? What is the trend down the group?

At room temperature, chlorine is gaseous, bromine is liquid and iodine is solid because they have different melting and boiling points. As you go down the group, melting and boiling point increase.







What state would you expect the halogens fluorine and astatine to be at room temperature?







What state would you expect the halogens fluorine and astatine to be at room temperature?

Fluorine is above chlorine so should have a boiling point lower than chlorine. This means it would be a gas at room temperature.

Astatine is below iodine in Group VII so should have a higher melting point than iodine. Therefore you can predict that it would be a solid at room temperature.





What is trend in colour and density of the Group VII elements?







What is trend in colour and density of the Group VII elements?

Colour gets darker down the group.

Density increases down the group.







Why do melting and boiling point increase down Group VII?







Why do melting and boiling point increase down Group VII?

The molecules get bigger down the group so there are stronger intermolecular forces to overcome during melting / boiling so more energy is required to change state.







When does a halogen displacement reaction occur?







When does a halogen displacement reaction occur?

When a more reactive halogen displaces a less reactive halogen from an aqueous solution of its halide ions.







Why does reactivity decrease down Group VII?







Why does reactivity decrease down Group VII?

Group VII elements gain an electron when they react. As you go down Group VII, atomic radius and electron shielding increase. This means that the attraction between the nucleus and outer electrons decreases so it is harder for the atom to gain an electron.







Why will halogen A only be displaced by halogen B if B is above A in Group VII?







Why will halide ions A only be displaced by halogen B if B is above A in Group VII?

The most reactive halogen (B) will displace the less reactive halogen (A) to become part of the ionic compound. Reactivity increases as you go up the group so B must be higher in Group VII to be more reactive than A.







Which halogens can chlorine displace from an aqueous ionic solution?







Which halogens can chlorine displace from an aqueous ionic solution?

Chlorine can displace any halogens below it in Group VII. It will displace iodine and bromine.







Which halogens can't be displaced from an aqueous ionic solution by bromine?







Which halogens can't be displaced from an aqueous ionic solution by bromine?

Bromine can't displace any halogens above it in Group VII. These are chlorine and fluorine.







Why can't iodine displace chlorine or bromine from an aqueous ionic solution?







Why can iodine not displace chlorine or bromine from an aqueous ionic solution?

Because reactivity decreases down the group and iodine is below chlorine and bromine Group VII. Displacement will only occur if iodine is more reactive than the halogen in the ionic compound.





Write the word equation for the reaction between chlorine and potassium bromide







Write the word equation for the reaction between chlorine and potassium bromide

Chlorine + potassium bromide \rightarrow potassium chloride + bromine







Write the word equation for the reaction between bromine and calcium chloride







Write the word equation for the reaction between bromine and calcium chloride

No reaction will occur because bromine is less reactive than chlorine so chlorine won't be displaced.







Write the balanced symbol equation for the reaction that takes place between bromine and potassium iodide







Write the balanced symbol equation for the reaction that takes place between bromine and potassium iodide

 $Br_2 + 2KI \rightarrow I_2 + 2KBr$







Which halogens would you expect astatine to be able to displace?







Which halogens would you expect astatine to be able to displace?

None of them. It is at the bottom of Group VII so has the lowest reactivity.







What colours are solutions of chlorine, bromine and iodine?







What colours are solutions of chlorine, bromine and iodine?

Chlorine water - colourless

Bromine water - orange

Iodine solution - brown







What would you observe when chlorine is added to potassium bromide?







What would you observe when chlorine is added to potassium bromide?

$$Cl_2 + 2KBr \rightarrow Br_2 + 2KCl$$

Colour change from colourless (due to Cl_2) to orange (due to Br_2).



