

Reactivities of the group 7 elements (the halogens)

Aims

You have already seen that the Group 1 elements have different reactivities. Of the three elements you have seen, lithium is the least reactive, potassium is the most reactive, and sodium lies between them. Today, you will use **displacement reactions** to work out the order of reactivity for three of the Group 7 elements (chlorine, bromine and iodine).

Apparatus

Goggles

Bench mat

Test tube and test tube rack

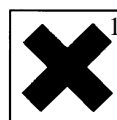
Teat pipettes

0.2M potassium chloride solution ¹

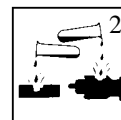
0.2M potassium bromide solution ¹



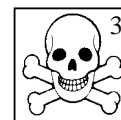
Eye protection must be worn



Irritant



Corrosive



Toxic

0.2M potassium iodide solution ¹

chlorine water ^{2,3}

bromine water ^{2,3}

iodine water ³

Methods

1. Leave space to write your own Methods, then copy the table shown below into your book.
2. Add about 1cm³ (about half a pipette-full) of potassium bromide solution to the test tube.
3. Add **one** drop of chlorine water and **gently** shake the test tube to mix the contents.
4. If you see a colour change, make a note of it in your table.
If you do not see a colour change, add up to 9 more drops of chlorine water (remembering to shake the test tube after each drop) and make a note of any colour change in your table.
If you still do not see a colour change, write **No reaction** in your table.
5. Wash out your test tube.
6. Repeat steps 2 – 5 for each of the following combinations:
chlorine water added to potassium iodide iodine water added to potassium chloride
bromine water added to potassium chloride iodine water added to potassium bromide
bromine water added to potassium iodide

Results

	potassium chloride	potassium bromide	potassium iodide	number of reactions
chlorine water	No reaction			
bromine water		No reaction		
iodine water			No reaction	

Conclusions

Count the number of reactions seen in each row and write the results in your table. The halogen that produces the most reactions is the most reactive of the three.

1. Write the names of the halogens in order of reactivity, from the most reactive to the least.
2. Compare your reactivity series with Group 7 in the Periodic Table – what do you notice?
3. What results might you get if fluorine water and potassium fluoride were in the experiment too?
4. Write word equations for each of the reactions seen in the experiment.

For example: chlorine + potassium bromide → potassium chloride + bromine