

## C4.1.3 Halogen Displacement Reactions

# Lesson Objectives

Describe displacement reactions involving Group 7 elements

Explain whether a displacement reaction will occur

# Review of C4.1.2 Work

Group 7 elements become less reactive as you go down the group



# Model of halogen displacement reactions

Here are five food in order of how much I like them

1. Chocolate (Yum Yum)
2. Crisps (Nice)
3. Pizza (OK)
4. Peanuts (Not Great)
5. Gherkins (Yuk)

If I was eating pizza, what would happen if someone offered me some chocolate or crisps?

If I was eating pizza, what would happen if someone offered me some peanuts or gherkins?

# Model of halogen displacement reactions

If I am eating food and someone offers me nicer, **more attractive** food, then I will put down the less attractive food and eat the nicer food

If I am eating food and someone offers me **less attractive** (worse) food, then **nothing will change**

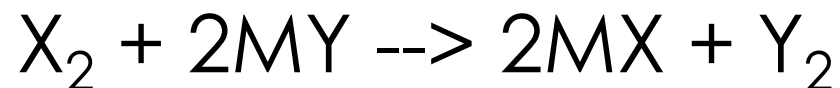
This is the same for halogens

If an element has formed a compound with a halogen, if a **more reactive** halogen comes along it will react and form a compound with the more reactive halogen

If an element has formed a compound with a halogen, if a **less reactive** halogen comes along, then nothing will change (there will be **no reaction**)



A more reactive halogen will displace a less reactive halogen from a compound

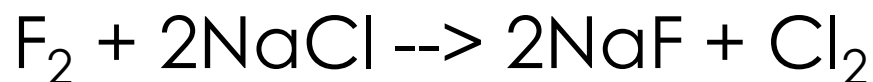


If X and Y are halogens and M is a metal

This reaction will only work if X is more reactive than Y

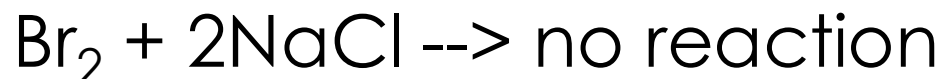


So for example:

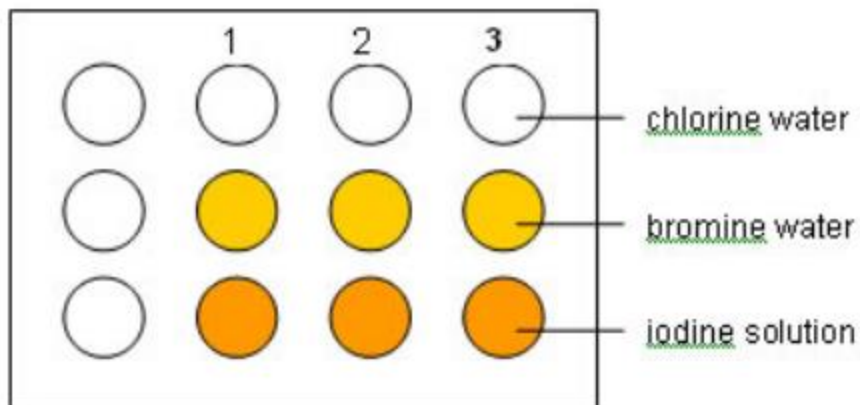


This would work as fluorine is more reactive than chlorine

But:



This would not work as bromine is less reactive than chlorine



# Practical

- Using a plastic pipette put two drops of chlorine solution in each of three dimples in the spotting tile, as shown above.
- Add two drops of potassium chloride solution to each of the three dimples in column 1 of the tile.
- Add two drops of potassium bromide solution to each of the three dimples in column 2 of the tile.
- Add two drops of potassium iodide solution to each of the three dimples in column 3 of the tile.
- Observe and record any colour changes that take place.



# Practical Expected Results

	Potassium chloride	Potassium bromide	Potassium iodide
chlorine	no visible change	<b>Yellow orange colour appears (bromine is forming)</b>	<b>Brown colour appears (iodine is forming)</b>
bromine	no visible change	no visible change	<b>Brown colour appears (iodine is forming)</b>
iodine	no visible change	no visible change	no visible change

# Products of displacement reactions

	Potassium chloride	Potassium bromide	Potassium iodide
chlorine	x	potassium chloride + bromine	Potassium chloride + iodine
bromine	x	x	Potassium bromide + iodine
Iodine	x	x	x