

# Alkali metals, halogens and noble gases

Chemistry grades 9-10 (GCSE · IGCSE · O Level · Class 9-10) · Lab answers

These model answers use the sample results. They show how a pattern of reactions leads to an order of reactivity, and how the trend can be explained using electron shells.

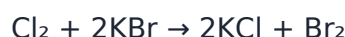
**Level:** Chemistry grades 9-10 (GCSE · IGCSE · O Level · Class 9-10) · **Curriculum:** GCSE C1, IGCSE 9

## Question 1 Which reactions occurred

Chlorine reacted with potassium bromide and potassium iodide. Bromine reacted with potassium iodide only. Iodine reacted with none.

**Three reactions in total:  $\text{Cl} + \text{KBr}$ ,  $\text{Cl} + \text{KI}$ ,  $\text{Br} + \text{KI}$ .**

## Question 2 Write the equations



**Each equation shows a more reactive halogen displacing a less reactive one.**

## Question 3 Order of reactivity

Chlorine displaced both other halogens, bromine displaced only iodine, and iodine displaced neither.

**Order: chlorine, bromine, iodine.**

## Question 4 Explain with electrons

Chlorine (2,8,7) has three shells and iodine has five. In chlorine the electron it gains goes into a shell closer to the nucleus with less shielding, so the attraction is stronger.

**Fewer shells means stronger attraction, so chlorine is more reactive.**

## Question 5 Why use a control

Iodine solution is brown already, and a brown product would look similar. The control shows the starting colour so that real changes can be compared.

**The control provides the starting colour for comparison.**

## Question 6 Make the tests fairer

Use the same volume and concentration in every tube, a white background and repeats of

each mixture. A hexane layer (used by the teacher) could extract the halogen and show its colour more clearly.

**Fixed volumes, repeats and a white background.**

### Question 7 Predict for astatine

Astatine is below iodine in Group 7, so it is less reactive. A more reactive halogen displaces a less reactive one, so iodine would displace astatine.

**Yes: iodine is more reactive than astatine.**