

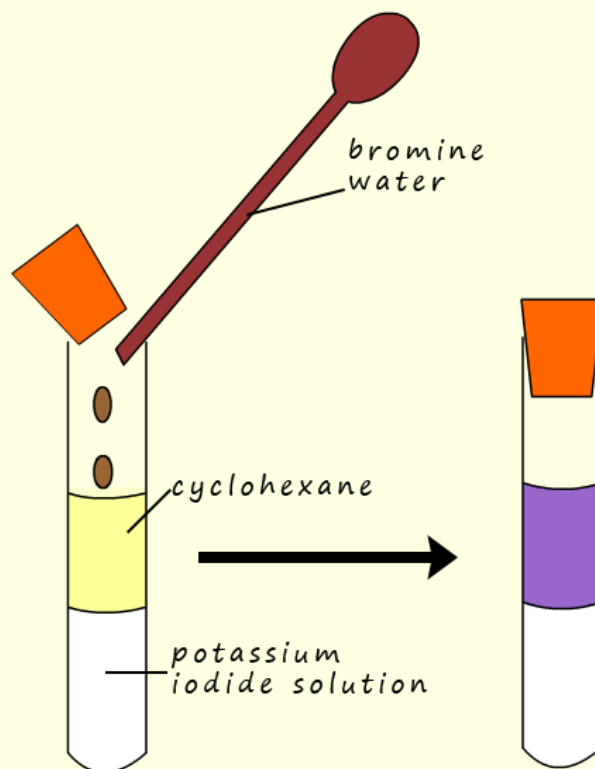


Answer the following questions then check your answers

1. Which of the halogens is the most reactive? Which is the least reactive?

b. What is a displacement reaction?

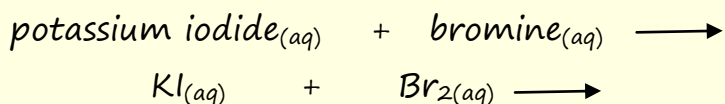
c. A student set-up the experiment opposite. A few  $\text{cm}^3$  of a solution of potassium iodide was placed in a boiling tube. A few centimetres of the solvent cyclohexane was then added to the boiling tube. Finally a few drops of brown bromine water was added and the tube shaken for a few seconds.



i. Cyclohexane and potassium iodide solution are immiscible, what does this mean?

ii. Name the 2 halogens present in the first boiling tube.

iii. Complete the word and symbolic equation for the displacement reaction taking place:



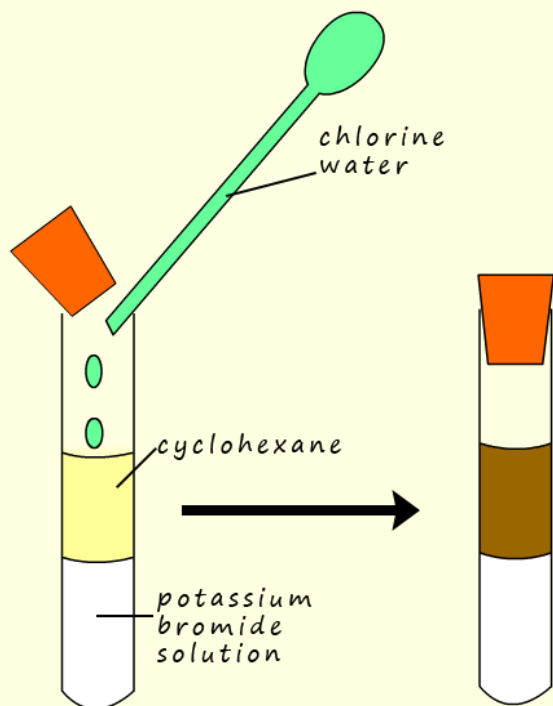
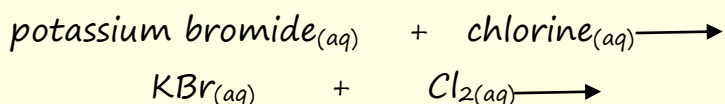
iv. In the second test tube what was causing the purple colour present in the cyclohexane layer?

2. A second displacement reaction was set-up as shown below:

a. This time a potassium bromide solution has a few drops of chlorine water added to it. After shaking the boiling tube a brown colour was seen in the cyclohexane layer in the second tube.

b. Why is cyclohexane used in these displacement reactions?

c. Complete the word and symbolic equation for the displacement reaction taking place:

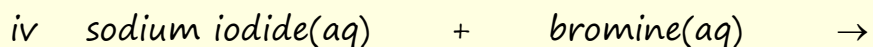
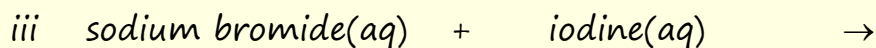
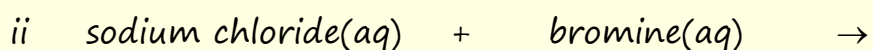
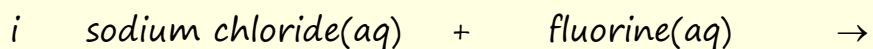


d. What was responsible for the brown colour in the cyclohexane layer?

e. What do the words reduction and oxidation mean?

- e. In the above displacement reaction the bromide ion in the potassium bromide solution forms the brown bromine in the boiling tube. Is this a reduction or oxidation reaction?
- i. Write an ion-electron half-equation for the transformation of bromide ions into bromine (remember bromine is a diatomic element).
- f. What is reduced in the above reaction? Write an ion-electron half equation for this reduction reaction.
- g. What is the name given to reactions where one substance is oxidised and one is reduced?

3 Complete the word equations for the displacement reactions shown below.



- b. Write symbolic equations for the reaction taking place in question 3. If you need help with working out chemical formula then go to the ["Finding the formula page"](#)

# Halogen displacement reactions

## Answers

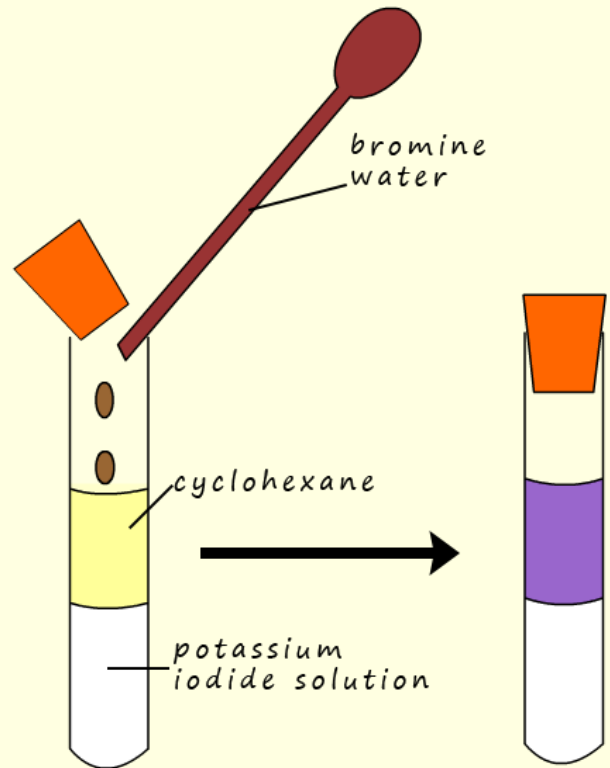
1a Which of the halogens is the most reactive? Which is the least reactive?

fluorine the most reactive, iodine the least reactive halogen

b. What is a displacement reaction?

A more halogen will remove or displace a less reactive halogen from its salts or solution.

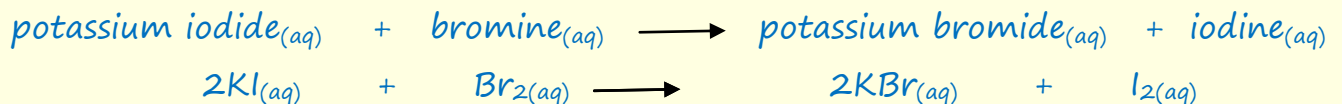
c. A student set-up the experiment opposite, a solution of potassium iodide was placed in a boiling tube. A few centimetres of the solvent cyclohexane was then added to the boiling tube. Finally a few drops of brown bromine water was added and the tube shaken for a few seconds.



i. Cyclohexane and potassium iodide solution are immiscible, what does this mean? They don't mix, the cyclohexane floats on top of the aqueous solutions.

ii. Name the 2 halogens present in the first boiling tube. Iodide and bromine

iii. Complete the word and symbolic equation for the displacement reaction taking place:

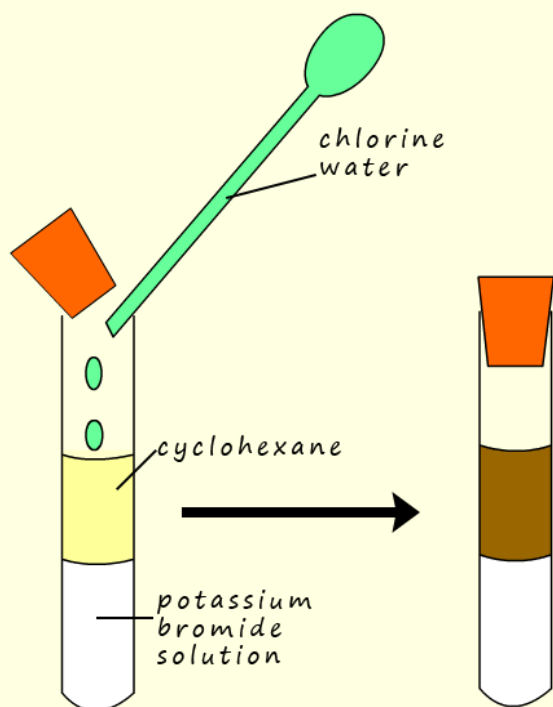


iv. In the second test tube what was causing the purple colour present in the cyclohexane layer? *iodine*

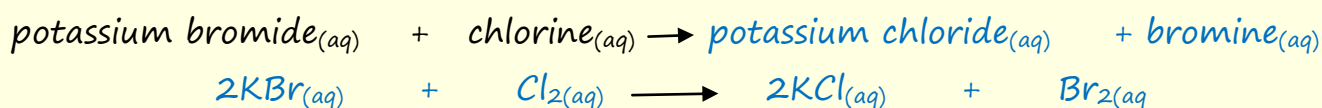
2. A second displacement reaction was set-up as shown below:

a. This time a potassium iodide solution has a few drops of chlorine water added to it. After shaking the boiling tube a brown colour was seen in the cyclohexane layer in the second tube.

b. Why is cyclohexane used in these displacement reactions? *Excellent solvent for halogens and also halogen colours are vibrant and show up well in this particular solvent*



c. Complete the word and symbolic equation for the displacement reaction taking place:



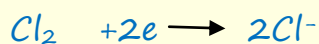
d. What was responsible for the brown colour in the cyclohexane layer? *bromine*

e. What do the words reduction and oxidation mean? *Reduction is a gain of electrons and oxidation is a loss of electrons (REMEMBER OILRIG!)*

- e. In the above displacement reaction the bromide ion in the potassium bromide solution forms the brown bromine in the boiling tube. Is this a reduction or oxidation reaction? *oxidation*
- i. Write an ion-electron half-equation for the transformation of bromide ions into bromine (remember bromine is diatomic).



- f. What is reduced in the above reaction? Write an ion-electron half equation for this reduction reaction. *Chlorine*

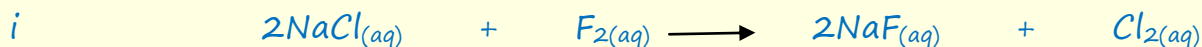


- g. What is the name given to reactions where one substance is oxidised and one is reduced? *Redox reaction*

3 Complete the word equations for the displacement reactions shown below.

- i sodium chloride(aq) + fluorine(aq) → sodium fluoride(aq) + chlorine(aq)
- ii sodium chloride(aq) + bromine(aq) → no reaction
- iii sodium bromide(aq) + iodine(aq) → no reaction
- iv sodium iodide(aq) + bromine(aq) → sodium bromide(aq) + iodine(aq)

b. Write symbolic equations for the reaction taking place in question 3.



ii. *no reaction*

iii. *no reaction*

