

Chem!stry

Name: ()

Class:

Date: / /

Chemistry of the Group 17 Elements – The Halogens

The elements in Group 17 of the Periodic Table are often referred to as the *Halogens*. The Group 17 elements are; fluorine (F), chlorine (Cl), bromine (Br) and iodine (I).

Question 1:

Give the formula for a molecule of fluorine, a molecule of chlorine, a molecule of bromine and a molecule of iodine

Question 2:

In the space provided below, draw a dot-and-cross diagram to show how the electrons are arranged in a molecule of fluorine:

Question 3:

Complete the table below to describe the appearance of chlorine, bromine and iodine:

Element	Colour	Physical state at room temperature
Chlorine		
Bromine		
Iodine		

Question 4:

Group trends – how do the melting points and boiling points of the Group 17 elements change upon descending the Group? How do the colours change upon descending the Group?

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Question 5:

Give a use for each of the Group 17 elements:

Use of fluorine:

Use of chlorine:

Use of bromine:

Use of iodine:

Question 6:

a) When sodium reacts with fluorine, sodium fluoride is formed as the reaction product. Write a balanced chemical equation, including state symbols, for this reaction:

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b) When magnesium reacts with chlorine, magnesium chloride is formed as the reaction product. Write a balanced chemical equation, including state symbols, for this reaction:

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c) Sodium fluoride and magnesium chloride are both **salts**. With reference to this piece of information, define the term **halogen**:

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Question 7:

Chemical reactivity **decreases** down Group 17. This means that fluorine is the most reactive element in Group 17 while iodine is the least reactive element in Group 17.

a) In terms of loss or gain of electrons, explain how the Group 17 elements react:

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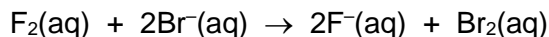
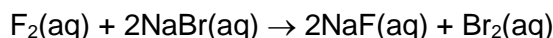
b) With reference to atomic structure, explain why the reactivity of the Group 17 elements decreases while descending the Group:

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Question 8:

A more reactive element can displace a less reactive element from its compounds. For example, fluorine could displace bromine from sodium bromide. This is called a *displacement reaction*:

fluorine + sodium bromide → sodium fluoride + bromine



- a) What do you *observe* when an aqueous solution of chlorine is added to an aqueous solution of sodium bromide?

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- Write the balanced chemical equation, including state symbols, for this reaction:

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- Write the ionic equation for this reaction:

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- b) What do you *observe* when an aqueous solution of chlorine is added to an aqueous solution of sodium iodide?

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- Write the balanced chemical equation, including state symbols, for this reaction:

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- Write the ionic equation for this reaction:

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- c) What do you *observe* when an aqueous solution of bromine is added to an aqueous solution of sodium iodide?

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- Write the balanced chemical equation, including state symbols, for this reaction:

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- Write the ionic equation for this reaction:

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- d) What do you observe when an aqueous solution of bromine is added to an aqueous solution of sodium chloride?

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Question 9:

The reaction between fluorine and sodium bromide to form bromine and sodium fluoride is also known as a *redox reaction*. Define the terms *reduction* and *oxidation* and hence define the term *redox reaction*:

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