

The Halogens - as reducing agents

Answer all the questions below then check your answers

1. What is a reducing agent?
2. State the trend in the reducing abilities of the group 7 halide ions.
3. Complete the table below by adding the oxidation number of sulfur atoms in each of the substances listed in the table.

substance	sulfur	Sulfur dioxide	Hydrogen sulfide	Sulfuric acid
Symbol/formula	S	SO ₂	H ₂ S	H ₂ SO ₄
Oxidation number of sulfur				

4. Write symbolic equations to show the products of the reaction of potassium fluoride and sodium chloride with concentrated sulfuric acid.
 - a. Name the type of reaction taking place when these compounds react with concentrated sulfuric acid.
 - b. State any observations that would be seen during these reactions.

5. Write symbolic equations to show all the products produced when potassium bromide reacts with concentrated sulfuric acid.
6. List all the products of the reaction of sodium iodide with concentrated sulfuric acid.
 - a. Write ion-electron half-equations to show how the sulfate ion (SO_4^{2-}) can be reduced to:
 - i. sulfur dioxide
 - ii. sulfur
 - iii. hydrogen sulfide
 - b. What tests could be used to identify the gases sulfur dioxide and hydrogen sulfide.

Answers

1. What is a reducing agent?

An electron donor

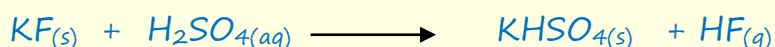
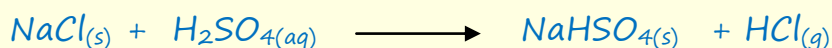
2. State the trend in the reducing abilities of the group 7 halide ions.

$I^- > Br^- > Cl^- > F^-$

3. Complete the table below by adding the oxidation number of sulfur atoms in each of the substances listed in the table.

substance	sulfur	Sulfur dioxide	Hydrogen sulfide	Sulfuric acid
Symbol/formula	S	SO ₂	H ₂ S	H ₂ SO ₄
Oxidation number of sulfur	0	+4	-2	+6

4. Write symbolic equations to show the products of the reaction of potassium fluoride and sodium chloride with concentrated sulfuric acid.



a. Name the type of reaction taking place when these compounds react with concentrated sulfuric acid.

Acid-base reaction

b. State any observations that would be seen during these reactions.

Moist fumes of HF and HCl gases will be seen.

5. Write symbolic equations to show all the products produced when potassium bromide reacts with concentrated sulfuric acid.

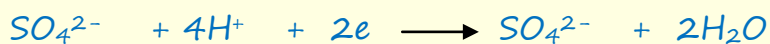


6. List all the products of the reaction of sodium iodide with concentrated sulfuric acid.



a. Write ion-electron half-equations to show how the sulfate ion (SO_4^{2-}) can be reduced to:

i. sulfur dioxide



ii. sulfur



iii. hydrogen sulfide



b. What tests could be used to identify the gases sulfur dioxide and hydrogen sulfide.

SO_2 - turn strips of filter paper soaked in acidified potassium dichromate solution from orange to green or will turn damp blue litmus red.

H_2S - turn strips of filter paper soaked in lead ethanoate (lead acetate) solution black.