

Name : _____ () Class: _____ Date : _____

1. For each of the following changes, state whether the change is oxidation or reduction and give a reason for your choice.

(a) ammonia into nitrogen

(i) type of change : **oxidation**

(ii) reason : **loss of hydrogen**

(b) potassium manganate(VII) into manganese(IV) oxide

(i) type of change : **reduction**

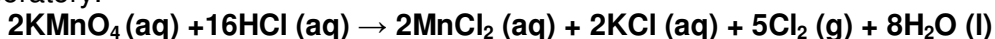
(ii) reason : **oxidation state of manganese decreases from +7 in manganate (VII) to +4 in manganese (IV) oxide**

(c) Fe_2O_3 into iron metal in the blast furnace

(i) type of change : **reduction**

(ii) reason : **loss of oxygen**

2. The equation below shows a common method of preparing chlorine at room temperature in the laboratory.



(a) Which substance is oxidised? Justify your answer in terms of oxidation number.

HCl is oxidised as it loses hydrogen to form Cl_2 .

(b) Name one element in this reaction whose oxidation number has not changed.

hydrogen

(c) Name the oxidising agent in the reaction.

Potassium manganate (VII)

3. State clearly in each of the reactions below, which substance is oxidised and which is reduced. Write an equation for each of the reactions described.

(a) Hydrogen reacting with bromine

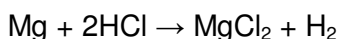


Hydrogen is oxidised as its oxidation state increases from 0 in H_2 to +1 in HBr.

Bromine is reduced as its oxidation state decreases from 0 in Br_2 to -1 in HBr.

(b) A named metal reacting with dilute hydrochloric acid

Magnesium reacts with dilute hydrochloric acid to form magnesium chloride.



Magnesium is oxidised as its oxidation state increases from 0 in Mg to +2 in MgCl_2 .

Hydrogen is reduced as its oxidation state decreases from +1 in HCl to 0 in H_2 .

(c) A named metallic oxide being converted into its corresponding metal

Copper (II) oxide being reduced to copper metal.



(d) Chlorine reacting with potassium iodide solution



- (e) A named metal reacting with copper (II) sulfate solution giving copper as a precipitate.

Magnesium reacts with copper (II) sulfate to form magnesium sulfate and copper metal.
**Magnesium is oxidised as its oxidation state increases from 0 in Mg to +2 in MgSO₄.
Copper (II) sulfate is reduced as oxidation state of copper decreases from +2 in CuSO₄ to 0 in Cu.**

4. (a) Acidified potassium manganate(VII) solution is an oxidising agent.

- (i) Name another oxidising agent in aqueous solution.

acidified potassium dichromate (VI) solution.

- (ii) Describe how you would use potassium manganate(VII) solution to test a solution for reducing agents.

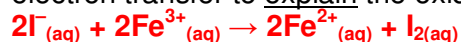
Add 2cm³ of potassium manganate(VII) solution to a test solution. If the purple potassium manganate(VII) solution decolourises rapidly, then the test solution contains a reducing agent.

- (iii) Suggest the name of a gas that you would expect to reduce potassium manganate(VII).

sulfur dioxide or hydrogen sulfide

- (b) A solution of iodide ions reacts with a solution of iron(III) chloride to produce iodine and a solution of iron(II) chloride.

- (i) Construct a balanced ionic equation for this reaction and use the concept of electron transfer to explain the oxidation and reduction that take place.



For ionic equations, make sure you balance the atoms on both sides and then the charges on both sides.

- (ii) By naming the reagent and giving the observation, explain how you would show that iron(II) ions has been produced in the reaction.

Add aqueous sodium hydroxide. If a dirty green precipitate is produced, indicating that iron (II) ions are present, then we know that iron (II) ions has been produced. If iron (II) ions has not been produced, the iron (III) ions would have produced a reddish brown precipitate with aqueous sodium hydroxide.