

ACTIVITY 1

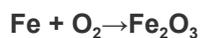
Iron reacts with oxygen

When iron rusts, it is because the iron metal reacts with oxygen in the air to form iron oxide.

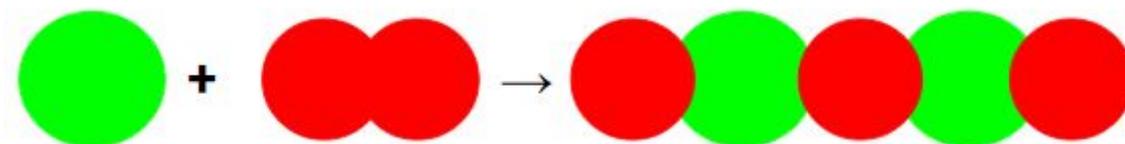
The word equation is the following:

iron + oxygen → iron oxide

The chemical equation is the following:



Is the equation balanced? Draw a submicroscopic picture to help you decide.



You could also use a table like the one below:

Number of atoms	Reactants	Products
Fe	1	2
O	2	3

What is your verdict: Is the equation balanced? Explain your answer.

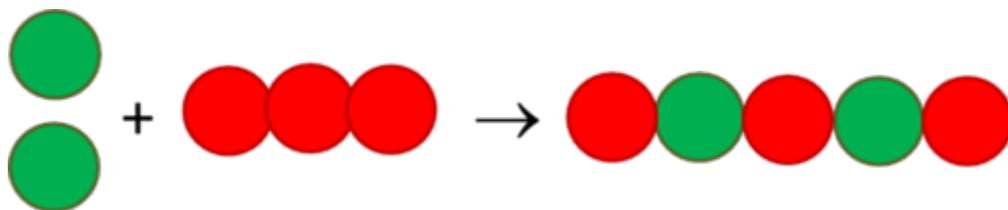
No

In the reactants there is 1 Fe atom and in the product there are two Fe atoms

In the reactants there is 2 O atoms and in the product there are three (3) O atoms

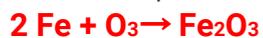
How could we balance the reaction? Three possibilities (Plans A, B and C) are given below. You must evaluate each plan, and say if it is allowed or not.

Plan A



Changes made	Is this change allowed? Yes/no?	Reason
Add one Fe atom on the reactant side.	Yes	Can change the number of molecules that react
Change O ₂ to O ₃ on the reactant side of the equation.	No	Not allowed to change the number of atoms in a compound

Convert the picture equation above to a chemical equation.



Did any coefficients change? Remember that this is allowed.

Yes

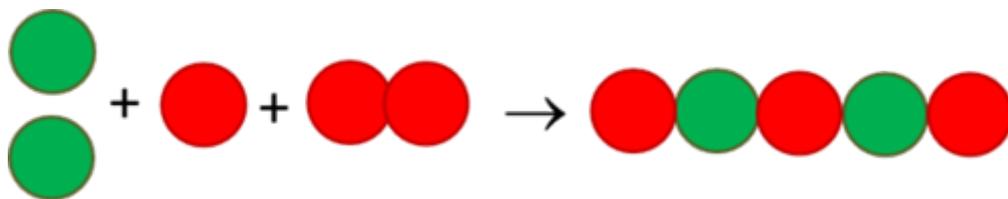
Did any formulae change, or were any new formulae added? Remember that this is NOT allowed.

Yes

What do you think: Can this plan work? Explain your answer.

No, because a formula was changed.

Plan B



Changes made	Is this change allowed? Yes/no?	Reason
Add one Fe atom on the reactant side.	Yes	Can add molecules
Add one O atom on the reactant side.	No	Can not add further chemical formulae (atoms or compounds) to a chemical reaction

Convert the picture equation to a chemical equation.



Did any coefficients change? Remember that this is allowed.

Yes - Iron in the reactants

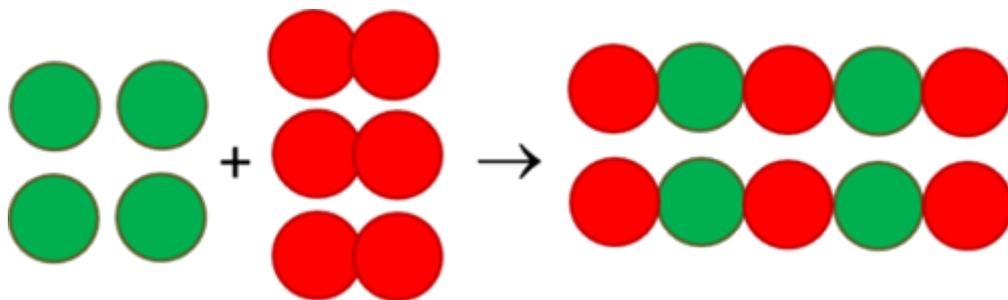
Did any formulae change, or were any new formulae added? Remember that this is NOT allowed.

Yes

What do you think: Can this plan work? Explain why or why not.

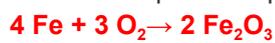
No, because adding formulae (compounds or atoms) to a reaction is not allowed.

Plan C



Changes made	Is this change allowed? Yes/no?	Reason
Add three Fe atoms on the reactant side.		
Add two O2 molecule on the reactant side.		
Add one Fe2O3 on the product side.		

Convert the picture equation to a chemical equation.



Did any coefficients change? Remember that this is allowed.

Yes

Did any formulae change, or were any new formulae added? Remember that this is NOT allowed.

No

What do you think: Can this plan work? Explain why or why not.

Yes, because none of the rules for balancing equations were broken.

Which of the three plans (A, B or C) helped us to balance the equation using only moves that are allowed?

Plan C

Are there any other plans that you can think of to balance this equation?

Plan C is the best. There may be other solutions, mathematically this is in its simplest form