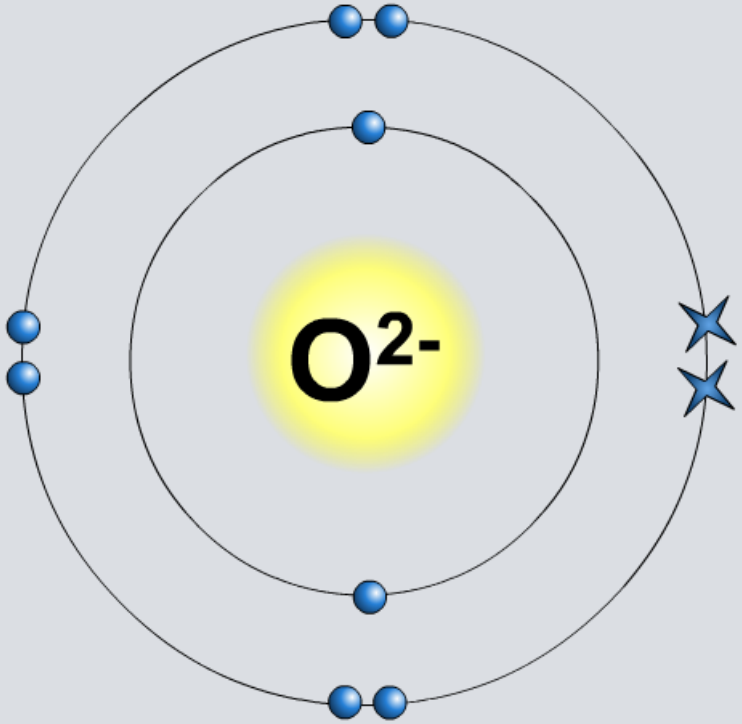
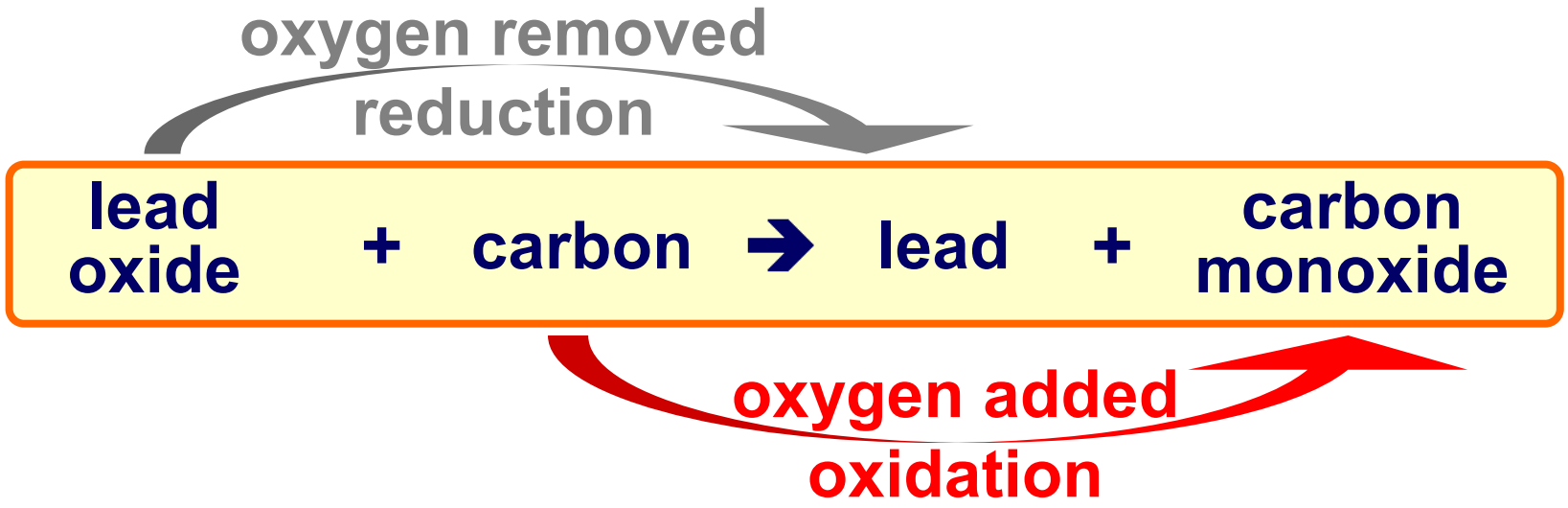
Redox Reactions



What is a redox reaction?

Oxidation is the **addition of oxygen** to a substance, and **reduction** is the **removal of oxygen** from a substance.

Which substances are oxidized and reduced in this reaction?



Reduction and oxidation always take place together.
Why is this type of reaction called a **redox** reaction?

redox = reduction and oxidation

Redox reactants – oxidized or reduced?

Is each reactant oxidized or reduced?

oxidized	reduced
?	?

Reaction 1/5

copper oxide + carbon → carbon dioxide + copper

Redox and electrons

Magnesium burns in oxygen to form magnesium oxide.

It is obvious that the magnesium has been oxidized, but what has happened to the oxygen?

A redox reaction can also be explained in terms of the gain or loss of **electrons.**

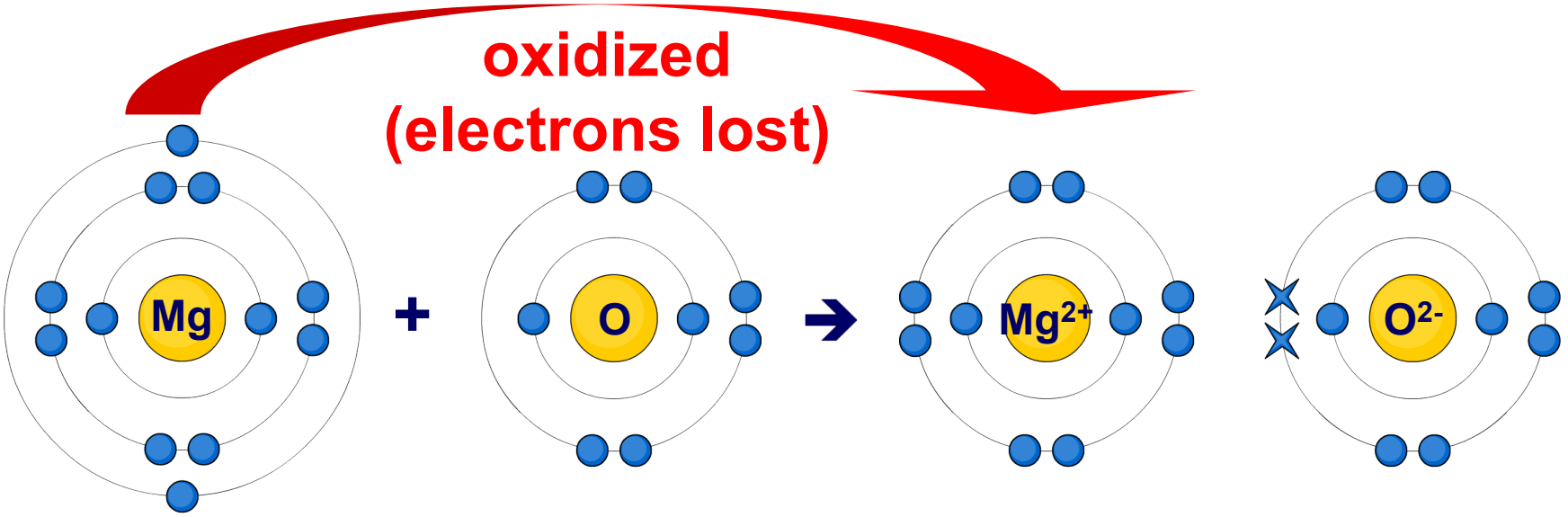
What happens to the atoms and electrons in this reaction?

magnesium + oxygen → magnesium oxide

$2Mg(s) + O_2(g) \rightarrow 2MgO(s)$

Oxidation and electron loss

When magnesium burns in oxygen to form magnesium oxide, what happens to magnesium and its electrons?

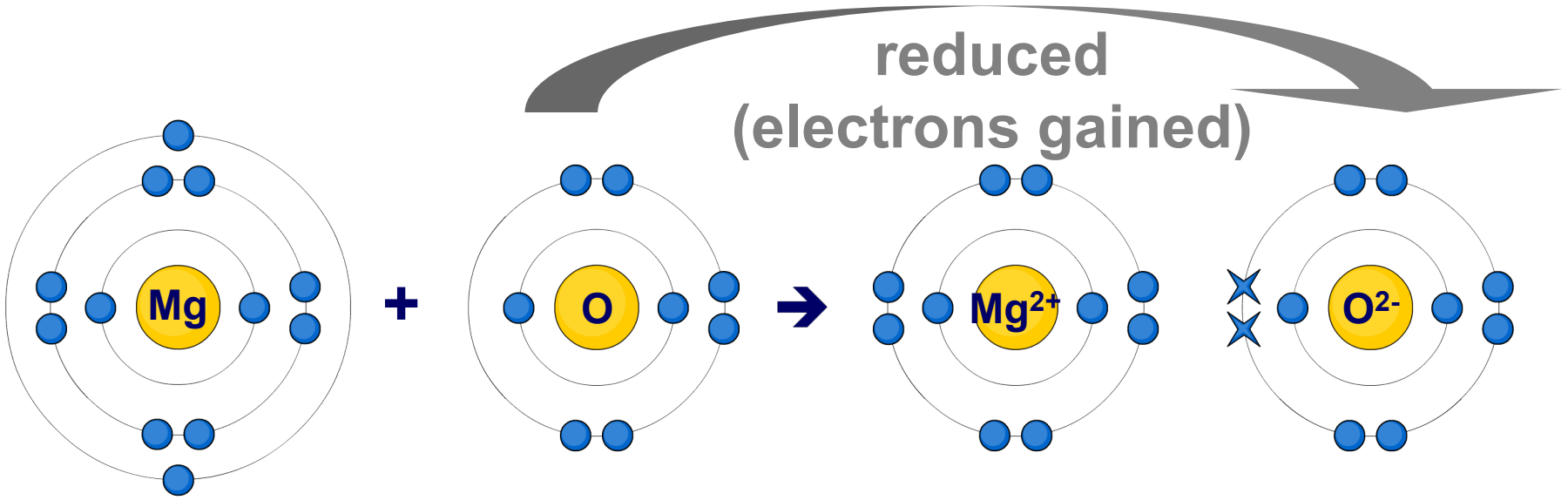


- The magnesium has been oxidized.
- The Mg atom has lost 2 electrons to form a Mg^{2+} ion.

Oxidation is the **loss** of electrons.

Reduction and electron gain

When magnesium burns in oxygen to form magnesium oxide, what happens to oxygen and its electrons?

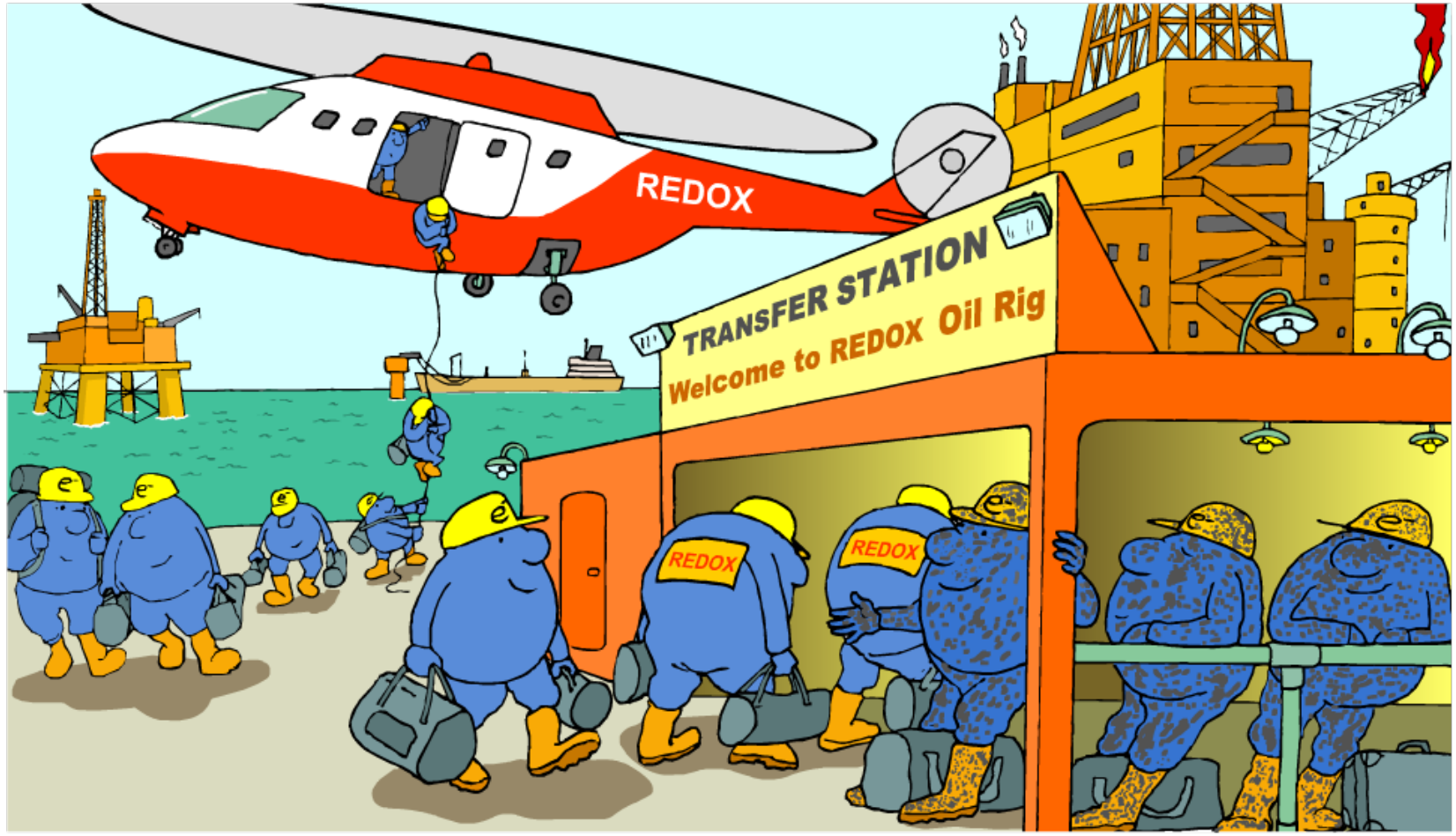


- The oxygen has been reduced.
- The O atom has gained 2 electrons to form an O^{2-} ion.

Reduction is the **gain** of electrons.

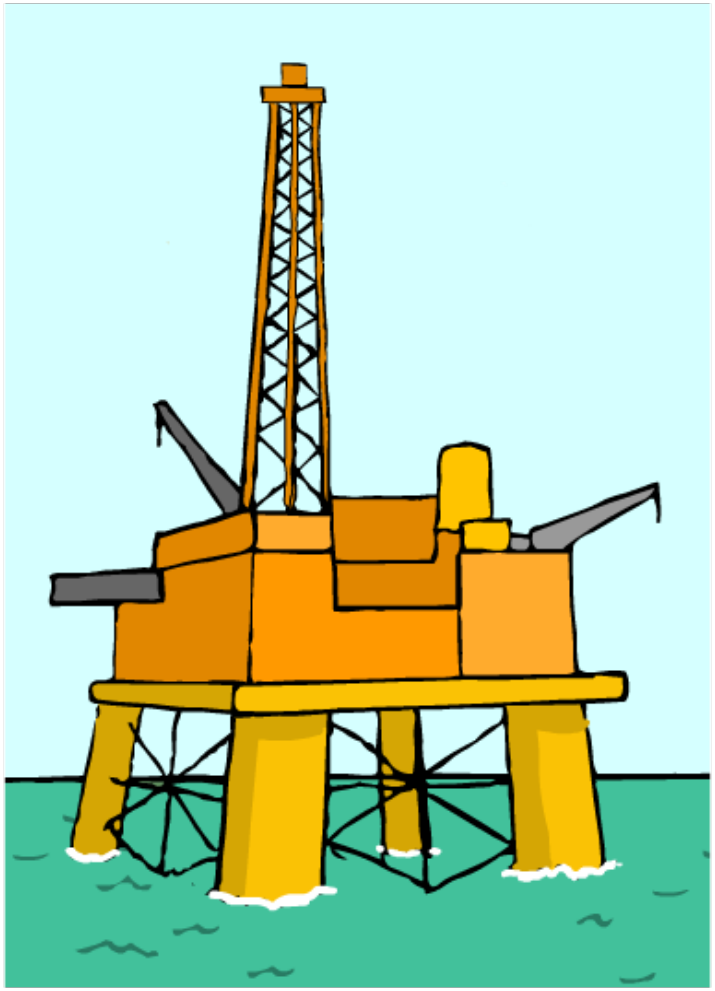
Redox and OILRIG

An easy way to remember what happens to the electrons during oxidation and reduction is to think… **OILRIG**!



Using OILRIG

What does **OILRIG** stand for in terms of redox reactions?



Oxidation

Is

Loss of electrons

Reduction

Is

Gain of electrons

What is a half-equation?

Redox reactions involve the transfer of electrons.

Equations written to show what happens to the electrons during oxidation and reduction are called **half-equations**.

What are the half-equations for the oxidation and reduction processes in this reaction?

magnesium + oxygen → magnesium oxide

$2Mg(s) + O_2(g) \rightarrow 2MgO(s)$

oxidation: $Mg \rightarrow Mg^{2+} + 2e^-$

reduction: $O_2 + 4e^- \rightarrow 2O^{2-}$

What does each half-equation show?

Does each half-equation show oxidation or reduction?

oxidation	reduction

$Zn^{2+} + 2e^- \rightarrow Zn$

solve

Redox reactions – summary

What are the missing words about redox reactions?

1a. In a redox reaction, one substance is reduced and one substance is [? ▼].

1b. Oxidation and reduction always take place at [? ▼].

2a. Oxidation means the addition of [? ▼] or the loss of electrons.

2b. Reduction means the loss of oxygen or the [? ▼] of electrons.