AIM 20 | What is oxidation?

You have probably seen rusted iron and burning wood. You probably did not think that rusting has anything to do with burning. But they are very much alike. Both are chemical reactions that use oxygen. In both rusting and burning, oxygen links up with other matter.

The name for the link-up of oxygen with other matter is *oxidation* (ox i DAY shun). There are two kinds of oxidation—*rapid oxidation* and *slow oxidation*.

RAPID OXIDATION: In rapid oxidation, oxygen links up with other matter very rapidly. The chemical reaction gives off a flame and a lot of heat. What we call a flame is rapid oxidation. Another name for it is *combustion* [com BUS chun].

SLOW OXIDATION: In slow oxidation, matter links up with oxygen very slowly. There is no flame. The heat that is given off is so slight that it cannot be felt.

Two good examples of slow oxidation are the rusting of iron and the decaying of food.

The most important oxidation for us takes place in our bodies. The food we eat is oxidized slowly. This oxidation supplies us with energy we need to live.

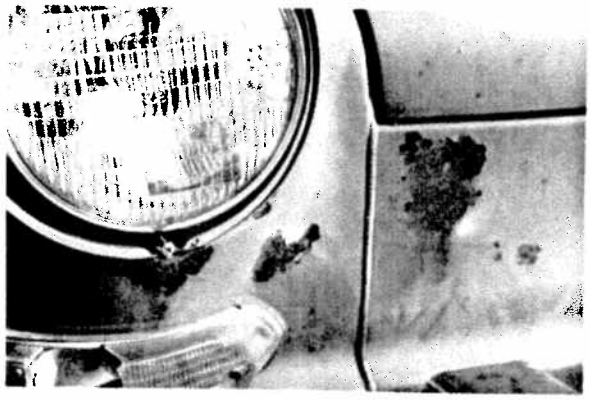
I. An example of slow oxidation

The car in this picture is rusting.

Another name for rust is *iron oxide*. Iron oxide is a compound.

Iron oxide is formed when iron links up with oxygen.

Rusting is an example of slow oxidation.



A.

The chemical equation that describes rusting is

$$\underbrace{\overbrace{4\,Fe}^{\text{element}}}_{\text{iron}} + \underbrace{\overbrace{3\,O_2}^{\text{element}}}_{\text{oxygen}} \rightarrow \underbrace{\overbrace{2\,Fe_2O_3}^{\text{compound}}}_{\text{iron oxide}} + \text{heat energy}$$

Answer these questions.

1. a) Does iron give off heat when it rusts? _____

b) Can you feel this heat? _____

2. Does iron give off light when it rusts? _____

3. Rusting is an example of _____ (slow, rapid) oxidation.

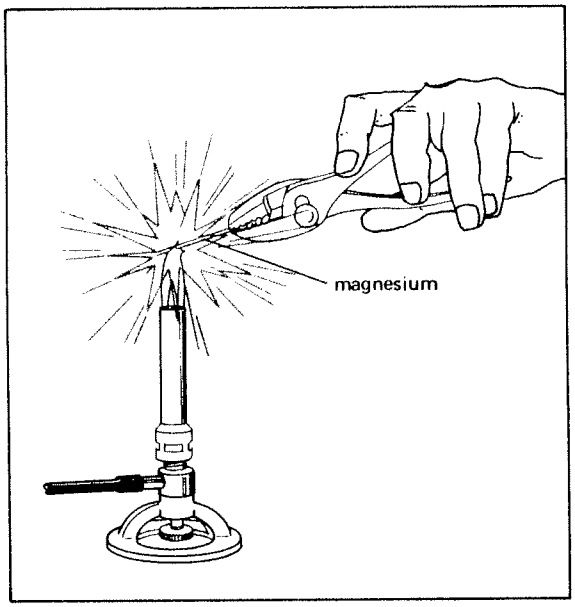
4. Rusting causes a _____ (physical, chemical) change.

5. a) When iron rusts, atoms _____ (do, do not) change the way they link up.

b) A new product _____ (is, is not) formed.

c) Properties _____ (do, do not) change.

d) A chemical reaction _____ (does, does not) take place.



II. An example of rapid oxidation

This picture shows magnesium burning.

When magnesium burns, oxygen links up with the magnesium. The compound *magnesium oxide* is formed.

The burning of magnesium is an example of rapid oxidation.

B.

The chemical equation that describes the burning of magnesium is

$$\underbrace{\overbrace{2\,Mg}^{\text{element}}}_{\text{magnesium}} + \underbrace{\overbrace{O_2}^{\text{element}}}_{\text{oxygen}} \rightarrow \underbrace{\overbrace{2MgO}^{\text{compound}}}_{\text{magnesium oxide}} + \text{heat and light energy}$$

Answer these questions.

1. **a)** Does magnesium give off heat when it burns? _____

   b) Can you feel this heat? _____

2. What other energy is given off? _____

3. Burning magnesium is an example of _____ (slow, rapid) oxidation.

4. Burning magnesium causes a _____ (physical, chemical) change.

5. **a)** When magnesium burns, atoms _____ (do, do not) change the way they link up.

   b) A new product _____ (is, is not) formed.

   c) Properties _____ (do, do not) change.

   d) A chemical reaction _____ (does, does not) take place.

COMPLETING SENTENCES

Complete the sentences with the words below. One of these words may be used twice.

rapid oxidation	oxidation	slight
slowly	heat	slow oxidation
flame	combustion	quickly
slow		

1. The link-up of oxygen with other matter is called _____.
2. The slow link-up of oxygen with another substance is called _____.
3. The fast link-up of oxygen with another substance is called _____.
4. Oxidation always produces _____.
5. Slow oxidation produces only _____ heat and no _____.
6. _____ produces a flame and much heat.
7. Another name for rapid oxidation is _____.
8. In rapid oxidation, oxygen links up with matter very _____.
9. In slow oxidation oxygen links up with matter very _____.
10. Rusting is an example of _____ oxidation.

TRUE OR FALSE

Write T on the line next to the number if the sentence is true. Write F if the sentence is false.

1. _____ Oxidation causes a chemical change.
2. _____ Oxidation gives off oxygen.
3. _____ Oxidation takes in energy.
4. _____ Slow oxidation gives off heat.
5. _____ Slow oxidation gives off a lot of heat.
6. _____ Slow oxidation gives off a flame.
7. _____ Rapid oxidation gives off a flame.
8. _____ Rapid oxidation gives off very little heat.
9. _____ Rusting iron gives off heat.
10. _____ Combustion is slow oxidation.

MATCHING

Match the two lists. Write the correct letter on the line next to each number.

1. _____	slow oxidation	**a)**	no flame and very little heat
2. _____	rapid oxidation	**b)**	needed for burning
3. _____	rust	**c)**	much heat and a flame
4. _____	heat	**d)**	one kind of slow oxidation
5. _____	oxygen	**e)**	always given off in oxidation

WORD SCRAMBLE

Unscramble each of the following to form a word or term that you have read in this Aim.

1. TIXONDAIO _____

2. AIDPR _____

3. STUR _____

4. URBN _____

5. WOLS _____

REACHING OUT

The more active you are, the more oxidation takes place in your body.

How can you tell that exercise increases oxidation?

_____

_____

_____