Chemistry Knowledge Map - Reactivity and Reactions

Metals from ores

An ore is a rock containing enough metal inside to make it worth extracting.'.

Metals are mined from the ground by digging up their ores and processing the ores to extract the metal. The extracting process will be different for different metals.

Metals can be extracted from their ores by heating them (smelting) and then further processing to purify the metal.

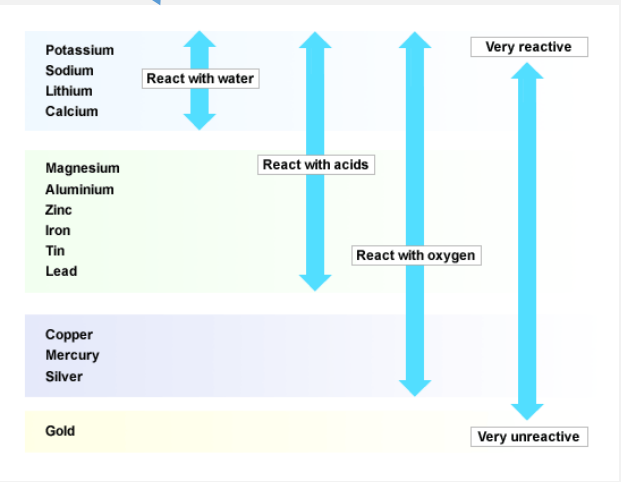
Reactivity Series

The elements in the first group in the periodic table are called the alkali earth metals. They increase in reactivity as you go down the group. They react with air, water and acid. They are stored in oil to stop these reactions.

The reactivity series of metals is shown below.

The general equation for the decomposition of metal carbonates is metal carbonate --> metal oxide and carbon dioxide.

An example would be calcium carbonate --> calcium oxide and carbon dioxide.



Displacement Reactions

When a reactive metal reacts with a compound of a less reactive metal, the more reactive metal'pushes out' pr 'displaces' the leass reactive metal. This is called a displacement reaction.

An example of a displacement reaction would be iron + copper sulfate --> iron sulfate and copper.

This shows that iron is more reactive than copper and has 'displaced' it.

Extracting Iron

To extract iron from the iron ore, you need limestone, hot air and coke.

The limetsone is used to remove impurities. The coke, which is carbon heated to over 3000 degress, is used to displace the iron from it's ore, as carbon is more reactive than iron.

The word equation for the displacement of iron in a blast furnace is:

iron oxide + carbon --> carbon dioxde + iron

Extracting Copper

Malachite is the name for the copper ore and is a copper carbonate.

Firstly, the ore is heated to over 200 degrees, to form copper oxide.

The word equation for this is;

copper carbonate --> Copper oxide + carbon dioxide.

The copper oxide is then heated with 'coke', which is a form of carbon, to displace the copper.

The word equation for this reaction is;

Copper oxide + carbon --> Copper + Carbon dioxide.

The copper will still contain impurities. A process known as electrolysis will be used to purofy the copper.

Impacts of Mining Metals

The advantages of mining metals are providing jobs for the local people, providing raw materials needed, bringing money into the area and the mine could also be a tourist attraction.

The disadvantages of mining metals are, noise pollution, traffic, greenhouse gas emissions, destruction of animal habitat and wildlife, production of acid rain and may cause breathing problems.

Exothermic and Endothermic Reactions

If the temperature of a reaction increases, the reaction is exothermic.

If the temperature of a reaction decreases, the reaction is endothermic.

During an exothermic reaction, more energy is transferred to the surroundings than is taken in.

During an endothermic change, more energy is absorbed from the surroundings than is given out.

Energy absorbed from the atmosphere is used in the bond-breaking process.

Energy given out during a reaction is a result of the bond-making process.

Catalysts

A catalyst is a substance that is added to a chemical reaction, causing it to happen faster or slower. Catalysts are not cahnged by the reaction, they alter the rate of reaction.

Most catalysts provide an 'alternative pathway' for the reaction to take place. This lowers the amount of energy needed for the reaction to happen.

y

Keywords you should be confident with by the end of this topic

Ore reactivity alkali metals carbonates displacement

reactants products blast furnace economic social environmental exothermic endothermic catalyst