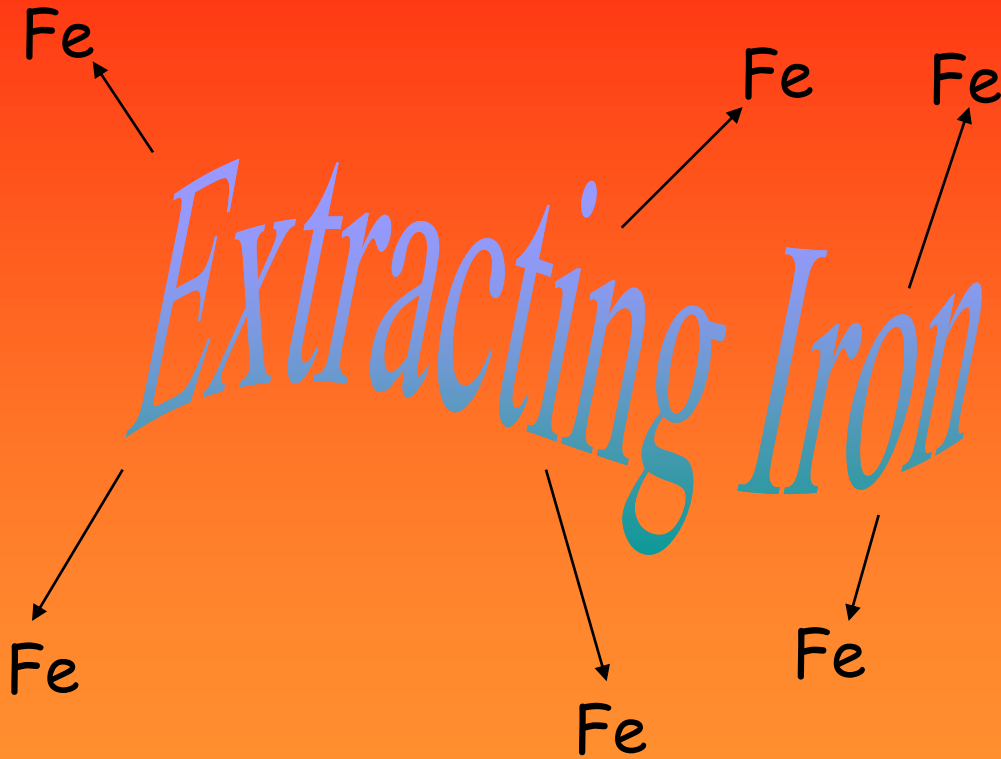


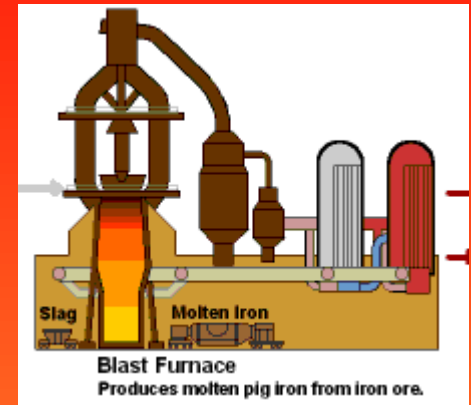
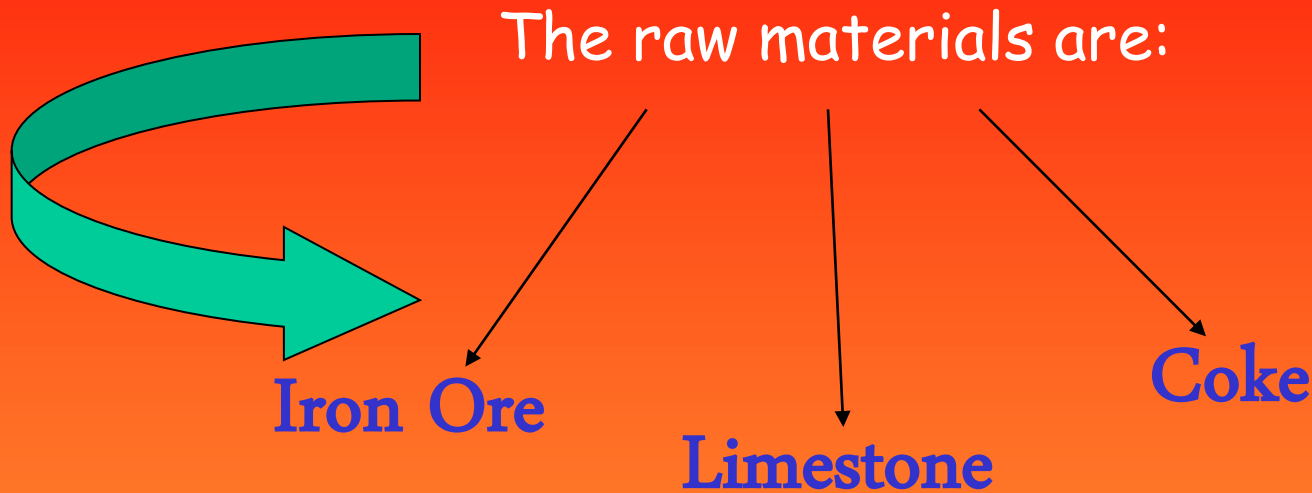
# The Blast Furnace



# Introduction

- Iron is a very common element in the Earth's crust, but good iron ores are only found in a few select places around the world, such as Australia, Canada and Millom.
- Iron is extracted from haematite,  $\text{Fe}_2\text{O}_3$ , by reduction (i.e. removal of oxygen) in a blast furnace

# What are the raw materials??



- The **iron ore** contains the iron - **IMPORTANT!!**
- The coke is almost **pure carbon**. This is for reducing the iron oxide to iron metal
- The limestone takes away impurities in the form of slag

# Reducing the Iron Ore

to Iron:

- Hot air is blasted into the furnace making the coke burn much faster than normal and the temperature rises to about 1500°C.
- The coke burns and produces carbon dioxide:



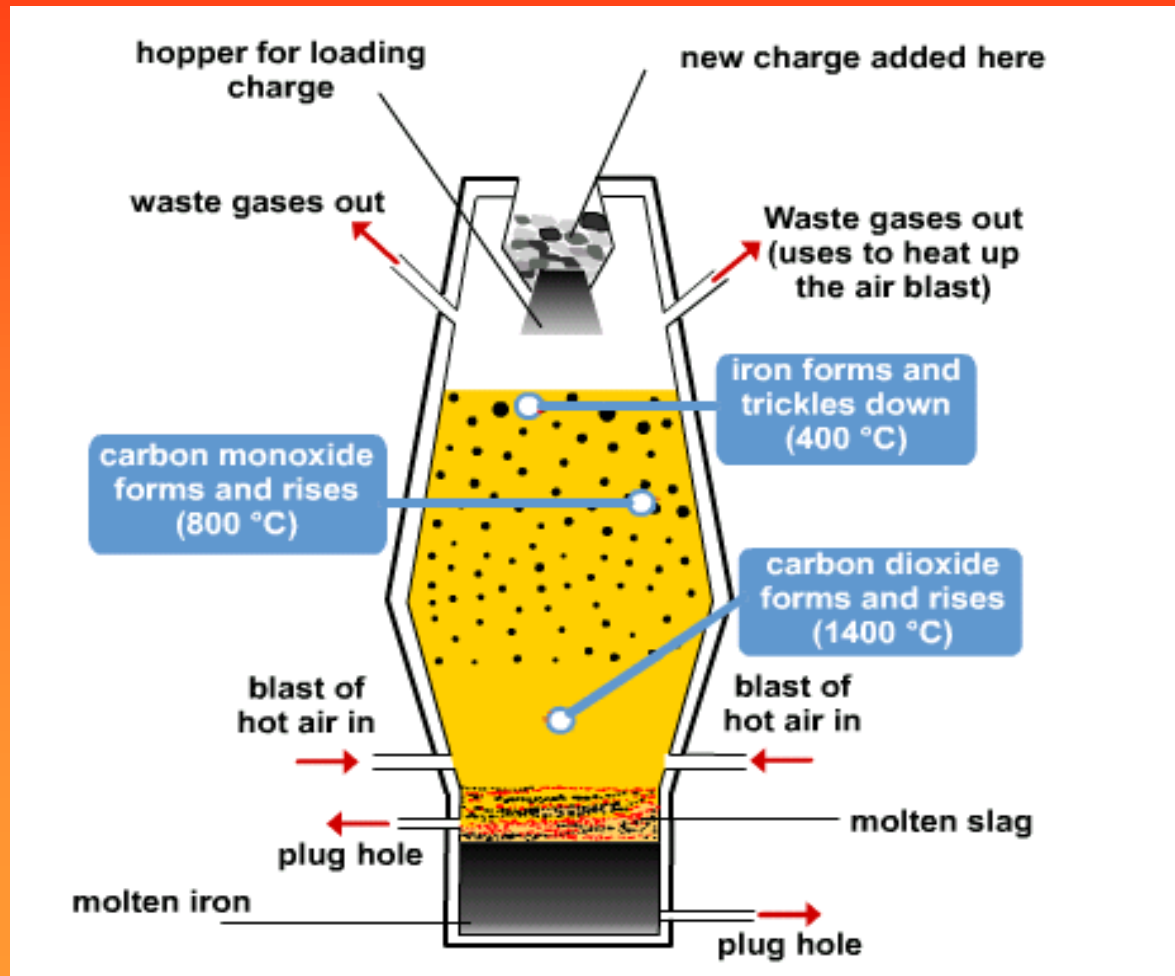
- The  $CO_2$  then reacts with unburnt coke to form  $CO$ :



- The carbon monoxide then reduces the iron ore to iron:



- The **iron** is molten at this temperature and it's very dense, so it *runs to the bottom* of the furnace where it's tapped off..



# Example: Port Talbot Steel Works (Blast Furnace)



## Removing the Impurities:

- The main impurity is **sand** (silicon dioxide). This is still solid at 1500°C and would tend to stay mixed in with the iron.

Q... What removes the sand???

A... **Limestone** ( $\text{CaCO}_3$ )



# Removing the Impurities:

- The limestone is decomposed by the heat into calcium oxide and  $\text{CO}_2$ :



- The calcium oxide then reacts with the sand to form calcium silicate or slag which is molten and can be tapped off:



# Uses of Slag.....

**Road building**