

### Coke making

Coal is not (as is often assumed) pure carbon. Coals from different sources have different compositions, all of them having complex macromolecular structures. As well as carbon they contain hydrogen and oxygen and also smaller quantities of sulfur, nitrogen and some trace elements. In coke-making, a blend of coals is heated in the absence of air. The coal decomposes; volatile compounds are driven off and collected. Carbonisation takes place leaving a porous solid containing around 88% carbon.

The video clip shows 'pushing' of a coke oven in which a hydraulic ram forces the red hot coke from the oven and into a waiting rail car.

### Design of the blast furnace

It is worth remembering that, as for most industrial plants, there is no single design of blast furnace. Each one is individually designed and modified. For example, some furnaces are loaded by skips whereas others are loaded by conveyer belt. Arrangements for tapping hot metal and slag vary too. In some furnaces, slag and molten iron are tapped separately through different tap holes while in others they are tapped together and separated outside the furnace. See T. Lister and C. Osborne (eds), (*Industrial Chemistry Case Studies*, London: RSC, 1998) for more detail of this and other aspects of iron and steel-making.

### Secondary steel making

The steel resulting from primary steel making by the Basic Oxygen Steelmaking (BOS) process contains more than the desired amount of oxygen, both as bubbles of gaseous oxygen and as iron oxide. Aluminium, silicon or manganese are commonly added to the steel in the secondary steel-making process and these react with this oxygen to form oxides which float on top of the molten steel and can be removed. Further additions are often made to produce steels of particular specifications.