

In the limelight

To be 'in the limelight' means to be in the spotlight or to be the centre of attention, but why 'limelight'? The phrase comes from the theatre in the days before electric lighting. At this time there was no simple way produce a bright, white light suitable for a stage spotlight - gas flames were far too dim.

However, in the 1820s one Goldsworthy Gurney (later 'Sir') found that if he played a hydrogen-oxygen flame onto a cylindrical lump of lime (calcium oxide) he found that the lime glowed with a brilliant white light. With appropriate lenses, a beam of light could be produced which was suitable for theatre spotlights and also lighthouses. The two gases were stored in bags or bladders and were fed to the burner under pressure caused by placing weights on the bags.

A little later a Scottish Engineer called Thomas Drummond saw a demonstration of this light and developed it for surveying – the light was bright enough to be visible for over 60 miles and a light placed on one hill could be seen by a surveyor on another hill many miles away.



Limelight produced by playing a flame onto a piece of calcium oxide

Photo Peter Hollamby

What causes limelight? In fact almost anything heated up to a high enough temperature will glow white hot. This is called incandescence. Calcium oxide (lime) is suitable because it does not decompose at high temperatures, it does not react with oxygen in the air (it is already an oxide) and it has a very high melting point (3123 K, 2850 °C). When an object is heated to a high temperature, electrons are promoted from the ground state to very high energy levels. They then drop back to a whole variety of lower energy levels, each transition giving out electromagnetic radiation of

a different wavelength (colour). The resulting mix of colours corresponds to white light.

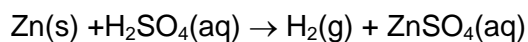
The chemistry of limelight

Lime, calcium oxide, is made by strongly heating limestone, calcium carbonate, which is a common rock type.



The remains of kilns in which this was done can be found in a number of places in limestone areas of Britain.

Hydrogen for limelighting was produced by the reaction of zinc and sulfuric acid



and the oxygen was made by heating potassium chlorate(V) with a catalyst of manganese(IV) oxide (this mixture is sometimes called 'oxygen mixture').

