

# The blowpipe: A forgotten analytical tool

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An indispensable tool for skilful chemists (for instance Berzelius)  
for 200 years – today a museum piece that almost no one knows how to use.

**T**he statement that laboratories are essential for chemistry is certainly neither sensational nor new. Throughout history, chemists have used labs to establish the chemical properties of different substances and to study what happens when substances are mixed. Without work in laboratories there would be no chemistry or chemical knowledge.

Berzelius' famous statement that a tidy laboratory is indicative of a lazy chemist drastically emphasises how vital it is for chemists to spend a lot of their time in the lab.

**The methods** and the instruments used in the chemistry lab have remained surprisingly similar throughout the ages. Images of 17th century laboratories look familiar to modern observers as, in principle, the same types of test tubes, flasks, crucibles, and distillation equipment are still used today and make up an important part of a chemist's tools – although lately many more sophisticated instruments have been added.

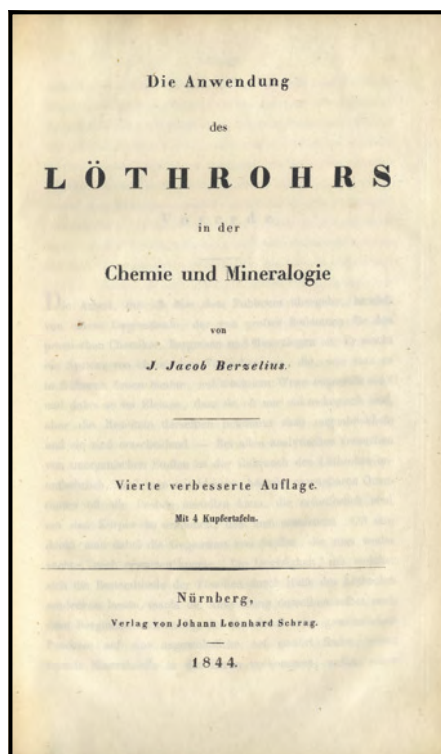
**However, one important** instrument that disappeared in the beginning of the 20th century, and which no modern chemist is likely to be able to use, is the blowpipe. Using this tool, leading chemists such as Bergman and Berzelius were able to considerably increase our collective chemical knowledge. The principle of a blowpipe is simple: with a blowpipe, a jet of air could be directed through a flame in order to create a hot airstream, into which a specimen could be inserted. Based on the reactions observed in the specimen, essential conclusions could be drawn regarding the composition of the specimen. A simple principle, but in practice not so easy.

**In itself**, the method probably stems from the way in which gold- and silversmiths used to solder together different metals,

but it was developed, not least by chemists in Sweden during the 18th century, into an analytical tool for especially minerals. It is a complicated craft.

A powerful jet of air through the centre of a flame will result in an oxidising flame, while a weaker stream of air through the edges of the flame will result in a reducing flame, because of the soot residue in the flame. Naturally, the two different flames will result in different reactions.

The blowing itself is difficult. Preferably, a steady jet of air should be maintained for between ten and fifteen minutes, which according to the manuals is easy to do if you breathe through the nose, and use the mouth-cavity as a sort of bagpipe, slowly releasing a stream of air from the mouth.



**"The master of quantitative measurements, Berzelius also mastered the blowpipe method. In 1820, he wrote a book of 300 pages about its use, published also in four German, two English and two Italian editions as well as one in Russian. Shown here is the title sheet of the last of the German editions."**

**Blowpipe analysis** had many advantages; it was quick, and for an experienced chemist an accurate and indispensable instrument for identifying unknown specimens. Also, it was an easily transportable equipment. Many chemists had personal "portable laboratories" with blowpipes and essential chemicals, which they always brought on their travels in case they found some interesting mineral to "blow on". However, the only way to learn how to use it was to use it again and again. According to Berzelius, it could take a chemist between ten and fifteen years to master the blowpipe.

The reason for that was not just that the technique itself was tricky, but chemists also had to be able to interpret the results. They had to be able to identify many different reactions, and since all results were of a qualitative nature only, chemists had to be very observant. Primarily, it was colour reactions they had to look out for, although they might also use their senses of smell, taste, and even hearing.

With impressive precision, chemists learnt to distinguish between pink, light red, and pale red, and to use these differences to draw definitive conclusions regarding the composition of a sample. This required knowledge and many years of experience.

**The blowpipe was used** until the early 20th century, i.e. over a period of more than 200 years, which would not have been the case had it not been such a quick and efficient instrument. However, perhaps the most remarkable fact to consider in relation to the blowpipe's role in the history of chemistry is that all the results that chemists gathered with the help of this tool were dependent on a qualitative assessment and, in particular, the chemists' ability to immediately and precisely identify colours. Which leads to the wider question of which role qualitative elements have played in the evolution of a modern science within which quantitative measures have always been hailed as ideal? 