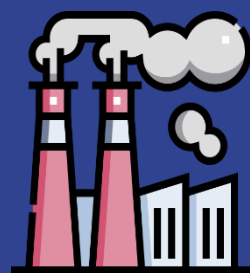




## What are diffusion tubes and how do they work?

### Where does Nitrogen Dioxide come from?

Nitrogen Dioxide (NO<sub>2</sub>), along with Nitrogen Monoxide (NO), are referred to as NO<sub>x</sub>. NO<sub>x</sub> is released into the atmosphere when fuels are burned (for example, petrol or diesel in a car engine, or natural gas in a domestic central heating boiler or power station). It's really important to measure

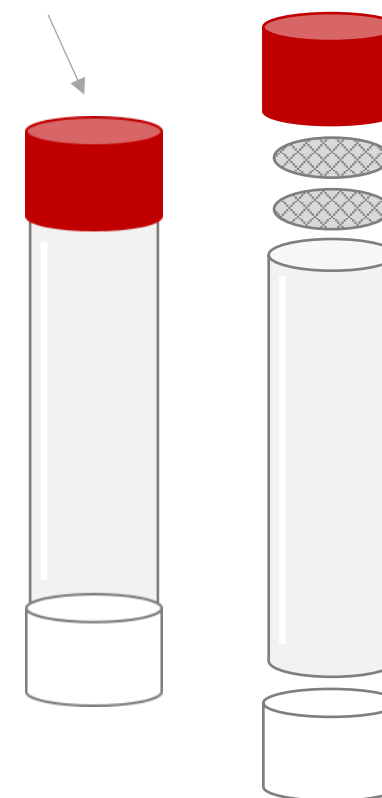


Diffusion tubes are a cheap and easy way to measure nitrogen dioxide (NO<sub>2</sub>). They are supplied and analysed by laboratories. Councils use them to get an indication of nitrogen levels across their borough by putting tubes in lots of different places. Diffusion tubes can be used to measure other pollutants too, but for our work we are most interested in measuring nitrogen dioxide.

Diffusion tubes are small plastic tubes with a cap at each end one of which is coloured. Under the coloured cap is a steel mesh disc which is coated with triethanolamine (TEA) a chemical that absorbs nitrogen dioxide. When gases pass over this mesh the chemical changes. This chemical change tells us how much nitrogen dioxide was in the air during the monitoring period. Tubes are attached in a vertical position with the coloured cap at the top to a stationary object such as a lamppost, road sign, railings or a drainpipe. The bottom white cap is removed so that the air can get into the tube in a process known as molecular diffusion. Nitrogen dioxide in the air reacts with the chemical on the mesh at the top of the tube and changes into nitrite.

The tube must be left in place for a month, then it is returned to the laboratory for analysis. In the laboratory, the steel mesh is removed and washed with distilled water which is then analysed. The concentration of nitrogen dioxide is found by shining ultra violet light (UV) through the water sample and observing how much light is absorbed.

### Diffusion Tube



**End cap** – cap on the end of the tube, holds absorbent-coated grids

**Grids** – small stainless steel mesh grids, coated in absorbent TEA (which absorbs NO<sub>2</sub>). Approximately 4x4mm<sup>2</sup> in size

**Plastic tube** – tubes are generally made from either acrylic or polypropylene, and are about 7.1 cm long. Air travels up the tube from the open end at the bottom in a process known as molecular diffusion

**Bottom cap** – this is removed during the survey, and placed back on at the end to secure the air inside