Pollution solution teacher notes

This experiment is not really testing for nitrogen dioxide in the samples. It is showing a reaction with different levels of acidity (the pH level). However, the process replicates the way that air pollution (nitrogen dioxide) is tested in real diffusion tubes that councils use.

	Real nitrogen dioxide test	**Our experiment**
Testing for	Nitrogen dioxide	Acidity
Reagent	Triethanolamine (TEA)	Grape juice
Mix with	Distilled water	Tap water
Visible change	Only visible under UV light	Visible in normal light

What is air pollution?

Air pollution is gases and dust particles in the air (so both solids and gases). The air pollution that most affects our health in the UK is nitrogen dioxide (NO2) which is a gas, and Particulate Matter (called $PM_{2.5}$ and PM_{10}) which are tiny bits of soot and dust, and are solid.

Air pollution is harmful for humans, animals, plants and buildings**.**

Why is air pollution a problem?

Air pollution leads to many health problems and is linked to 40,000 premature deaths in the UK each year. It affects three core areas of the body: lungs, heart and head, and has other effects too.

Lungs: Air pollution makes asthma and other respiratory conditions like bronchitis worse, and can lead to lung cancer. Children can suffer from reduced lung development if they live or go to school in areas with higher air pollution in the UK.
Heart: Levels of air pollution in UK towns and cities increases the number of heart attacks, strokes and heart failures.
Brain: There is new evidence that might link air pollution to dementia, reduced brain development in small children and lower intelligence levels in adults. This research is still being done, and we need more scientists to keep studying this topic so that we can understand it better.

For more information, see the World Health Organisation campaign on air pollution www.breathelife2030.org

Some of the same health problems will be felt by animals like our pets. Air pollution affects plant and tree growth. Nitrogen dioxide is linked to acid rain which damages plants, trees

and buildings. Buildings in polluted areas can also end up with more black soot on them, meaning we have to clean our windows more often.

What is causing air pollution?

Across the UK, traffic is a major cause of air pollution, especially the gas nitrogen dioxide. This comes from diesel engines. We have lots of diesel cars as well as coaches, buses and lorries with diesel engines on our roads. Even though bigger vehicles (e.g. buses and lorries) produce slightly more of the gas, when you have lots of cars on the road this can cause a bigger proportion of the air pollution. Is it better to have 76 cars driving to the shops, or one bus? The bus is definitely not producing 76 times more pollution!

Particulate Matter (PM) can also be caused by traffic – some coming out of the engine, but also from the friction of tyres on the road, brakes etc. PM and other air pollutants also come from other sources e.g. burning fuels like wood or coal for heating, and some types of industry.