**ACTIVITY: Diffusion and effusion**

**Activity idea**

In this activity, students investigate gaseous diffusion and effusion. After completing a laboratory experiment to gain a basic understanding of diffusion and effusion, students investigate carbon monoxide and hydrogen sulfide.

By the end of this activity, students should be able to:

* understand the difference between diffusion and effusion
* relate the diffusion of gases to the kinetic theory model for gases
* link gaseous diffusion to the movement of toxic gases like carbon monoxide and hydrogen sulfide
* provide a simple rap/poem/song to highlight the some of the dangers of poisonous gas diffusion.

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**Introduction/background**

We live in a gaseous atmosphere and experience numerous features of this state of matter on a regular basis. One of these relates to the speed with which different gases can mix and mingle. For example, the smell of perfume or aftershave following in the wake of the wearer quickly fills the air and catches our attention. However, not all gases have an odour, and in some situations, that can be a problem.

After completing a laboratory experiment to gain a basic understanding of diffusion and effusion, students will read internet-based factsheets on carbon monoxide (the odourless killer gas) and hydrogen sulfide (the smelly killer gas). Students will then prepare a rap/poem/song/poster on one of these gases that highlights their properties and dangers.

In preparation for this activity, read the article [Truly chaotic – the gaseous state](https://www.sciencelearn.org.nz/resources/1253-truly-chaotic-the-gaseous-state).

**What you need**

* Perfume in liquid form
* Dropper
* Balloon
* Unpleasant smelling liquid like butyric acid
* Small glass Petri dish

**What to do**

1. Place a drop of the perfume into an uninflated balloon outside of the classroom and inflate the balloon.
2. Place the inflated balloon in a prominent central position in the classroom (still air).
3. Have students note when they can smell the odour of the perfume in their immediate vicinity.
4. Place a drop of the unpleasant smelling liquid into a small Petri dish outside of the classroom and replace the Petri dish cover.
5. Place the Petri dish on a desk towards the front of the classroom and remove the glass cover.
6. Have students note when they can smell the unpleasant odour in their immediate vicinity.
7. Discuss the students’ responses:

* From the results of each activity, can you use the kinetic theory model of gases to explain what has happened?
* How do effusion and diffusion compare?

***Poisonous gases***

1. Explain to the students that the diffusion of perfume is, to most people, a pleasant experience. However, the diffusion of carbon monoxide from a faulty car exhaust system or hydrogen sulfide from a geothermal steam vent has the potential to be less pleasant. Ask students to read this factsheet on carbon monoxide (the odourless killer gas) and hydrogen sulfide (the smelly killer gas) to find out why:

Factsheet – Forklifts + Carbon Monoxide = A Potentially Deadly Combination (<http://www.worksafe.govt.nz/worksafe/information-guidance/all-guidance-items/clean-air-fact-sheets/forklifts-and-carbon-monoxide>)

1. Ask students to choose one of these gases and prepare a rap/poem/song/poster to present to the class.