

# Testing for gases

Tests for gases

Gas	Test	Result if positive
carbon dioxide (CO <sub>2</sub> )	-add limewater	-turns limewater <i>milky</i>
chlorine (Cl <sub>2</sub> )	-damp litmus paper	- <u>blue</u> litmus paper turns <u>red</u> - <u>universal</u> litmus paper turn <u>red</u> -then both are bleached <u>white</u>
hydrogen (H <sub>2</sub> )	-a lighted splint	-goes "pop"
oxygen (O <sub>2</sub> )	-a glowing splint	-splint bursts into flame



## What is a formulation?

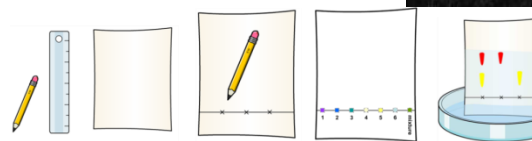
- This is a mixture that has been designed as a useful product.
- They are made up of several chemicals – each of which has a specific purpose
- Each part of the mixture is carefully measured (usually)
- E.g.
  - Paint
  - Medicines
  - Fertilisers
  - Food
  - Cleaning agents



# Chemical analysis

How to tell the difference between pure and impure substances using melting points

- Pure substances – specific, single melting/boiling point
- Impure substances – the melting/boiling point is over a range



Filter paper is used. A pencil line is drawn across the bottom. Pencil is insoluble in water so it will not run up the paper. The substance to be separated out is placed on the pencil line. These can be done in a row so the results can be compared. The bottom of the filter paper is placed into the water.

$$R_f = \frac{\text{distance moved by substance}}{\text{distance moved by solvent}}$$

### Understanding a Chromatogram

Small molecules travel faster than large ones through the filter paper. This causes separation because the molecules of the different substances in a mixture are different sizes.

- The retention factor is used to identify to identify an unknown substance.
- A database containing the retention factors of different substances is used to compare the retention factor calculated from the chromatogram.
- This can be used to identify the substances in a mixture.

### Worked example

Find the  $R_f$  value of compounds A and B using the chromatogram below.

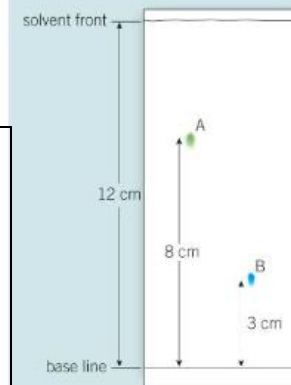


Figure 4 The  $R_f$  value of an unknown substance, in a particular solvent at a given temperature, can be compared with values in a database to identify the substance

### Solution

$$\text{The } R_f \text{ value of A} = \frac{8}{12} = 0.67$$

$$\text{The } R_f \text{ value of B} = \frac{3}{12} = 0.25$$

What does this chromatograph show...

- Substance A – contains only one of the colours and one unknown
- Substance B – contains only two of the colours and no unknowns
- Substance C – contains only two of the colours and no unknowns
- Substance D – contains one of the colours and one unknown

# Chemical analysis

## Pure substances

What is a pure substance?

Which main physical property differentiate substances?

How do the melting points of impure substances and pure substances differ?

PURE-

IMPURE

Milk is a mixture, why do we say, for instance, in everyday language that people prefer to drink 'pure milk'? What does 'pure' mean in everyday speech?

## Formulations

What is a formulation? What makes them different to a general mixture?

Give 5 examples of formulations

- 1.
- 2.
- 3.
- 4.
- 5.

## Tests for gases

Detail the test and result for these gases:

**Hydrogen**

**Carbon dioxide**

**Oxygen**

**Chlorine**

## Chromatography

What can chromatography be used for?

In paper chromatography, what is the-

Stationary phase-

Mobile phase-

Draw a labelled diagram of paper chromatography below.

How can one work out the  $R_f$  value of a substance? Give the equation.

# RATES OF REACTION

What do we mean by 'rate of reaction'?

What 4 factors affect the rate of a reaction?

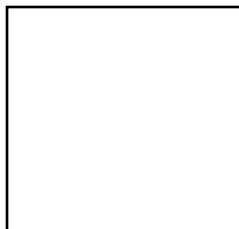
What must happen for a reaction to occur?

What is the smallest amount of energy that must be overcome for a reaction to occur?

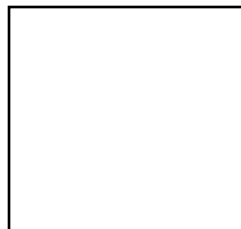
How does surface area affect rate of reaction?

Explain the effect of concentration on the rate of reaction

Draw diagrams to represent it?



Low conc<sup>n</sup>



High conc<sup>n</sup>

Explain the effect of temperature on the rate of reaction [think about: kinetic energy & number of collisions]

Draw diagrams to represent it:



Low temp



High temp

What is collision theory?

What is a catalyst?

What happens to them during a reaction?

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