

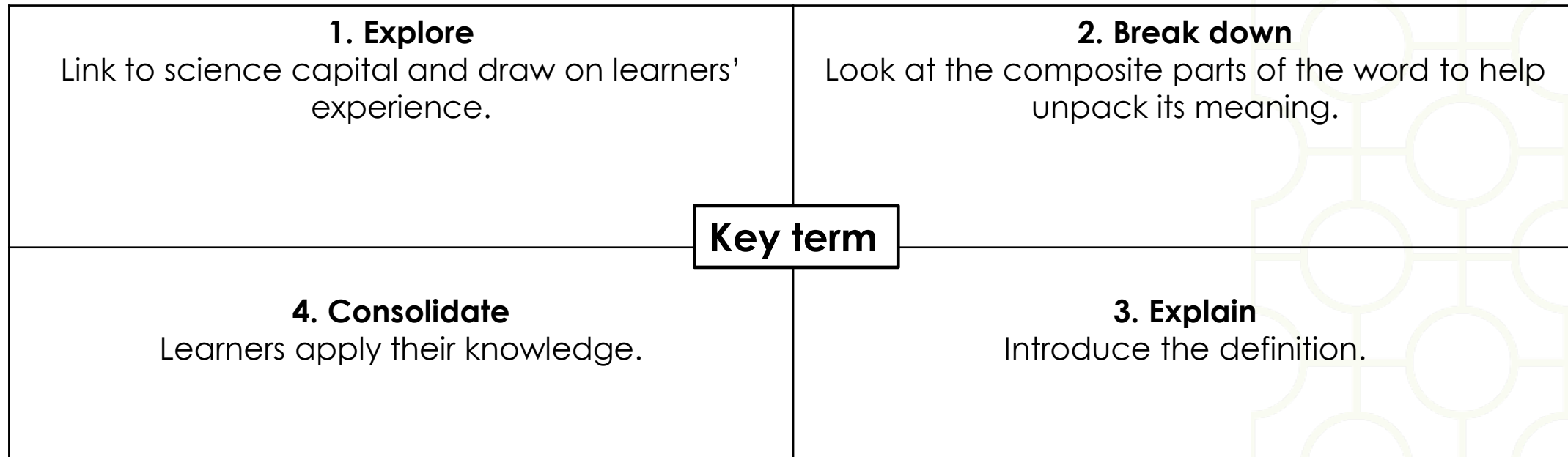
11–14 years 

Elements, compounds and mixtures: Frayer models

How to use Frayer models

Frayer models are a simple but effective way to develop learners' understanding of a new piece of vocabulary. You will see what your learners already know and identify any misconceptions they have.

There are four stages learners can work through, but you can adapt this model to best suit your learners. You can guide learners through all quadrants, but particularly quadrant 2 works best as a teacher-led discussion. Quadrant 3 might also need/benefit from some discussion.



Find more guidance, including tips, adaptations and further reading, in the teacher notes: rsc.li/42AcGmK



1. What does the word 'pure' mean to you? Where have you come across this word before?

In everyday language lots of items are described as pure.

- pure orange juice
- pure air
- pure table salt
- pure honey

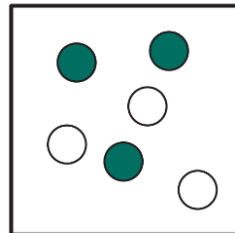
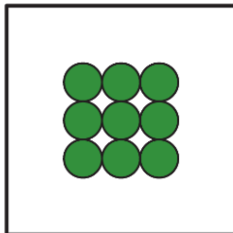
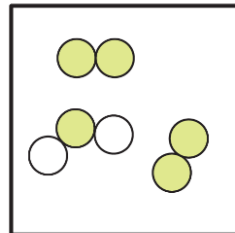
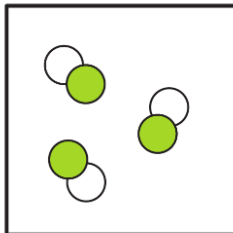
Which do you think a scientist would describe as **pure**?

2. What is the origin of the word 'pure'?

In classical Latin, pūrus means 'clean' or 'unmixed'.

pure substance

4. Which of the particle diagrams represent a pure substance (choose all that apply)?



3. Write down what you think a 'pure substance' is.

Hint: what must be true about all the particles in a substance if it is pure?

Compare what you wrote with the definition (slide 7).



1. What does the word 'aqueous' mean to you?
Where have you come across this word before?

What do all these words have in common?

- **A**queduct
- **A**quatic
- **A**quarium

2. Break down the word 'aqueous'.

aqu-

In classical Latin, aqua means 'water'.

-OUS

If something is dangerous, it is full of danger.

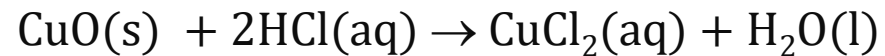
If someone is joyous, they are full of joy.

What does the suffix -ous mean in these words?

aqueous

4. Which substance(s) are 'aqueous' in the chemical reaction shown below.

Hint: look at the state symbols for each substance.



3. What do you think 'aqueous' means?

Put together your understanding of the parts aqua and -ous to form the definition.

Compare what you wrote with the definition (slide 8).



1. What does the word 'condenser' mean to you?

Where have you come across this term or parts of this term before?

Here are some ideas.

- You often see **condensation** on the mirror in the bathroom after a hot shower. What is **condensation**?
- You might **condense** a page of notes into two sentences on a revision card. What are you doing?

2. Break down the word 'condenser'.

con-

Prefix meaning 'with' or 'together'.

-dense-

Liquids are much denser than gases. Why?

-er

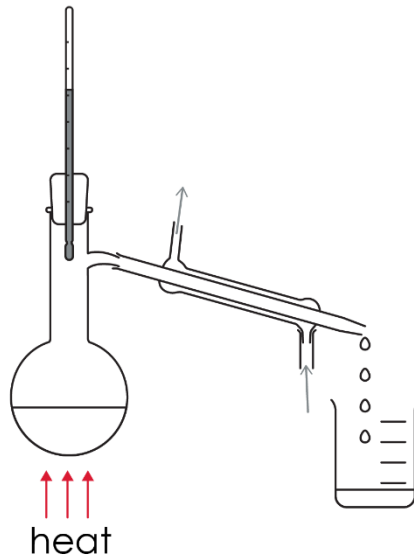
A mixer is an object that mixes things.

A boxer is someone who boxes.

What does the suffix -er mean in all these terms?

condenser

4. The image shows apparatus set up for distillation. Circle the condenser.



3. Write down what you think a 'condenser' does.

Put together your understanding of the parts con-, -dense- and -er to form the definition.

Compare what you wrote with the definition (slide 9).

1. What does the word chromatography mean to you?

Here are some ideas.

- In art, the **chroma** of a colour refers to the purity and depth of the colour.
- This image is mono**chrome**. It contains just a single colour.



2. Break down the word 'chromatography'.

Chroma-
'colour(s)'

-graphy

The choreography of a dance is a description of the steps and movements in the dance.

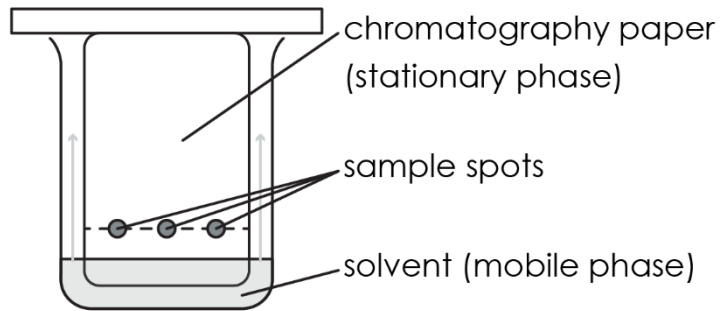
A biography is a description of someone's life.

What does the suffix *-graphy* mean in these words?

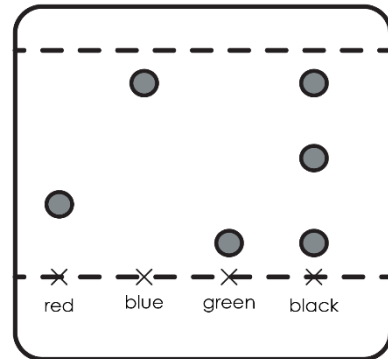
chromatography

4. A student uses chromatography to find the colours in a black ink.

Look at the chromatogram. What colours are in the black ink?



chromatography



chromatogram

3. Write down what you think 'chromatography' means.

Put together your understanding of the parts chroma- and -graphy to form the definition.

Compare what you wrote with the definition (slide 10).

1. What does the word pure mean to you?

Where have you come across this word before?

In everyday language lots of items are described as pure.

- Pure orange juice
 - Pure air
- Pure table salt
- Pure honey

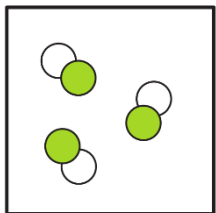
Which do you think a scientist would describe as **pure**?

2. What is the origin of the word pure?

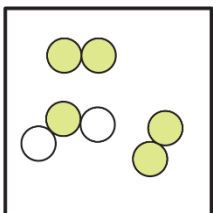
In classical Latin *pūrus* means 'clean' or 'unmixed'.

pure substance

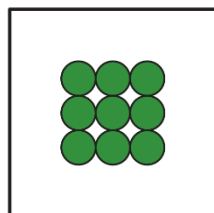
4. Which of the particle diagrams represent a pure substance (choose all that apply)?



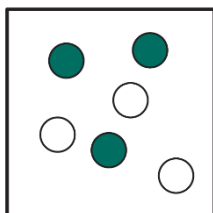
A pure compound



Not pure



A pure element



Not pure

3. Write down what you think the key term means (below is the definition from the key terms list).

A substance that is just one compound or element with nothing else mixed in.

Encourage learners to compare their attempted definition with the definition above.



1. What does the word 'aqueous' mean to you?
Where have you come across this word before?

What do all these words have in common?

- **Aqu**educt
- **Aqu**atic
- **Aqu**arium

2. Break down the word 'aqueous'.

aqua

In classical Latin *aqua* means 'water'

-OUS

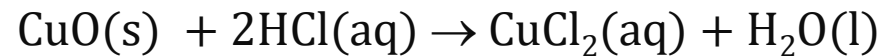
*Borrowed from classical Latin -ōsus meaning
'abounding in, full of, characterised by'*

aqueous

A substance full of water.

aqueous

4. Which substance(s) are 'aqueous' in the chemical reaction shown below.



Aqueous substances in the reaction are:

- *HCl - hydrochloric acid*
- *CuCl₂ - copper chloride*

3. Write down what you think key term means (below is the definition from the key terms list).

When a substance is dissolved in water; shown by the state symbol (aq).

Encourage learners to compare their attempted definition with the definition above.



1. What does the word 'condenser' mean to you?

Where have you come across this term or parts of this term before?

Here are some ideas.

- You often see **condensation** on the mirror in the bathroom after a hot shower. What is condensation?
- You might **condense** a page of notes into two sentences on a revision card. What are you doing?

2. Break down the word 'condenser'.

con-

Prefix meaning 'with' or 'together'

-dense-

A measure of the amount of matter in a set volume. So liquids are denser than gases because in liquids, the particles are closer together.

-er

A person or thing that performs an action.

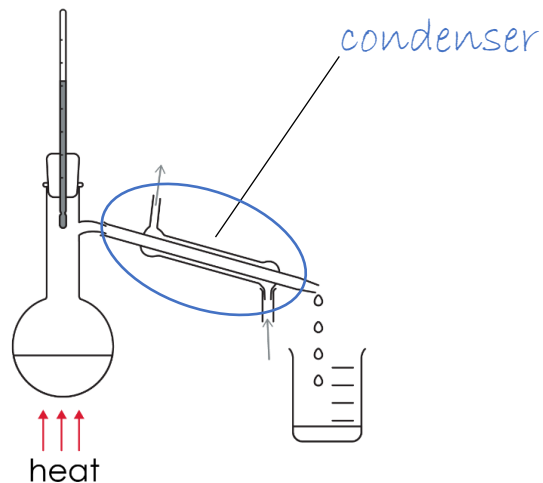
condenser

An object that brings together particles to form something that is more dense.

condenser

4. The image shows apparatus set-up for distillation.

Circle the condenser.



3. Write down what you think key term means (below is the definition from the key terms list).

A glass tube used in distillation to condense a gas into liquid, by surrounding the tube with a continuous flow of cold water.

Encourage learners to compare their attempted definition with this one.

1. What does the word chromatography mean to you?

2. Break down the word 'chromatography'.

chroma-
colour(s)

-graphy

The choreography of a dance is a description of the steps and movements in the dance.

A biography is a description of someone's life.

What does the suffix -graphy mean in these words? *Description*

chromatography

A description of the colours in a mixture.

chromatography

4. A student uses chromatography to find the colours in a black ink.

What colours are in the black ink?

The black ink consists of:

- *blue ink*
- *green ink*
- *an unknown colour.*

3. Write down what you think chromatography means (below is the definition from the key terms list).

A method of separation based on how easily each substance is carried by a liquid that is moving through a porous solid, like paper.

Encourage learners to compare their attempted definition with this one.

1. Explore

Link to science capital and draw on learners' experience.

2. Break down/'what do we know about X?'

Look at composite parts of the word to help unpack its meaning.

Or invite learners to suggest what, as a class, they already know about the key term (with the help of a few bullet points).

**Select your
key term**

3. Explain

Introduce the definition.

4. Consolidate

Learners apply their knowledge.