

11–14 years  

Introducing chemical change: Frayer models

this description of a

Product

made by adding pieces of zinc metal to
a salt called zinc chloride is also made

products

metal

zinc chloride

multiplying
it is a su
a product is so

something

3. Write

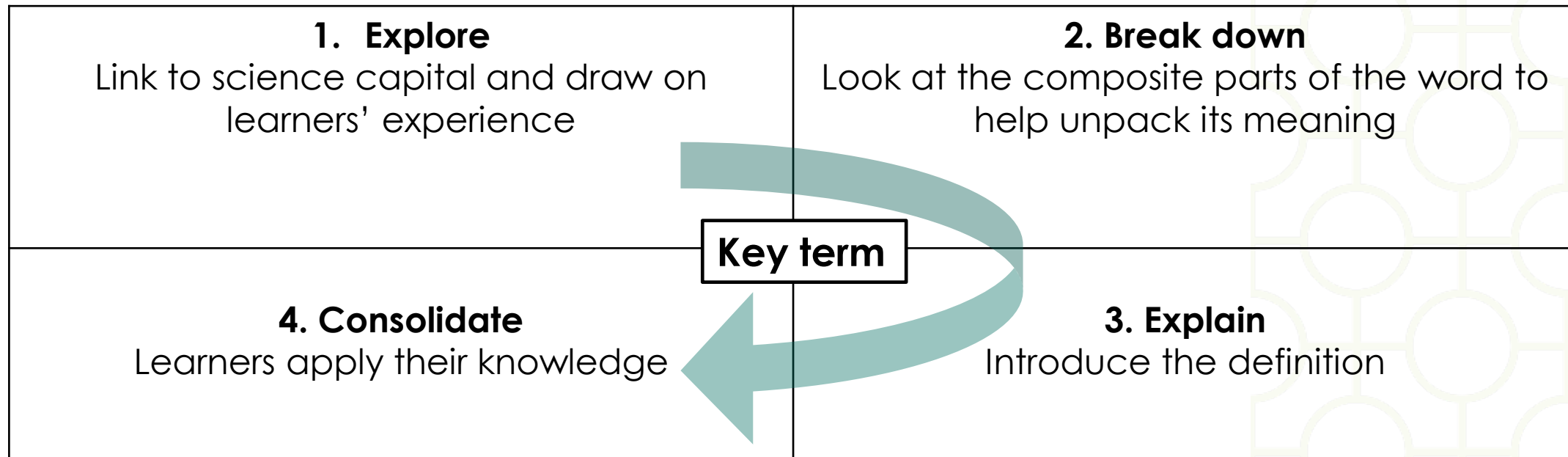
(below

A new subs

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 to 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/3Rej6T9](https://www.rsc.li/3Rej6T9).

1. What do the words 'chemical' and 'reaction' mean to you? Where have you come across these words (or parts of these words) before?

2. What do we know about the terms 'chemical reaction' or 'chemical change'?

Chemical reaction and chemical change are two terms for the same thing, so what do we mean by:

reaction

change

How is a **chemical** change different from a **physical** change?

Chemical reaction/change

4. Circle the statement below that applies to a chemical reaction or chemical change and not to a physical change.

- A** one or more new substances are formed
- B** it may be accompanied by a transfer of energy to or from the surroundings
- C** it involves a change in state
- D** the atoms emit ionising radiation

3. Write down what you think 'chemical reaction' means.

Compare what you wrote with the definition (slide 6).



1. What does the word 'product' mean to you? Where have you come across this word (or parts of this word) before?

2. What do we know about the word 'product'?

It means something different in chemistry than in maths.

A product is something that is produced – what does 'produced' mean?

Product

4. Identify the products from this description of a chemical reaction.

Hydrogen gas can be made by adding pieces of zinc metal to dilute hydrochloric acid. A salt called zinc chloride is also made by this reaction.

Draw a circle around the products.

zinc metal

hydrogen gas

zinc chloride

hydrochloric acid

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

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

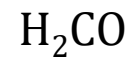
1. What does the term 'chemical formula' mean to you? Where have you come across this phrase (or parts of this phrase) before?

2. What do we know about the term 'chemical formula'?

The word 'formula' has got several slightly different meanings – how does a chemical formula differ from a mathematical formula or a formula like a recipe?

Chemical formula

4. Identify the row in the table that shows the relative number of atoms of each element shown by the chemical formula below.



	Carbon C	Cobalt Co	Hydrogen H	Oxygen O
A	2	0	1	1
B	0	2	1	0
C	1	0	2	1
D	0	1	2	0

3. Write down what you think 'chemical formula' means.

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

1. What do the words 'chemical' and 'reaction' mean to you? Where have you come across these words (or parts of these words) before?

2. What do we know about the terms 'chemical reaction' or 'chemical change'?

Chemical reaction and chemical change are two terms for the same thing, so what do we mean by:

reaction

Something that happens – caused by something else.

change

A process where something becomes different.

The word 'chemical' is used to distinguish this type of change from a physical change.

Chemical reaction/change

4. Circle the statement below that applies to a chemical reaction or chemical change and not to a physical change.

A one or more new substances are formed

B it may be accompanied by a transfer of energy to or from the surroundings

C it involves a change in state

D the atoms emit ionising radiation

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

When one or more new substances are made from other substances.

Encourage learners to compare their attempted definition with this one.

1. What does the word 'product' mean to you? Where have you come across this word (or parts of this word) before?

2. What do we know about the word 'product'?

It means something different in chemistry than in maths ...

In maths a product is what you get by multiplying numbers together. In chemistry it is a substance you get from a reaction.

A product is something that is produced – what does 'produced' mean?

Something that is made by a process.

Product

4. Identify the products from this description of a chemical reaction.

Hydrogen gas can be made by adding pieces of zinc metal to dilute hydrochloric acid. A salt called zinc chloride is also made by this reaction.

Draw a circle around the products.

hydrogen gas

zinc metal

zinc chloride

hydrochloric acid

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

A new substance that is made in a chemical reaction.

Encourage learners to compare their attempted definition with this one.

1. What does the term 'chemical formula' mean to you? Where have you come across this phrase (or parts of this phrase) before?

2. What do we know about the term 'chemical formula'?

The word 'formula' has got several slightly different meanings – how does a chemical formula differ from a mathematical formula or a formula like a recipe?

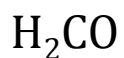
In maths a formula shows us how to calculate something, e.g. $f = m \times a$

A formula is a mixture made for a specific purpose, such as a medicine.

A chemical formula contains symbols for the elements in a substance.

Chemical formula

4. Identify the row in the table that shows the relative number of atoms of each element shown by the chemical formula below.



	Carbon	Cobalt	Hydrogen	Oxygen
	C	Co	H	O
A	2	0	1	1
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3. Write down what you think 'chemical formula' means (below is the definition from the key terms list).

uses chemical symbols to show the relative number of the atoms of each element in a substance.

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).

4. Consolidate

Learners apply their knowledge.

**Select your
key term**

3. Explain

Introduce the definition.