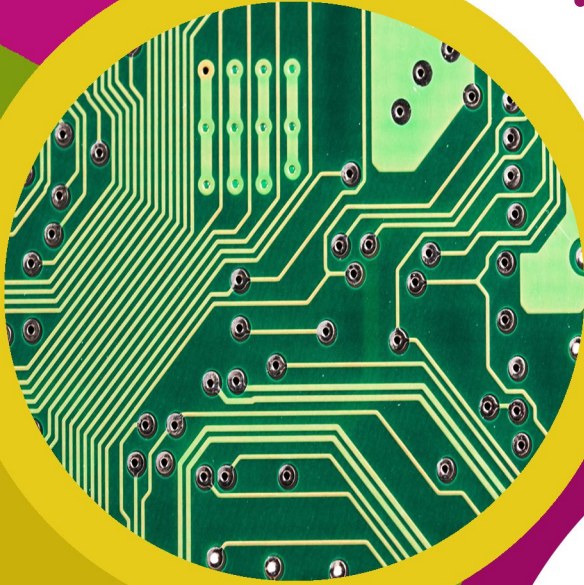
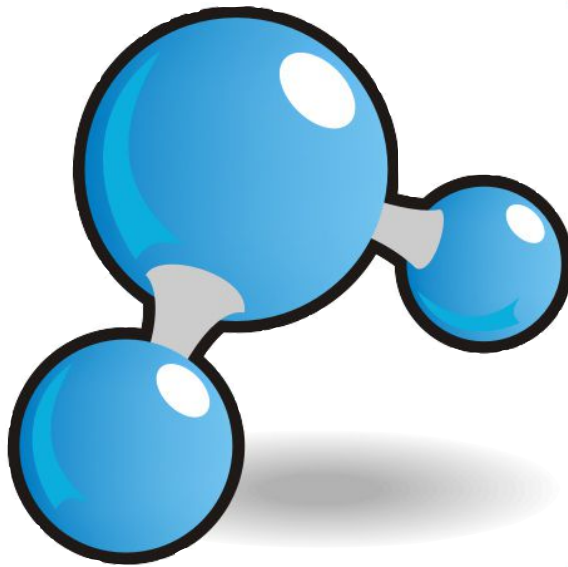


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## Modelling Molecules Workbook



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## Overview

In this workshop, we will be learning about what makes up the world around us, states of matter, how molecules behave and modelling this behaviour using Scratch.

1. Improved understanding of science concepts such as states of matter and chemical reactions.
2. Improved problem-solving abilities.
3. Improved programming skills in Scratch.



## Learning Outcomes

## Attendee Prerequisites

1. Basic experience of programming in Scratch.

## What is Modelling?

In your own words, write down what you think modelling is:

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## Boiling and Melting Points

Draw a State of Matter diagram for **water**:

In which state is **water** at the following temperatures:

1. 70 °C \_\_\_\_\_

2. 121 °C \_\_\_\_\_

3. -20 °C \_\_\_\_\_

## Boiling and Melting Points

Element	Melting Point °C	Boiling Point °C	Element	Melting Point °C	Boiling Point °C
Aluminium	660.25	2519	Manganese	1246	2061
Argon	-189.19	-185.85	Mercury	-38.72	357
Arsenic	817	614	Molybdenum	2617	4639
Barium	729	1897	Nickel	1453	2913
Beryllium	1287	2469	Niobium	2468	4744
Boron	2300	3927	Nitrogen	-209.86	-195.79
Bromine	-7.1	58.8	Osmium	3027	5012
Cadmium	321.18	767	Oxygen	-226.65	-182.95
Calcium	839	1484	Phosphorus	44.1	280
Carbon (diamond)	3550	4827	Plutonium	640	3228
Carbon (graphite)	3675	4027	Potassium	63.35	759
Cesium	28.55	671	Radium	700	1737
Chlorine	-100.84	-34.04	Rhenium	3180	5596
Cobalt	1495	2927	Rubidium	39.64	688
Copper	1084.6	2562	Scandium	1539	2836
Fluorine	219.52	-188.12	Silicon	1410	3265
Francium	27	677	Silver	961	2162
Gallium	29.76	2204	Sodium	98	883
Gold	1064.58	2856	Strontium	769	1382
Helium	-272.20	-268.93	Sulfur	115.36	444.6
Hydrogen	-259.98	-252.87	Tantalum	2996	5458
Iodine	113.5	184.3	Tin	232.06	2602
Iridium	2443	4428	Titanium	1660	3287
Iron	1535	2861	Tungsten	3422	5555
Lead	327.6	1749	Uranium	1132	4131
Lithium	180.7	1342	Zinc	419.73	907
Magnesium	650	1090			

## Boiling and Melting Points

Draw a State of Matter diagram for **mercury**:

In which state is **mercury** at the following temperatures:

1. 70 °C \_\_\_\_\_
2. 121 °C \_\_\_\_\_
3. -20 °C \_\_\_\_\_

## Boiling and Melting Points

Draw a State of Matter diagram for **oxygen**:

In which state is **oxygen** at the following temperatures:

1. -10 °C \_\_\_\_\_
2. -200 °C \_\_\_\_\_
3. -250 °C \_\_\_\_\_

## How Do Atoms Move?

In a Solid:

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In a Liquid:

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In a Gas:

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## What Is a Molecule?

What is a Molecule?

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## True or False

Question	Statement	True or False
1	$5 = 5$	_____
2	$7 \times 3 = 24$	_____
3	$5 > 3$	_____
4	$5 < 3$	_____
5	$0 < 0$	_____

## Atoms, Molecules and Compounds

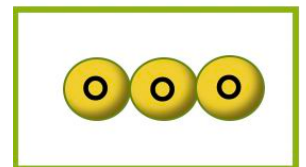
Compound

Consists of two or more different elements and/or compounds.



Mixture

A group of atoms bonded to each other. They can be the same or different types of atoms.



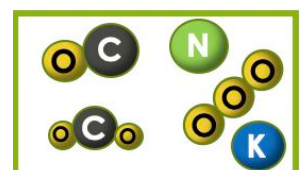
Atom

A molecule of atoms of two or more different elements bonded together.



Molecule

The smallest particle of a chemical element that can exist.

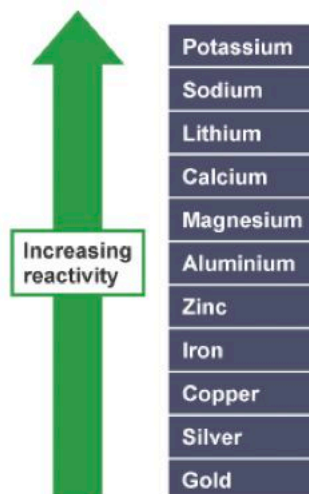
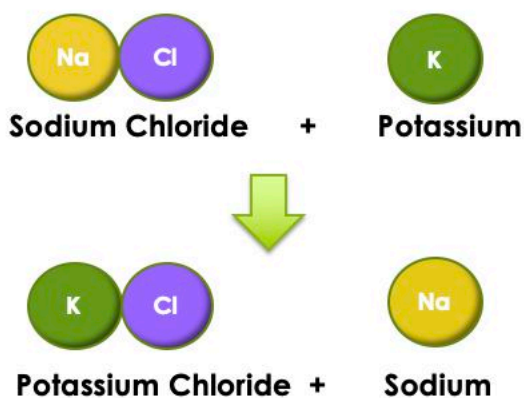




## Reactivity Series

### Reactivity Series

If we took normal table salt, **Sodium Chloride**, and introduced **Potassium** to it:



<https://bam.files.bbci.co.uk/bam/live/content/zb7y4wx/small>

## Complete the Equations

1 Sodium Chloride + Aluminium → \_\_\_\_\_

2 Aluminium Nitrate + Potassium → \_\_\_\_\_

3 Copper Sulphate + Aluminium → \_\_\_\_\_

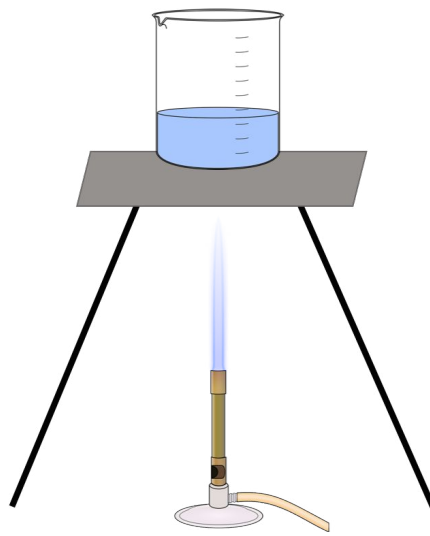
4 Iron Sulphate + Copper → \_\_\_\_\_



## Simulating an Experiment

Try to create a scratch program that simulates the following experiment. Think about the molecules and how they change behaviour as temperature changes.

Are there molecules coming off the flame as it burns?





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