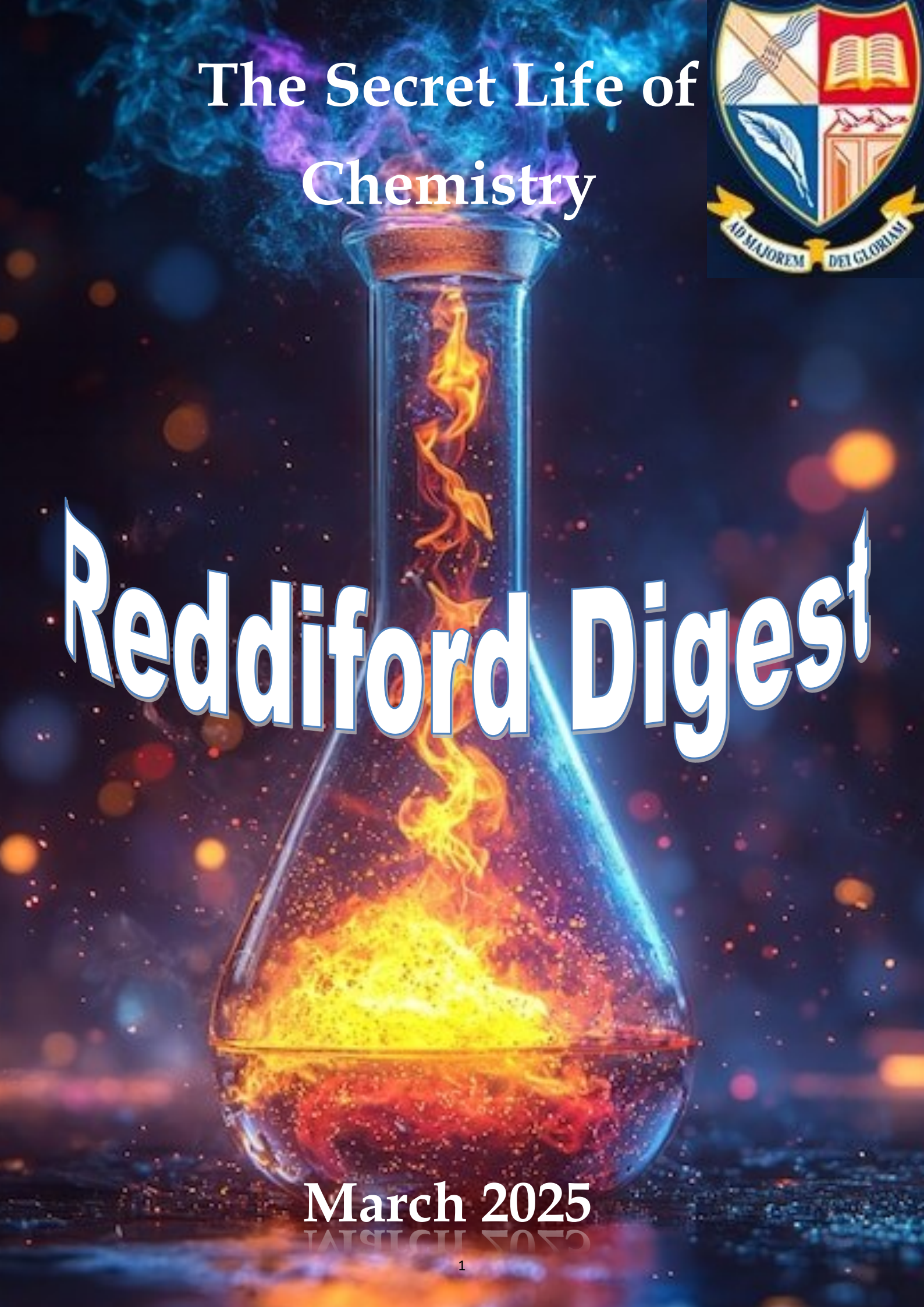
The Secret Life of Chemistry



March 2025

Have you ever wondered what creates a chemical reaction?

Well you will learn all about it in this thrilling magazine! Uncover the secrets of how explosions work, dive deep into how oxygen causes fire and read about lots more wonderful experiments and theories to satisfy your hunger for chemistry.

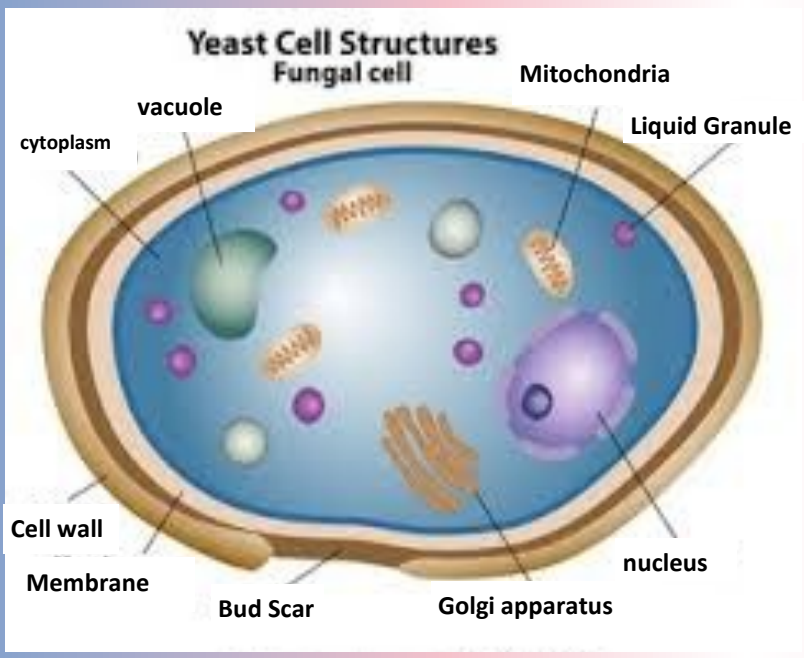
The Sensational World of Yeast

By Harisiyan and Tanaya

Did you know that to make a loaf of bread it requires a chemical reaction?

Read on to discover more…

Yeast is a micro-organism which means it's a tiny living thing. I know right, you eat a living thing. But enough of that, lets look at the biological structure of yeasts (the anatomy of it).



Mitochondria

Mitochondria make most of the energy for the cell and have their own genetic material that is different from the genetic material found in the nucleus.

Nucleus

It is responsible for storing the cell's hereditary material or the DNA. It is responsible for coordinating many of the important cellular activities such as protein synthesis, cell division, growth and a host of other important functions.

Bud Scar

Yeast cells reproduce asexually by an asymmetric division process called budding. In yeast, budding usually occurs during the abundant supply of nutrition. In this process of reproduction, a small bud arises as an outgrowth of the parent body.

Cell Membrane

The cell membrane, also called the plasma membrane, is found in all cells and separates the interior of the cell from the outside environment.

Cell Wall

A cell wall is a structural layer that surrounds some cell types, found immediately outside the cell membrane. It can be tough, flexible, and sometimes rigid. Primarily, it provides the cell with structural support, shape, protection, and functions as a selective barrier.

Cytoplasm

Cytoplasm is the gelatinous liquid that fills the inside of a cell. It is composed of water, salts, and various organic molecules.

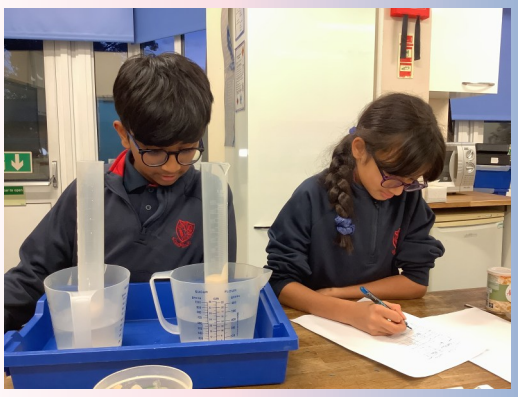
Vacuole

A vacuole is **a membrane-bound cell organelle**. In animal cells, vacuoles are generally small and help sequester waste products. In plant cells, vacuoles help maintain water balance. Sometimes a single vacuole can take up most of the interior space of the plant cell.

Our Equipment:

First we gathered all off our equipment, this included :

- Water
- Kettle water
- Stirring rod
- 5 Table spoons (one for each type of flour)
- 3 teaspoons of yeast (for each flour)
- 1 tablespoon of sugar (for each flour)
- Measuring beakers
- Measuring cylinder
- Cornflour
- Plain flour
- Rice flour
- Potato starch flour
- Oat flour

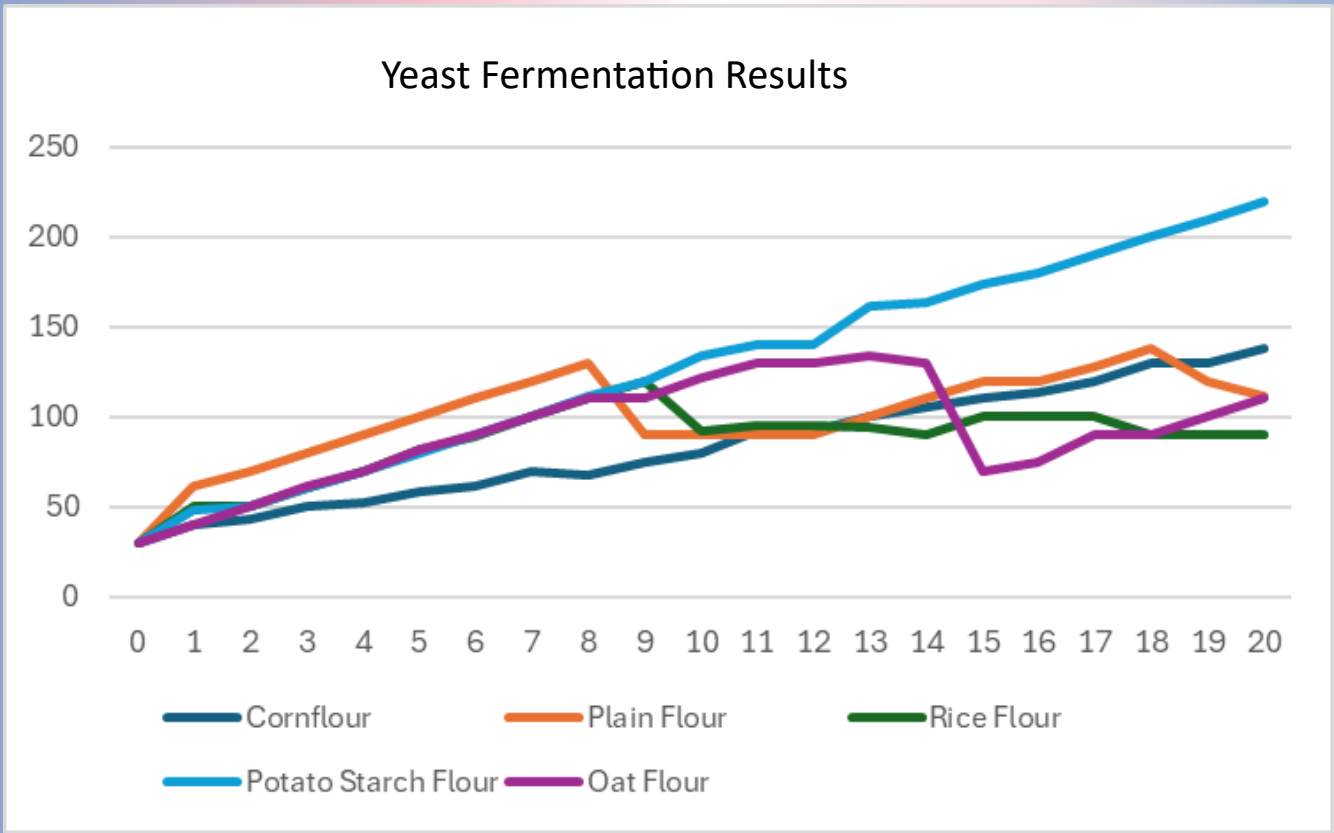


Method:

First we mixed the yeast, sugar and type of flour together in a beaker. Then we filled a cylinder with warm water and using our solid mixture slowly started to pour the water into the mixture to get a yoghurt-like consistency . Lastly we poured the mixture into a measuring cylinder and placed the beaker into a warm water bath for the yeast to ferment, to allow the mixture to rise as carbon dioxide gas bubbles were produced. For each minute afterwards, we recorded the volume of the yeast mixture as it rose in the measuring cylinder.

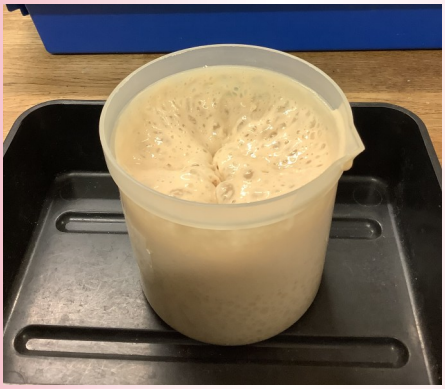
Although this experiment is super exciting and interesting and fun make sure you follow the instructions and always have an adult with you and most importantly have fun!!!

Results



Conclusion

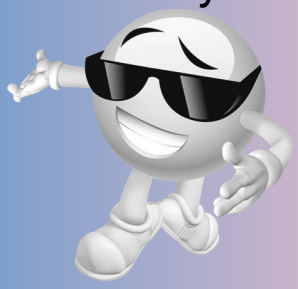
After conducting our experiment we took a look at our results and concluded that the potato starch flour rose the most at 220ml. However, we had two drastic drops as the carbon dioxide bubbles burst. In addition, we discovered whenever someone walked past, moved the measuring cylinder or even made a loud sudden noise, the carbon dioxide bubble burst. The rice flour stood at the lowest amount at the end. Our theory for this is because fermenting yeasts feed on sugars and carbohydrates.

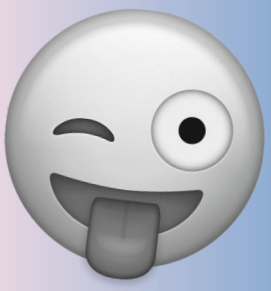


Games

W H M Y M I V C E X B J F S J Q I S
A H W S S Z R A Y S R S F B O K V U
L G I C O H W E P X S T I G R A E E
L U Y F X G A R E K A E B S C A R L
W I C F O S E N A R B M E M C G C C
D M N L T A X B E P C N Q G N I Y U
W Q P O J B I F H D S E V S W G J N
M W X U F I Q R F X E P L G I H S K
M M K R T C H I D E O T R L Q J U L
R F L A F J B K C N V H D B D D T C
N G B R I Q E P T C O P E D B E A E
D K C Q K G B U M W M H S S F N R S
E P A F C I L C T V R M C E S B A B
M T P C E G C O C Z W A U O W F P J
H O C C U L D E G J X Q D M T D P H
B A P T J H L M P P V U A T R I A B
U A M O F L E I K C B F X V Y C M G
W P I D Q M M B H Y A I F U S W J K

apparatus beaker bud
cell cell flour
golgi membrane mitochondria
nucleus scar wall
yeast

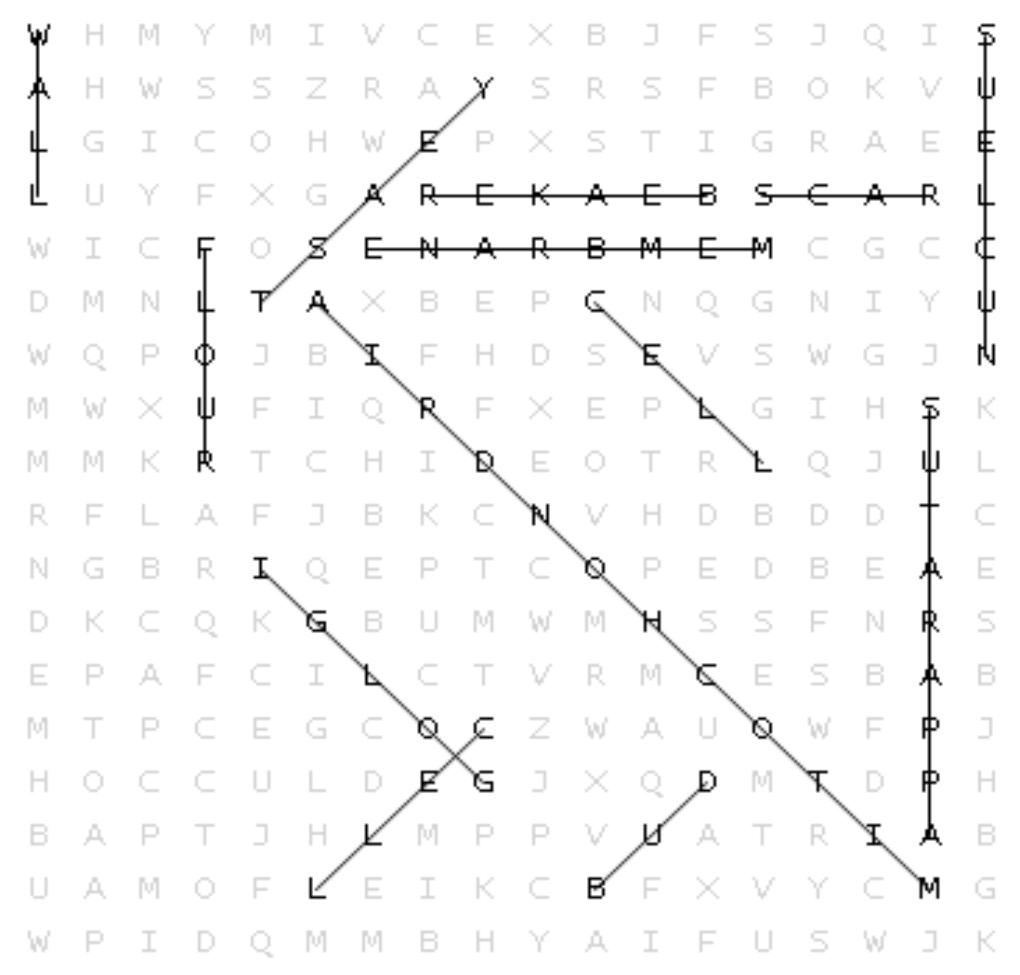




Jokes

- I asked my dough how it was feeling, and it said, “Can’t complain, I’m rising!”
- I thought my bread was done baking… but then I realised it was just bready, set, go!
- Why didn’t the yeast go to the party? He was feeling a little crumby.
- What direction did Mr Bread go? Yeast.

Answers



apparatus
beaker
bud
cell
cell
flour
golgi
membrane
mitochondria
nucleus
scar
wall
yeast

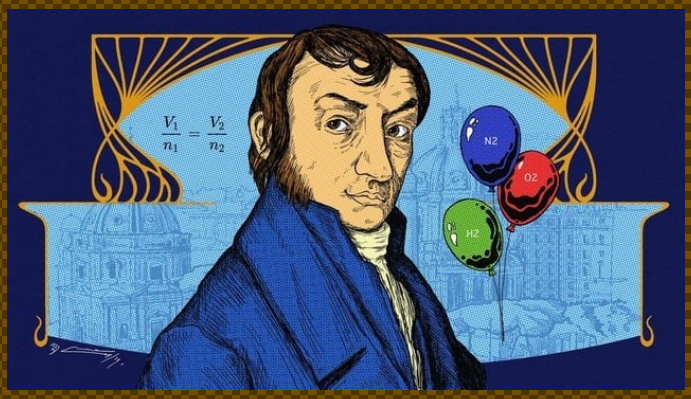
What is a Chemical Reaction?

A chemical reaction is a process in which one or more elements are converted to one or more different substances. In the reaction, the atoms of the starting materials are rearranged, forming new compounds that have different properties.

History of Chemistry

The history of chemistry shows a time from ancient history to the modern era. By 1000 BC, civilisations used technologies that would eventually form the basis of the various types of chemistry. Examples include the discovery of fire, extracting metals from ores, making pottery and glazes, fermenting beer and wine, extracting chemicals from plants for medicine and perfume, rendering fat into soap, making glass, and making metals like bronze.

Famous Chemists



Amedeo Avogadro was an Italian scientist who came up with Avogadro's Law which says that equal volumes of all gases contain the same number of molecules when under the same conditions of pressure and temperature. The Avogadro constant was named after him.

♦

Robert Boyle is often considered the first modern chemist and one of the founders of chemical science. He also pioneered the scientific method. He developed Boyle's Law which states that, under a closed system with constant pressure, the pressure and volume of a gas are inversely proportional. For example, the more children that work on a project the less time it takes to complete the task.

Elephant Toothpaste

If you want to have fun making a tray of toothpaste fit for an elephant then follow the instructions below and make sure you have an adult / guardian with you!!!!

Stay safe by wearing safety goggles, make sure that you have your hair tied up and that you wear safety gloves.

Aim: Does different amounts of yeast effect the amount of elephant toothpaste created?

Equipment:

- A TRAY
- DISH WASHING LIQUID
- A BEAKER/ PLASTIC BOTTLE
- 3 TABLE SPOON WARM WATER
- 1/4 CUP OF HYDROGEN PEROXIDE LIQUID
- 8 DROPS OF FOOD COLOURING
- 1 TABLE SPOON DRY YEAST

METHOD:

1. POUR THE HYDROGEN PEROXIDE INTO THE BEAKER / BOTTLE.
2. ADD THE FOOD COLOURING.
3. ADD THE DISHWASHING LIQUID AND MIX IT.
4. SEPARATELY, MIX THE WARM WATER AND THE DRY YEAST IN A CUP.
5. POUR THE WATER AND YEAST MIXTURE INTO THE BEAKER / BOTTLE AND ENJOY!

THE THEORY BEHIND HOW ELEPHANT TOOTHPASTE WORKS

THE HYDROGEN PEROXIDE IS MADE OF WATER AND OXYGEN, THE YEAST IS A CATALYST, THAT TAKES AWAY THE OXYGEN FROM THE PEROXIDE AND MAKES BUBBLES BECAUSE OF THE DISH SOAP.

What We Did

Prediction

We predicted that different amounts of yeast would have an affect on the different amounts of toothpaste created.

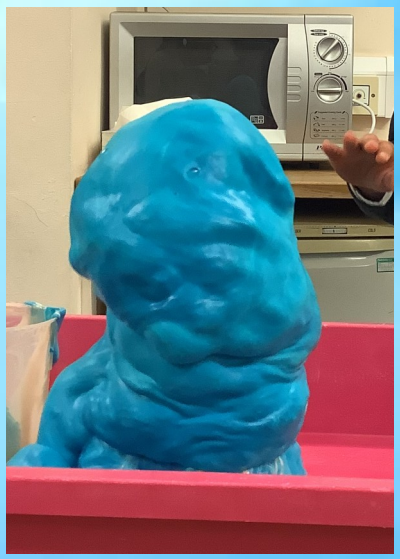
The experiment

First we gathered our equipment then we poured ¼ cup of hydrogen peroxide into the conical flask after that we added a few drops of food colouring and dishwashing liquid and then mixed it together. Next we measured 3 table spoons of warm water and mixed it with 1 table spoon of yeast in a cup. Finally we poured it into the conical flask. Then all the ingredients reacted together and the elephant toothpaste erupted. This chemical reaction also generated heat.

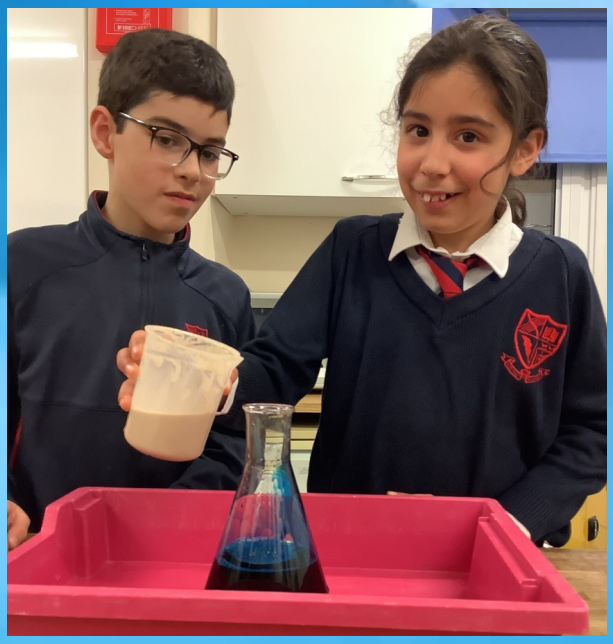
After the experiment we washed up the tray containing the equipment.

Conclusion

We found out that the more yeast we added the more toothpaste was created.



Elephant Toothpaste



Theory of Dishwashing Liquid

- Dishwashing liquid was invented by the German chemist Walter Norman in the 1930s.
- He discovered that a mixture of sulfonated oil and sulfuric acid could effectively clean dishes without damaging them.
- Another scientist, Dennis W. Weatherby, led a team that developed the chemical formula for what is now known as Cascade Dishwashing Detergent.
- The practice of cleaning dishes by hand dates back thousands of years.
- The ancient Egyptians used a paste made of ash and clay while the Greeks and Romans used water and sand for scouring.
- It wasn't until the 17th century in Europe that soap was widely used for cleaning dishes. However, early soap formulas contained harsh ingredients like lye that were harsh on delicate dishware.

Fun Facts about Dishwashing liquid

- The washing up liquid eases out the tension of the water, allowing the bubble to stretch and become bigger, but the sugar/glycerine mix in the water which makes the bubbles stop drying out.

Dish washing liquid is something we use

Everyday!

Games

n	p	h	o	s	p	h	o	r	i	c	h	o	x	p
e	h	v	j	u	d	j	n	f	n	u	d	q	n	H
u	j	k	c	a	m	h	k	a	d	l	e	m	z	n
t	i	t	r	a	t	i	o	n	i	r	p	s	d	u
r	y	u	s	s	r	e	o	z	c	o	u	u	v	m
a	j	g	a	f	t	x	t	l	a	m	q	r	l	b
l	j	f	l	u	x	o	g	x	t	w	g	y	j	e
y	f	v	t	m	o	t	g	i	o	m	u	w	a	r
h	y	d	r	o	c	h	l	o	r	i	c	n	c	b
h	j	u	n	i	v	e	r	s	a	l	p	i	i	a
m	s	u	l	f	u	r	i	c	z	z	o	t	d	s
n	c	h	r	a	m	m	o	n	i	a	j	r	c	e
h	y	d	r	o	x	i	d	e	k	u	n	i	y	b
x	w	j	g	q	h	c	j	x	k	h	p	c	b	y
u	x	r	r	m	p	a	l	k	a	l	i	z	p	d

acid
alkali
ammonia
base
exothermic
hydrochloric
hydroxide
indicator
litmus
neutral
nitric
pH number
phosphoric

HOW TO DRAW AN ERLENMEYER FLASK CUTE AND EASY (click on the link)

By Noya 5B & Waris 5DK

SUPER SPARKLY EXPLOSION

by Aarishan, Vivek and Deyan

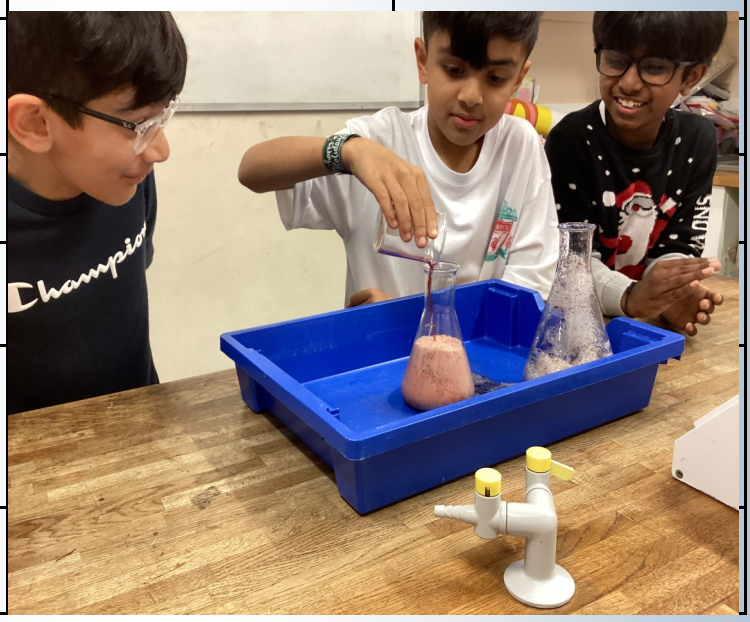
Aim

To discover what happens when baking soda is mixed with vinegar.

Equipment

- Conical flask
- Half cup of white vinegar
- 2 tablespoons of baking soda
- 1 tray
- 2 teaspoons of blue glitter
- 5 drops of red food colouring

Variables

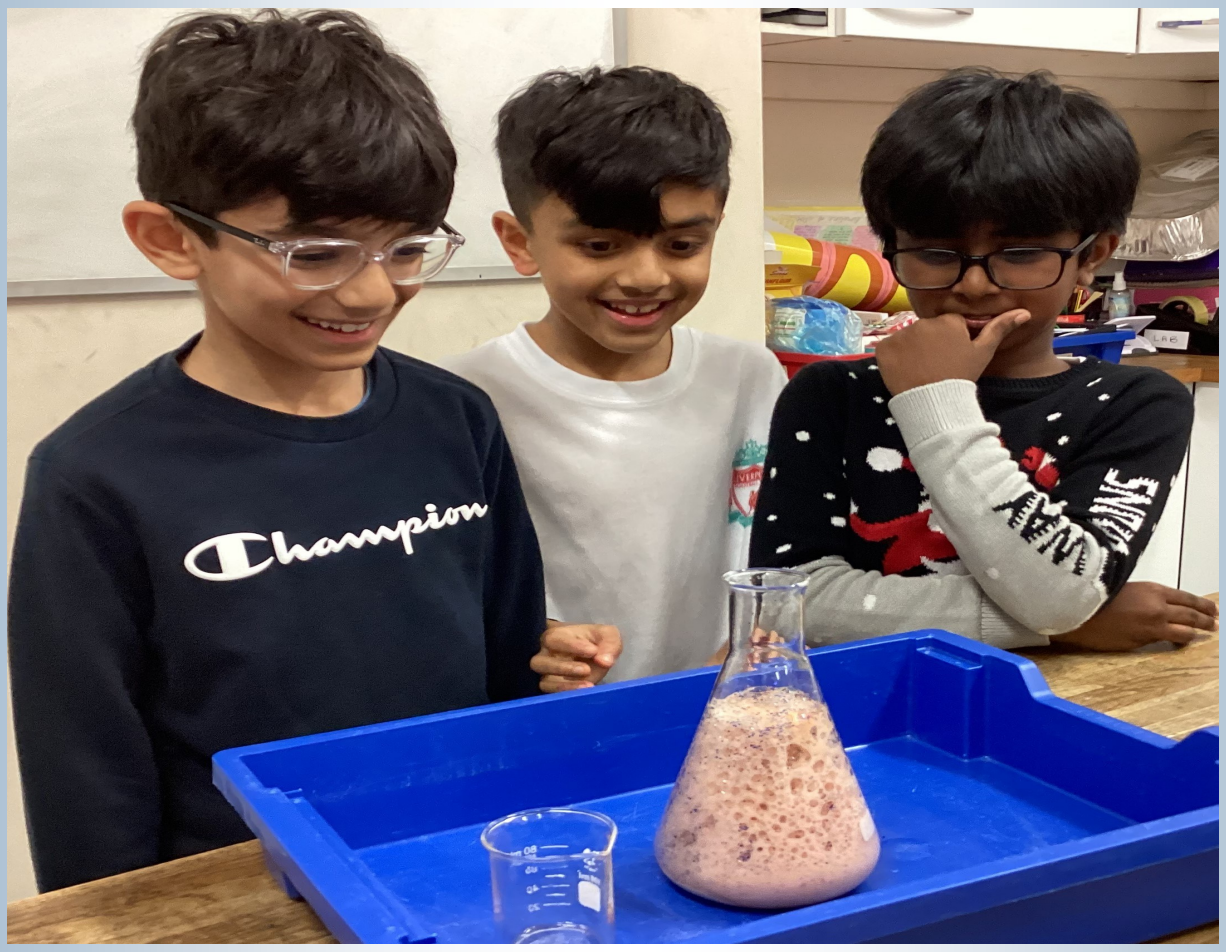
Same	Change	Measure/Observe
The type of soda	The amount of baking soda	We were looking at the amount of froth produced
The type of vinegar		
Colour of glitter		
Amount of vinegar		
The type of baking soda		
Amount of glitter		

Fair Test

The flask, amount of vinegar, tray, glitter and food colouring were all kept the same.

Method

1. Put the amount you choose of baking soda in the conical flask.
2. Place the conical flask on the tray.
3. Add the food colouring and glitter.
4. Pour the vinegar quickly into the conical flask.



Acid Base Reaction

In this experiment the baking soda and the vinegar mixed together causing them to react. When they react they form carbonic acid (carbonic acid is an unstable substance). It breaks apart and becomes water and also carbon dioxide is produced creating all the fizz in this explosion.

The reaction of vinegar and baking soda is called an acid base reaction. The vinegar is the acid and the baking soda is the base.

The reaction between vinegar and baking soda has been known for centuries however it is not easy to say which chemist discovered this chemical reaction. Although, in the 17th and 18th century many scientists contributed to the understanding of chemical reactions.

FUN

s	a	f	e	t	y	l	s	u	q	r	r	t
d	f	h	x	b	l	o	j	c	m	f	e	h
m	h	t	p	f	c	h	e	m	i	c	a	l
m	h	t	l	b	j	m	j	b	o	p	c	t
f	b	n	o	v	q	b	v	g	g	d	s	f
p	n	m	s	s	m	m	l	o	d	u	i	k
t	b	d	i	c	c	o	e	l	b	c	o	h
g	j	n	o	i	x	i	b	n	m	b	n	v
n	n	n	n	e	e	k	e	m	v	l	s	g
b	m	k	j	n	p	n	m	n	b	v	v	s
f	g	l	l	c	c	m	b	f	c	h	g	y
o	i	y	q	u	k	n	u	j	h	e	o	d
v	i	n	e	g	a	r	f	n	u	k	s	y

Chemical Explosion Science Safety Vinegar Reactions

Jokes

“Why didn’t Einstein start a fight?

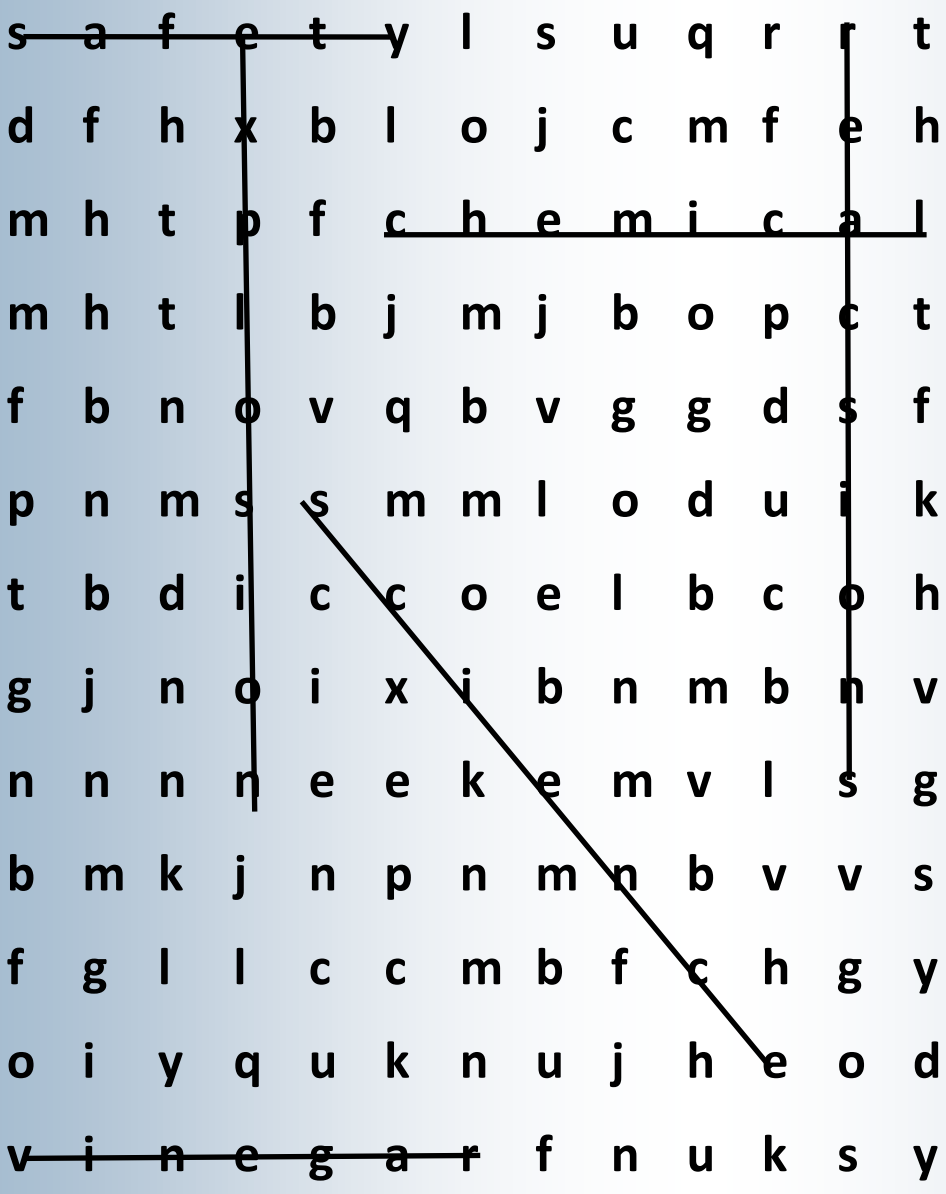
Because he knew that for every action, there’s an equal and opposite reaction!”

Have you heard the one about a chemist who was reading a book about helium?

He just couldn’t put it down.

Why couldn’t Sulphur, Argon, Calcium, and Samarium ever tell it straight? Because of SArCaSm.

ANSWERS



Great Gases

Written By Aarya and Aarav

Gases make up the entirety of our atmosphere. In fact, oxygen, the very gas we need to survive, makes up approximately two thirds of the mass of the human body. The next few paragraphs will discuss different important gases.

Nitrogen - nitrogen makes up approximately 78% of Earth's atmosphere. It has the atomic number 7 and holds the atomic weight of 14. The gas was named nitrogen by French chemist Jean-Antoine-Claude Chaptal in 1790. He discovered that it was part of the chemical compound of what is now known as potassium nitrate.

Oxygen – oxygen makes up 21% of Earth's atmosphere. It has the atomic number 8 and holds the atomic weight of 15.999. Oxygen was discovered in 1772 by Carl Wilhelm Scheele. He did not publish his work and Joseph Priestly, who discovered it in 1774 and did publish his work, is given the most credit. Oxygen is the 3rd most abundant gas in the cosmos.

Argon – argon makes up 0.9% of Earth's atmosphere. It has the atomic number 18 and holds the atomic weight of 39.948. Argon was discovered by Scottish chemist, Sir William Ramsay and English chemist, Lord Rayleigh in 1894. It was discovered as a result of trying to explain why the density of nitrogen extracted from air differed from that obtained by the decomposition of ammonia. Ammonia is an inorganic chemical compound of nitrogen and hydrogen with the formula NH 3.

Carbon Dioxide - carbon dioxide makes up 0.04% of Earth's atmosphere. As it is a compound gas (made of 1 molecule carbon and 2 molecules of oxygen) it does not have an atomic number. It does however have an atomic weight of 44.009. In 1754, the Scottish chemist Joseph Black discovered carbon dioxide . Black noticed that upon heating, calcium carbonate (CaCO3) it produced a gas that was denser than air and could not sustain fire or animal life. This is explains why it is found in some fire extinguishers.

Helium-helium makes up 0.0005% of Earth's atmosphere. It has the atomic number 2 and holds the atomic weight of 4.00. French astronomer Jules Janssen, while travelling in Guntur India, observed a solar eclipse through a prism where he saw a bright yellow light coming from the chromosphere of the sun.

Hydrogen - hydrogen makes up 0.00005% of Earth's atmosphere. It has the atomic number 1 and has the atomic weight of 1.00974. Hydrogen was first identified as a distinct element by British scientist Henry Cavendish after he separated hydrogen gas by reacting zinc metal with hydrochloric acid in 1766.

<u>Those are some of the most prominent or known about gases. Another one is methane. Here are some facts about it:</u>

Europe is the only continent to have reduced their methane emissions.

Economic growth in China drove methane emissions up.

Rice cultivation and livestock are the two main reasons of methane discharge in India and Southeast Asia.

Creating Oxygen

An experiment we did in the Science Lab

What were we trying to achieve?

When we put our extinguished splint in the oxygen-filled jar, the splint re-ignited again.

Don't drink although it looks like drinking water!

What we used:

- 100ml hydrogen peroxide (3%)
- Yeast
- Small glass jar **with lid**
- splints
- Burning candle/some sort of flame
- Safety goggles

Method:

1) We gathered all our equipment.
2) Put on safety goggles for protection against the flame.
3) Poured hydrogen peroxide into the glass jar.
4) Added yeast to the jar and covered it with the lid.
5) As bubbles began to form, we lit a splint and put it out. An adult helped with this part for safety.
6) While it was still glowing, we took off the lid and inserted the splint into the neck of the jar.
7) That's when the exciting bit happened!

How it was a fair experiment:

We kept everything the same except for the amount of yeast we used. This determined how much oxygen was produced to keep the flame alive.

SAFETY MEASURES:

- We wore safety goggles to protect our eyes to stop hydrogen peroxide from getting in them, if it is accidentally sprayed out and for protection against the flame.
- Asked an adult to pour the hydrogen peroxide—as it is very flammable!
- We also had an adult to supervise when using a live flame.

Glowing splint has reignited showing that oxygen has been created:

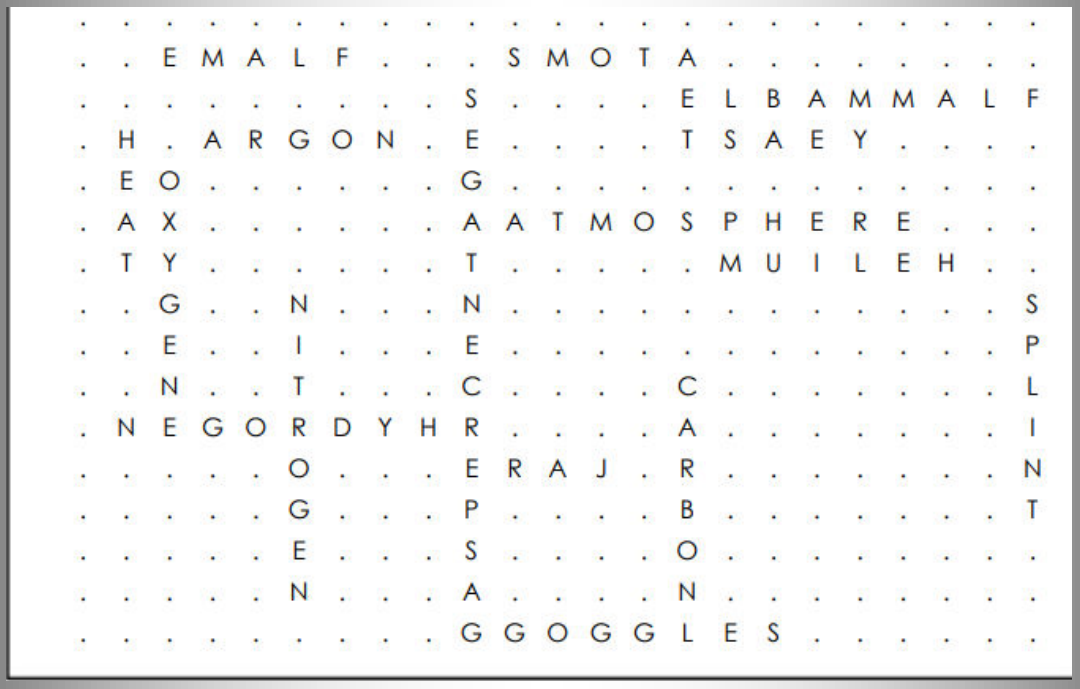
TIME FOR SOME SCIENCE FUN

D	H	V	M	U	I	N	S	J	L	V	T	F	B	P	U	V	Q	Q	Y	R	F	D
Z	G	E	M	A	L	F	B	S	R	S	M	O	T	A	A	E	X	N	X	O	O	N
R	C	O	N	Q	J	X	U	X	S	F	E	A	H	E	L	B	A	M	M	A	L	F
X	H	N	A	R	G	O	N	K	E	D	Y	Q	N	T	S	A	E	Y	M	T	K	Q
W	E	O	H	W	T	J	G	K	G	O	F	U	K	N	I	M	U	J	L	B	B	A
F	A	X	L	W	V	H	G	U	A	A	T	M	O	S	P	H	E	R	E	N	G	Q
W	T	Y	M	R	Y	K	C	P	T	G	T	E	V	O	M	U	I	L	E	H	O	X
A	R	G	S	M	N	K	M	B	N	W	O	D	P	N	L	C	A	E	S	L	C	S
R	A	E	Z	F	I	M	A	F	E	N	N	Y	A	P	M	J	Z	J	M	T	E	P
N	S	N	R	U	T	Q	Y	M	C	B	I	B	Z	C	M	K	J	R	O	Y	L	L
B	N	E	G	O	R	D	Y	H	R	F	B	T	T	A	K	O	R	S	G	H	L	I
I	J	K	Z	K	O	G	V	R	E	R	A	J	M	R	N	U	G	E	B	T	Y	N
Q	U	O	Y	N	G	I	S	Q	P	H	G	L	D	B	R	E	N	A	C	D	E	T
A	W	I	T	X	E	U	M	J	S	A	O	Z	G	O	O	U	C	O	G	C	X	U
K	S	T	E	H	N	H	U	X	A	L	Z	Z	L	N	F	A	Q	K	R	B	G	F
I	J	R	Q	O	M	K	O	B	G	G	O	G	G	L	E	S	C	F	I	U	W	X

Find the following words in the puzzle.
Words are hidden ↑ ↓ → ← and ↘ .

PERCENTAGES
ATMOSPHERE
FLAMMABLE
NITROGEN
HYDROGEN
GOGGLES
SPLINT
OXYGEN
CARBON
HELIUM
YEAST
FLAME
ARGON
ATOMS
HEAT
JAR
GAS

Answers can be found on the next page!



Here are some riddles to solve:

1. You walk into a dark room and there's a candle, kerosene lamp and a gas stove. You have a box of matches. What would you light first?

Answer: The match

2. I'm invisible, yet I'm all around, in the air and spaces I can be found. I have no colour, shape, or form but without me, life would be forlorn. I can be compressed or allowed to spread, depending on the pressure, as scientists have said. What am I?

Answer: A gas.

3.I'm a gas that's colourless and clear but too much of me can cause great fear. Plants need me to grow and thrive, yet my excess makes the planet strive. I'm a product of burning fossil fuels and my impact on the climate is no jewel. What am I, this invisible threat, that's causing global temperatures to emanate?

Answer: Carbon dioxide