

Safety In The Science Lab

Know the **WHMIS** safety symbols and what they mean



Poisonous



Toxic



Corrosive



Compressed Gas



Flammable



Oxidizing



Highly Reactive



Biohazardous

CHEMICAL CHANGE CONTENT CARD SET



Early Ideas About Matter

8000 B.C. Stone Age	Matter made up of solid material, fashioned into tools.	Stone tools
6000-100 B.C. Precious Metals	Chemists investigated properties of materials that were valuable to humans.	'gold and copper'
4500 B.C. Bronze Age	The effect of heat on metals	alloys
1200 B.C. Iron Age	Iron combined with carbon to make steel, for stronger tools.	Steel
350 B.C. Alchemy	Everything was made out of Air – Water – Earth – Fire	'atomos particles'
1500 Democritus	Theory of Matter was based more on experimentation.	Alchemy

Scientific Inquiry

1660 Boyle	Particles can be compressed. Scientific Inquiry	Particle Model
1597 Libau	Chemical preparations and a textbook were written	Textbook
1770 Lavoisier	System for the naming of chemicals was developed.	Molecular Theory
1780	Air is necessary for combustion to occur.	Combustion

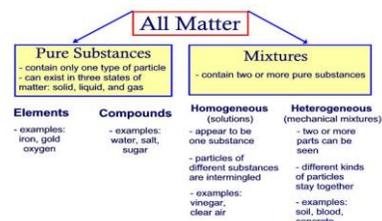
ATOMIC Theory

1808 Dalton	Observation principles during experimentation.	Billiard Ball Model
1897 Thomson	Raisin bun model with charged particles.	Raisin Bun Model
1904 Nagaoka	Negatively charged particles orbiting around nucleus.	Solar System Model
1913 Bohr	Electrons travel in shells around a central nucleus	Atomic Theory
Chadwick	Subatomic particles	Protons, neutrons, electrons
1922 Rutherford	Electrons rotate randomly around the nucleus.	Shell Model

'Quantum Theory' Electrons moving randomly in a cloud around the central nucleus

Classification of Matter

Matter exists in three states: solid, liquid, or gas. Matter undergoes a change in state when energy is gained or lost.



Properties are characteristics that can be used to describe a substance. These properties can be physical or chemical. Matter can change from one form to another, or create new materials. A **physical change** occurs when a material changes state. It is reversible. A **chemical change** occurs when substances react and create a new substance. Evidence that a chemical change occurs includes, but is not limited to the following: Change in color, Change in odor, Formation of a gas, Release or absorption of energy (heat), Difficulty reversing the change (non-reversible).

Elements: Patterns and Order

Finding a pattern and an order in an unknown helps scientists to organize ideas and information. It also helps them to interpret what the information means and explain these ideas, based on what they have learned – developing Theories.

Early chemists used symbols of the sun and the planets to identify the elements. This became a problem, when more elements were discovered than planets. **John Dalton** developed a new set of symbols in the early 1800's to improve communication between chemists. **Berzelius** revised Dalton's symbols by replacing them with letters, instead of pictures and representing each element by their first letter (capitalized), or their first two letters (first one capitalized and the second letter lower case).

Elements were then listed in order of their atomic mass. Atomic mass is the mass of one atom of an element.

It is represented in *atomic mass units* (amu).

John Newland's "law of octaves" identified the pattern by which properties of the elements seemed to repeat at regular intervals, similar to the octave scale in music.

The Modern Periodic Table

Modern Periodic Table
Except – for Grade 9 students

1	1.01	1.01								2	4.00
H	Li	Be								He	
Hydrogen	Lithium	Beryllium								Helium	
3	6.94	9.01	10.81	12.01	14.01	16.00	18.99	19.00	20.18		
Li	Be	B	C	N	O	F	Ne				
Lithium	Beryllium	Boron	Carbon	Nitrogen	Oxygen	Fluorine	Neon				
11	22.99	24.31	26.98	28.09	30.97	32.07	35.45	39.95			
Na	Mg	Al	Si	P	S	Cl	Ar				
Sodium	Magnesium	Aluminum	Silicon	Phosphorus	Sulfur	Chlorine	Argon				

Atomic Number → 16 32.07 ← Atomic Mass
Symbol → Si ← Element Name

Demitri Mendeleev later revised the pattern in 1869 by collecting the 63 elements known at the time and arranging them according to their properties.

By sorting and arranging the elements in this way, he was able to identify gaps - for undiscovered elements. They were later discovered and fit where he said they would.

Periodic Table Groupings

All the elements in a **group** (or column) are called **families**.

Group 1 - Alkali Metals - softer than most metals, good heat conductors and can explode if exposed to water.

Group 2 - Alkaline Earth Metals - extremely reactive, not found freely in nature. Radium is an alkaline earth metal.

Group 3-6-7 - Rare Earth Elements - 30 rare earth elements. Many of them are synthetic or man-made.

Groups 3-12 - Transition Metals - Iron, cobalt and nickel -the only elements known that produce a magnetic field.