2.0 - Student Notes

Tuesday, March 28, 2017 3:03 PM

- brainstorm / discussion

Chapter 2 2.1	WHMIS P. 94-109 BC Science Connections

Vocabulary & Concepts

toxic	corrosive	oxidizing	WHMIS

What is WHMIS?

WHMIS stands for workplace hazardous materials information system

WHMIS includes safety guidelines on how to be safe in a laboratory, and symbols to describe chemicals.

Things to be aware of before entering a laboratory

- exits
- fire alarm
- fire extinguisher
- eye wash station
- fire blanket
- info on chemicals

How you should be dressed while doing a lab

- no contacts
- safety glasses
- closed toe shoes
- no dangly jewelry
- hair tied back
- no baggy clothes

How you should act in a lab

- no horseplay
- follow instruction

How you should work with open flames

- know how to put it out
- no flammables nearby

How you should work with chemicals

- no direct touching/smelling unless teacher says it's ok
- wash skin with soap if contact occurs
- flush eyes if contact

How you should clean up spills

- tell teacher first while someone stays with the spill
- wipe away

What you should do if you break glassware

- tell teacher first while someone stays with it
- sweep glass, wipe with moist paper towel

What will happen if you act irresponsibly

- kicked out of lab, but report still due!
- kicked out of all future labs

- safety jeopardy also an option

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– cut + paste activity
* check student work before giving out glue

Symbol	Symbol Name	What does it mean?
		
		
		
		
		
		
		
		
		
		

these are scrambled, students to cut + match defn. with label and symbol

✂---------- Tear this page out of your notes ----------✂

Cut the following WHMIS symbol names and explanations out to match to the symbols on the previous page. Ask your teacher to check your work before you glue them down!

Environment	This substance might cause you some health effects, or damage the ozone layer.
Corrosion	These gases are kept under high pressure. Avoid bumping into these, otherwise they may explode.
Flame	This substance might explode or is so reactive that it might explode. Keep this material away from other chemicals.
Exclamation mark	This substance might cause you serious health issues. Do not inhale/ingest these materials.
Gas cylinder	This substance easily oxidizes, which means it releases oxygen. Keep this substance away from flames because oxygen make fires more violent.
Health hazard	This substance will harm the aquatic environment. Do not pour it down the sink!
Biohazardous infectious materials	This substance is flammable, or can easily catch on fire. Avoid putting this substance near a heat source.
Exploding bomb	This substance can burn your skin and eat through metal. Avoid touching these substances unless you are wearing gloves.
Skull and crossbones	This substance contains organisms or toxins that cause disease in people and animals. Wear gloves when handling these and do not inhale them!
Flame over circle	This substance can cause death. It is harmful even in small amounts, and even if you are exposed to it for a short amount of time. Do not ingest!

cut for WHMIS activity

Chapter 2 2.2	Classification of Matter P. 110-131 BC Science Connections

Vocabulary & Concepts

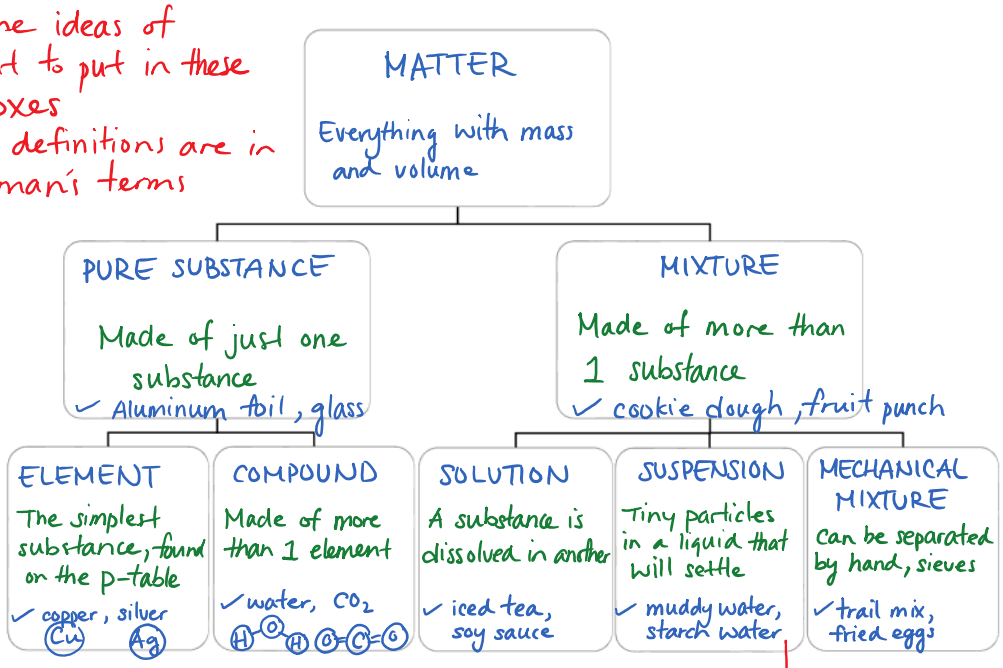
matter	pure	mixture	compound
element	suspension	mechanical mixture	solution
physical property	chemical property	physical change	chemical change

What are "stuffs" and "things" and "substances"?

Anything that has mass and volume is referred to as **matter**. Basically, anything that has a weight and size is considered matter.

There are many types of matter – carbon dioxide, water, silver, milk – so scientists have created a classification system to make sense of it all.

- some ideas of what to put in these boxes
- my definitions are in Layman's terms



* lots of pictures + examples

can do cornstarch demo just to show what non-dissolving is

Describing Matter Using Physical Properties

A **physical property** is something you can observe without changing the matter you are observing into something else.

do we have this?

Melting Point and Boiling Point

the temperature the substance melts or boils

show Coolaid vs. starch

Conductivity

how well electricity moves through it

Solubility

how well something dissolves

show sulfur vs. Mg

Hardness

how resistant something is to scratches

- show Mohs scale

Lustre

reflects light, shiny

- penny press machines

Viscosity

how thick a liquid is, how much it resists flow

Malleability

capable of being beat into a flat sheet

- show sulfur crushed

Ductility

capable of being stretched into a wire

density column

Density

How tightly packed something is

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

Other Physical Properties

- colour
- transparency
- smell

- classification lab
- density lab
- chromatography lab

demos

Describing Matter Using Chemical Properties

A **chemical property** is something you can observe only when the matter is changing into something else.

Demo Time! Watch the demonstration by your teacher and record some observations below. Write down the substances your teacher is using and how they react with to other substances. Listen carefully so you don't miss out!

(2) Reacts with acid

Drop Zn in conc. HCl, capture gas in balloon

- produce gas

(3) Combustible or Flammable

① Light balloon on fire (nothing happens)

② Light balloon from demo A (ball of flame)

~~OR~~

① Light water

② Light alcohol

(1) Inert

Drop paperclip in water

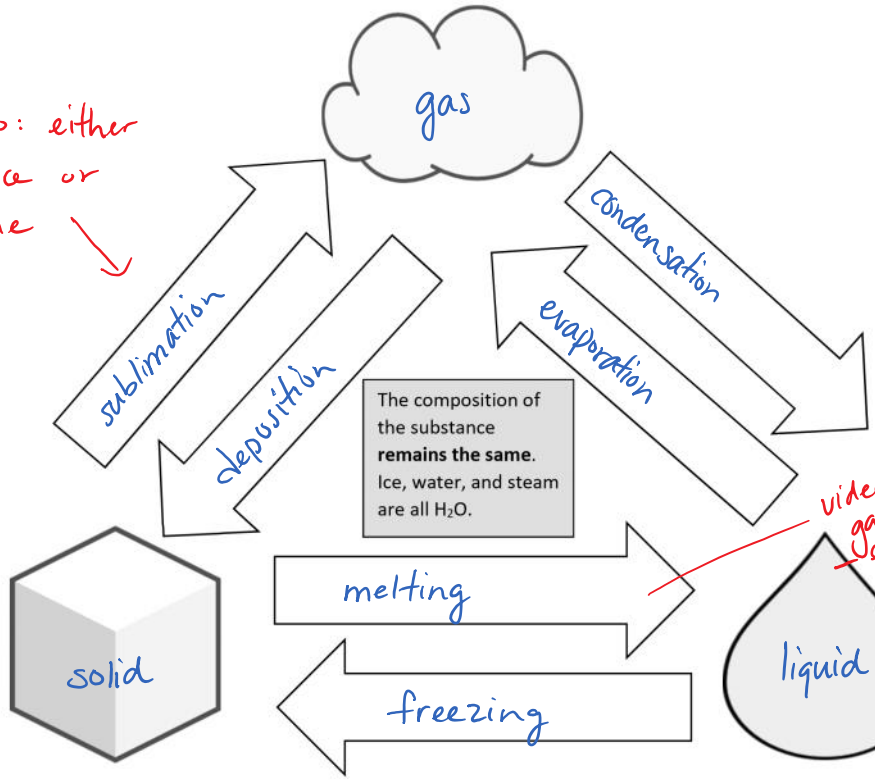
- nothing happens
- non-reactive

(4) Reacts with oxygen

Talk about rust ??

Physical Changes

demo: either dry ice or iodine



video: gallium emphasize melting vs. dissolving

but also a physical change (ask why?)

VERY different

Chemical Changes

The composition of the substance changes, in other words, NEW substances are formed.

NEW properties will be observed!

Brainstorm

How can you tell if a change is a chemical change?

- change in
  - smell
  - colour
  - temperature
  - state

- Physical vs. Chemical change lab

Chapter 2 2.3	Kinetic Molecular Theory P. 132-151 BC Science Connections

Vocabulary & Concepts

state | kinetic molecular theory | compressible | thermal expansion | theory

The States of Matter

some examples to address: marshmallows, sponges, water balloons

	Solid	Liquid	Gas
What it looks like			
What particles are doing	vibrating in place	sliding around	bouncing around
Energy of the particles	low	medium	high
Can it be compressed?	X	X	✓
Volume of the material	fixed	fixed	determined by size of container
Examples	gold	vinegar	carbon dioxide

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The Kinetic Molecular Theory

A **theory** in everyday speech means a guess. A theory in Science is the opposite! A theory is an explanation of a phenomenon based on MANY experiments and observations. The kinetic molecular theory explains the behavior of matter on the atomic scale. It has four main points:

1. All matter is made up of very small particles
2. The particles exist in empty space
3. Particles are constantly moving
4. Energy makes particles move (more energy = faster movement)

- PHet: states of matter
- ball + loop demo

Critical Thinking

The Bird's Nest is a stadium built in Beijing for the 2008 Summer Olympics. The structure is made of many interlocking steel beams and took 5 years to build. When the steel beams were placed, workers could not weld them together right away. Instead, they had to wait for a certain time of day to do the welding. Why do you suppose that is?

To ensure the steel was at the same temp. each time it was welded so the entire frame expands (day) and shrinks (night) at the same rate (otherwise frame breaks apart if certain parts expanded/cooled faster than others).

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Chapter 2 2.4	Atomic Theory P. 152-171 BC Science Connections

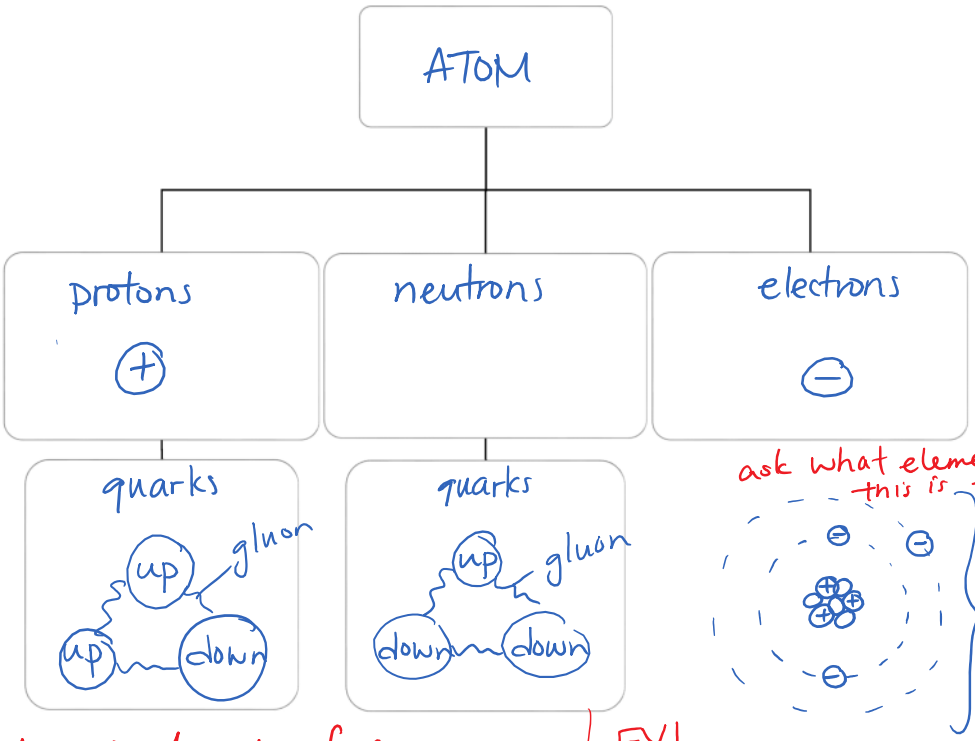
Vocabulary & Concepts

atom	proton	electron	neutron
quark	nucleus	shells	subatomic particle

Atomic Models Through the Ages

Remember that the smallest unit of matter is the atom. It is the smallest particle of an element that retains the properties of that element.

The atom is made of even smaller particles, called the subatomic particles.



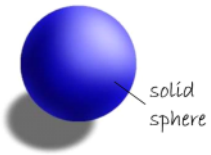
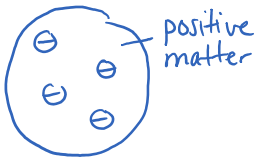
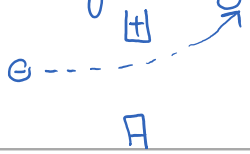
ask what element this is - Li

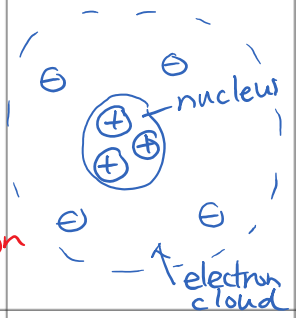
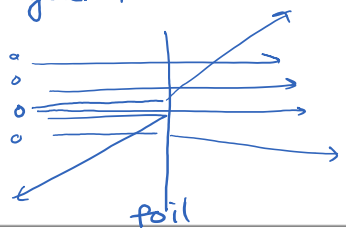
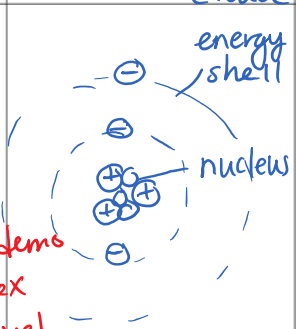
FYI
- p and n made up of even smaller particles called quarks held together by a force called a gluon (like glue)

FYI
- quarks + electrons are called elementary particles because you can't break them down further

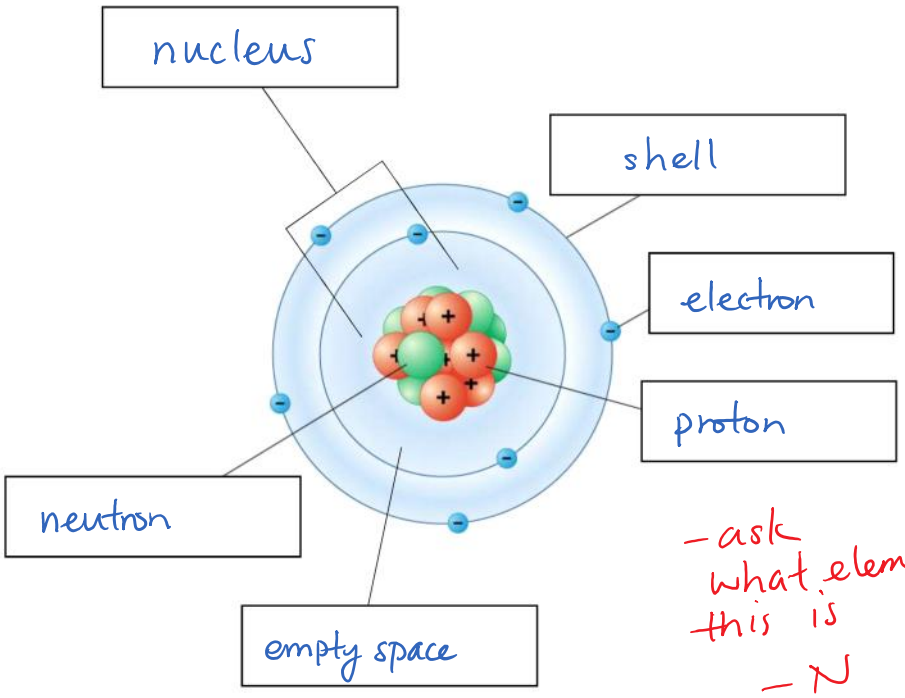
– black box model activity

How do we know what the atom is made of and what it looks like? Read P. 154-160 in BC Science Connections to complete the table below.

Scientist	The Model Draw the model and label it.	The Experiment Describe what lead to the model.	Major Discoveries and Ideas What did this scientist discover about the atom?
Democritus Proposed model 460 BC		– no experiment – just thought about it – used reason and logic	– matter is made of small particles in empty space – Particles are solid, can't be destroyed, invisible – different types of particles have different shapes and sizes – characteristics of the particles determine the properties of matter
John Dalton Proposed model 1800		– many chemical reactions experiments	* all matter made of atoms * atoms can't be destroyed or created – all atoms of one element are the same – can combine atoms to make compounds
J.J. Thomson Proposed model 1897 online simulation or ask Hodal?	"Plum pudding" 	Cathode ray tube – fired electrons through a magnet 	– discovered the atom is made up of even smaller particles – discovered that these particles have charge – discovered electrons

Scientist	The Model Draw the model and label it.	The Experiment Describe what lead to the model.	Major Discoveries and Ideas What did this scientist discover about the atom?
Ernest Rutherford Proposed model 1911 online simulation		Gold foil - shot tiny particles at gold foil 	- particles went through the foil, but some bounced back - there is a nucleus in the middle of the atom - atom is mostly empty space - discovered neutrons
Niels Bohr Proposed model 1912 the lab/demo is too complex for the 8 level, do it in Chem 11		- spectroscopy (experimented with light)	- electrons only occupy certain energy shells, cannot exist in between shells

The Bohr Model



- ask what element this is
- N

SUMMARY

	Protons	Neutrons	Electrons
What is its symbol?	p	n	e
What is its charge?	+1	0	−1
Where is it in the atom?	nucleus	nucleus	shells
Does it determine what element the atom is?	✓	X	X
Is it made of even smaller particles?	✓	✓	X