

Atoms

- An atom is the smallest unit of an element that upholds all of the properties of that element.
- Atoms are made up of subatomic particles called protons, neutrons, and electrons.
- Protons and neutrons are located in the nucleus of an atom and determine the atomic mass of an atom.
- Protons have a positive electrical charge and electrons have a negative electrical charge. Atoms that have the same number of protons and electrons are neutral charged atoms.
- Atomic number of an element tells you the number of protons for that element.
- Electrons are located outside of the nucleus of an atom in the "electron cloud." They are smaller and have less mass than protons and neutrons.
- Neils Bohr is a famous scientist who developed the model of an atom as a build up of successive orbital shells of electrons.
- Electrons located in the outermost shell of the electron cloud are called "valence electrons" and have the highest energy.
- Valence electrons determine the chemical properties of an element, or how it reacts with other elements.

Atoms Vocabulary Concepts- Define the following

Atom- smallest unit of an elementAtomic Mass- comes from nucleus (protons & neutrons)Atomic Number- (APE) Atomic #, Protons, Electrons are same numberElectron Cloud- energy levels Electrons- negative, no mass smallest subatomic particle located on electron cloudProtons- Positive, 1amu mass, located on nucleusNeutrons- Neutral, mass 1amu, located on nucleusNucleus- (protons & neutrons are located. (mass comes from)Valence Electrons- electrons on last shell and they determine reactivity

Atoms Key Concepts- Answer the following

- Atoms are composed of subatomic particles.

1. How are atoms structured?



2. What are the locations, masses, and electrical charges of the subatomic particles?

Protons - + positive, 1amu, located nucleusNeutrons - Neutral, 1amu, located nucleusElectrons - negative, no mass located on electron cloud

10. How does the arrangement of elements on the periodic table allow for the prediction of undiscovered elements and their properties? *By the number of protons*

- Elements are grouped into families on the periodic table.

11. How are groups of elements similar/different?

12. How are periods of elements similar/different?

13. How do groups and periods of elements compare?

(Vertical) Groups determine reactivity, # of valence electrons
(Horizontal) Periods are the number of electron clouds \leftrightarrow
Groups are like families they show reactivity, periods are # of electron clouds

Chemical Formulas, Equations, & Reactions

- During a chemical reaction, the atoms of substances rearrange themselves into a new configuration forming new substances. The reactants (or the energy and atoms or molecules of the original substance) combine to produce products (or the energy, atoms, and molecules of the new substance).
- A compound is the product of a chemical reaction that has different properties than their individual properties.
- A common compound found in living organisms is glucose, $C_6H_{12}O_6$.
- A chemical formula is the combination of all of the elemental symbols found within a substance. The atom numbers of each element are identified by subscripts to the right of the elemental symbol.
- A chemical equation shows the atom numbers and molecules making up the reactants and products of a chemical reaction. A number, or coefficient, in front of the molecule's chemical formula represents the molecule number in each reaction.
- Due to the Law of Conservation Mass, the total atom numbers of each element in a chemical equation is not changed during a chemical reaction; atoms are rearranged to form new compounds.
- The four signs of a chemical reaction are formation of a gas, a production of heat or light, formation of a precipitate or a color change.
- If any of the signs of a chemical reaction are observed, then a chemical change has most likely occurred.
- A chemical equation is balanced when the reactants and products have the same number of each atom on each side in a chemical equation.
- Changes in physical state (color change, breaking, crushing, or cutting) or phase (melting, freezing, boiling) are physical changes. The starting and ending materials of a physical change are the same, even though they may look different.

Chemical Formulas, Equations, & Reactions Vocabulary Concepts- Define the following

Chemical Equation- *shows the atoms elements & atoms making up the reactants & product \rightarrow*

Chemical Formula- *is combination of all of elemental symbols and atoms. H_2O \leftarrow example*

Chemical Reaction- *atoms are being rearrange to form a new substance*

Compound- *C, G, L, I, P*
2 or more different elements

Law of Conservation of Mass-

** Mass cannot be created or destroyed*
** Both parts of equation must be balanced*
Reactant \rightarrow Product
EIA 3 EIA

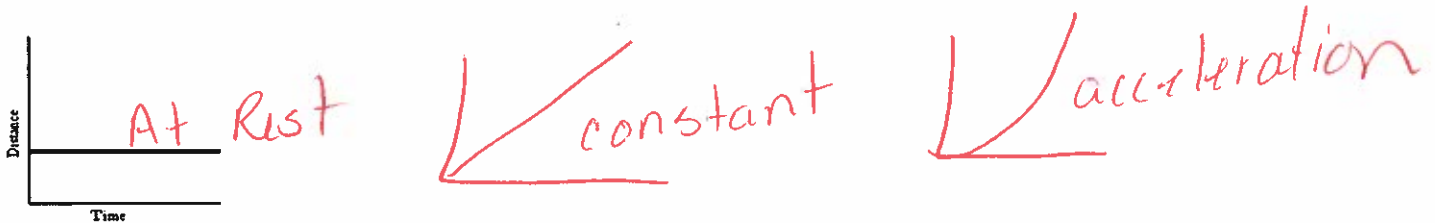
Force and Motion Vocabulary Concepts- Define the following

- Acceleration - change in speed or direction (velocity)
- Gravity - force
- Inertia - tendency of an object to resist change in motion
- Net force - sum of all forces $\leftarrow \rightarrow$ subtract $\rightarrow \rightarrow$ Add
- Newton - unit for force = Force = mass \times acceleration
- Speed - Distance and Time 30mph
- Balanced force- no movement or constant movement
- Unbalanced force - movement
- Velocity - speed and direction 30mph North
- Force - ~~Push~~ Push or a pull

Force and Motion Key Concepts- Answer the following

- Motion can be represented mathematically.

22. How are speed, velocity, and acceleration different? speed - Distance & Time
Velocity = Speed and direction • Acceleration
23. If a car travels 300 miles in 4 hours, what is its average speed?
24. Describe the motion of the object in the following graph.



- Unbalanced forces change an object's motion.

27. What is motion? movement
28. How is force measured? Newtons
29. How do forces affect an object's motion? causes movement
30. How do unbalanced forces affect an object? Give examples.

Causes movement
Car driving brakes, causes groceries to
keep going forward.

- The initial skepticism of earth scientists raised questions that became the starting point for new investigations.
- A freshwater reptile, the Mesosaurus, was found in some rock layers in both South America and Africa, which was evidence that the continents were once connected as a single landmass.
- In the 1960s, scientific discoveries about seafloor spreading, combined with earlier theories of continental drift, led to a theory of plate tectonics.
- The movement of plate tectonics causes several crustal formation including earthquakes, volcanoes, and mountains.
- Scientists use seismographs to help measure the movement of Earth and determine the composition of Earth's interior in order to warn people of potential earthquake danger.
- Scientists do not rely on seismographs because the forces of Earth are unpredictable.
- Volcanoes are formed when an oceanic plate and continental plate converge (Move towards each other)
- Mountains are formed when two continental plates collide towards each other.

Plate Tectonic Vocabulary Concepts- Define the following

Plate tectonic theory-

theory floating plates on top of the asthenosphere

Continental Drift-

continents moving apart.

Convergent Boundary-

→ ← two plates collide

Mountain-

convergent → ←

Seismograph-

instrument used to measure earthquakes

Volcano-

→ ← trench volcano subduction zone
melts

Plate Tectonic Key Concepts-Answer the following

- Many scientists have contributed to the theory of plate tectonics.

45. What is a theory? theory scientific evidence

46. What makes a theory accepted or not accepted? evidence

47. How does historical evidence support the theory of plate tectonics? landform, fossils

- Some crustal features on the land surface and beneath the ocean are caused by plate movement.

48. What are crustal features? landforms

49. How are crustal features related to plate tectonics? They form through convergent

50. How does Newton's law of action and reaction apply to Earth's tectonic activities?
divergent, transform

51. Are there patterns in volcanoes caused by plate movement? Explain.

→ ← subduction zone

63. If an object has the following dimensions (length = 6cm, width = 3cm, and height = 1.5cm) and a mass of 36g, what would be the density?

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

$$\frac{36\text{g}}{27\text{cm}^3}$$

$$6 \times 1.5 \times 3 = 27\text{cm}^3$$

64. In a lab, you need to determine the density of silly putty. You place it in a graduated cylinder that has 25 mL of water in it to start. The water level rises up to 29 mL after the silly putty is added. If the mass of silly putty is 8 grams, calculate the density (using water displacement to find volume).

$$\text{Density} = \frac{\text{mass}}{\text{volume}} \quad \frac{8\text{g}}{4\text{ml}}$$



$$\frac{29}{-25} \\ 4\text{ml}$$

$$\boxed{2\text{g/ml}}$$

65. Label whether each of the following would sink or float in water:
(hint density of water = 1.00 g/mL)

a. Air – 0.0013 g/mL float

b. Corn oil – 0.93 g/mL float

c. Glycerine – 1.26 g/mL sink

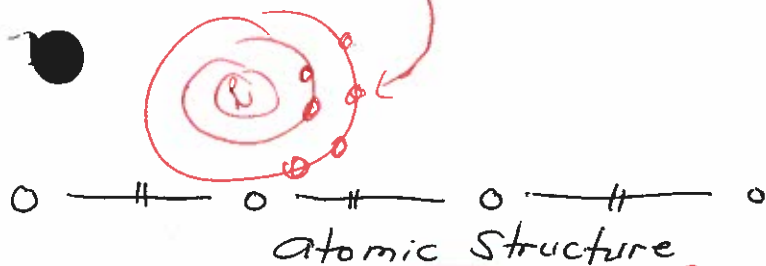
d. Corn syrup – 1.38 g/mL sink

e. Wood – 0.85 g/mL float

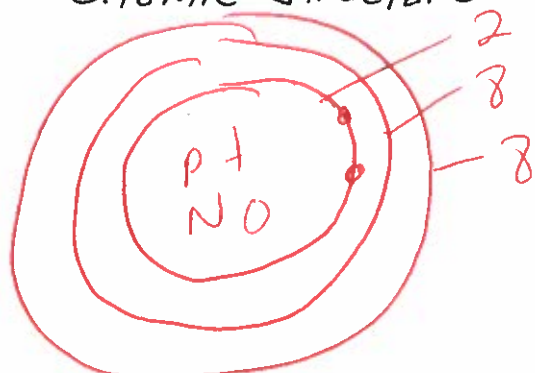
f. Steel – 7.81 g/mL sink

g. Ice – 0.92 g/mL float

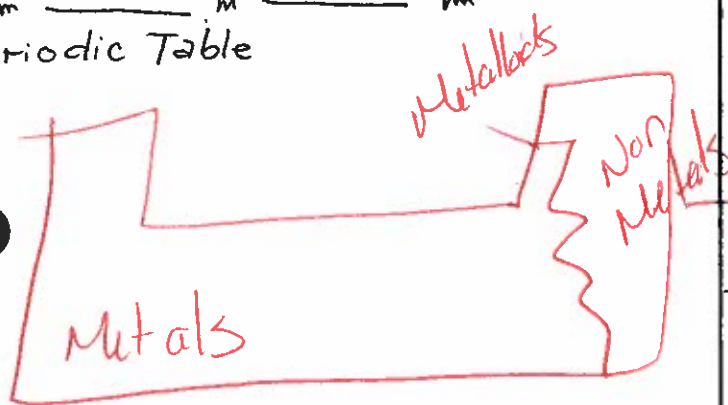
Valence electron found on the outermost shell



Atomic Structure



Periodic Table



Proton (+) mass 1 amu located in nucleus

Neutron - 0 neutral mass 1 amu located in nucleus

electron - negative found on electron cloud w/ no mass

Proton positive / Identity of an element

Group

Vs

Period

of valence electrons
Determining Reactivity
Electron clouds

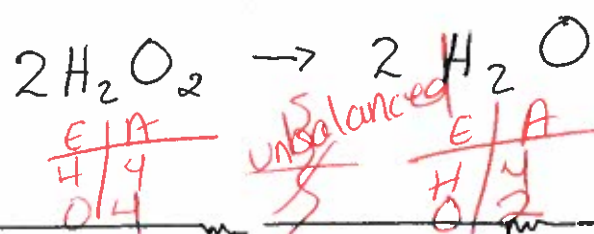
Group 1

Group 18

very reactive
Alkali Metals

3 major classes

- * metals
- * non-metals
- * metalloids



Law of Conservation of Mass



Chemical Reaction

- Cool - Color Change
- Girls - Gas
- Love - Light, Odor
- True - Temperature
- P - none
- Precipitate

Exothermic VS Endothermic
 ↓
 release heat Absorb Heat

Speed = Distance / Time
 30mph

Velocity -
 Speed and Direction
 30mph South

Constant Speed
 ← constant

Friction
 rubbing against 2 objects

Balanced Vs Unbalanced

$\begin{array}{r} 30 \quad 30 \\ \leftarrow \quad \rightarrow \\ \hline 30 \\ 30 \\ \hline 0 \text{ Balanced} \end{array}$	$\begin{array}{r} 45 \quad 45 \\ \rightarrow \quad \rightarrow \\ \hline 45 \\ + 45 \\ \hline 90 \end{array}$
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$\frac{D}{S \times T}$	$\frac{F}{m \times a}$	$\frac{m}{D \times V}$
Speed	acceleration	Density

1st Law
 an object tendency to resist change in motion

2nd Law
 Force = mass x acceleration

3rd Law
 Action - Reaction
 Equal & opposite reaction

Convergent - $\rightarrow \leftarrow$
 Collide • Mountain • subduction
 • Volcano zone

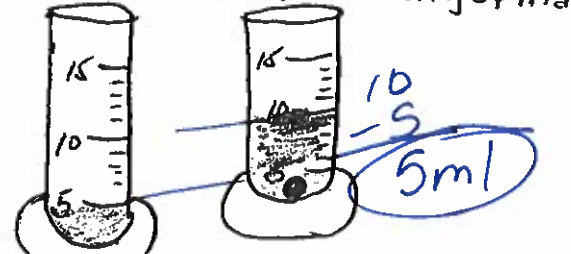
Divergent - $\leftarrow \rightarrow$ • Mid ocean
 Valley, Ridges
 seafloor spreading

Transform - slide strike fault
 • fault
 • earthquake

contour line

 contour interval

Using your own words: how can we solve for density of marble?


 mass is 150 grams $\frac{150}{5}$

