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Midterm Study Guide (answer the questions on a separate sheet of paper)

Chapter 1

What is a physical change?

Physical change = change that does not change the identity of the substance, only changes shape or form;

What is a chemical change?

Chemical change = change that does change the identity of the substance, a new substance is formed

What is the SI unit for mass? Volume? weight? density?

Mass = kilograms (kg)

Volume = centimeter cubed (cm³)

Weight = Newtons (N)

Density = (g/cm³) or (g/mL)

Can a chemical change be reversed?

Only with another chemical reaction. (i.e. removing tarnish from penny with vinegar and salt.)

What is mass? What tool do we use to measure mass?

Mass = amount of matter in an object; triple-beam balance

What is volume? Describe how to find the volume of a rectangular object and an irregular object.

Volume = amount of space an object takes up;

rectangular object = $l \times w \times h$;

irregular object = fill a graduated cylinder/ beaker with water. Record how many mL of water are in the graduated cylinder/ beaker. Place object in the graduated cylinder/ beaker. Record how much the water level rose. The difference between water levels is the object's volume.

What is weight? What tool do we use to measure weight?

Weight = force of gravity pulling down on an object; spring scale

What is chemistry the study of?

Chemistry is the study of matter and how it changes.

What is the formula of density?

$D = m/V$

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What is all matter made up of?

Matter is made up of atoms and molecules. (Matter is anything that has mass and takes up space)

How is matter classified?

Matter can be classified as a mixture or a pure substance

Definition: Elements, substances, mixtures, compounds, molecules

Element = substance that cannot be broken down into any other substances by chemical or physical means

Substance = single kind of matter that is pure and has a specific set of properties

Mixture = two or more substances that are together in the same place but their atoms are not chemically bonded

Compound = substance made up of two or more elements chemically combined in a specific ratio, has to be different elements

Molecule = two or more atoms chemically bonded, can be same or different atoms

What are the two types of mixtures? How are they different from one another?

Heterogeneous = see the different parts; easily separated

Homogeneous = so evenly mixed that you cannot see the different parts; not easily separated

What is matter? *All matter is made up atoms! Matter is anything that has mass and takes up space.

How do we describe matter? (Remember: a characteristic of matter that can be measured or observed is a property of that matter.)

Physical Properties = characteristic of a substance that can be observed without changing it into another substance

Chemical Properties = characteristic of a substance that describes its ability to change into different substances

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Characteristics Properties = physical or chemical property that helps identify and classify substances; they stay the same no matter is the sample you are observing is large or small

Law of conservation of mass = *Just like energy! It cannot be created or destroyed!

What does khdBdcm stand for?

King (kilo)

Henry (hecto)

Died (deka)

By (base unit – grams, meters, liters)

Drinking (deci)

Chocolate (centi)

Milk (milli)

What is the International System of Units? How many countries do not use this system?

- Used for measuring length, volume, mass, temperature, and time, System of units based on the number 10
- Only 3 countries do not use this system

What is a hypothesis?

- A prediction or an educated guess

What is the difference between an independent and dependent variable?

- Independent variable is the variable that is purposely changed in an experiment.
- The dependent variable is the variable that is affected by that change.

How does a scientist begin a scientific investigation?

- By asking a question

What is the purpose of a control group in an experiment?

- The control group is used as a comparison for the experimental group. The control group does not change.

At what temperature does water freeze at? Boil? What is average room temperature?
(All degrees need to be in Celsius!)

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- Freeze @ 0°C
- Boil @ 100°C
- Average room temperature @ 23°C

Practice converting these numbers:

1. 3mm = 0.3 cm
2. 5cm = 0.5 dm
3. 6dm = 0.6 m
4. 8g = 0.8 Dg
5. 6 cl = 0.06 L
6. 7 dl = 0.07 DL

Practice finding the density in these problems.

1. You have a rock with a volume of 15cm³ and a mass of 45 g. What is its density?
Density = 3 g/cm³
2. You decide you want to carry a boulder home from the beach. It is 30 centimeters on each side, and so has a volume of 27,000 cm³. It is made of granite, which has a typical density of 2.8 g/cm³. How much will this boulder weigh?
Mass = 75, 600 grams
3. Mercury metal is poured into a graduated cylinder that holds exactly 22.5 mL. The mercury used to fill the cylinder weighs 306.0 g. From this information, calculate the density of mercury.
Density = 13.6 g/mL

Chapter 2

1. How would you describe a solid?
 - a. State of matter that has a definite shape and a definite volume
 - b. Particles are in a fixed, closely packed arrangement
2. How would you describe a liquid?
 - c. Particles are free to move
 - d. State of matter that has no definite shape but has a definite volume
3. How would you describe a gas?
 - e. As gas particles move, they spread apart, filling all the space available
 - f. State of matter that has no definite shape or volume
4. Explain what happens to the water in a glass when you leave it out for a long time.

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g. Water in the glass gains energy from the ground, the air, or the sun. The added energy enables some of the water molecules on the surface to escape into the air, or evaporate

5. What happens to balloons when you increase their temperature? Decrease their temperature?

h. When you increase the temperature of a balloon, it will get bigger (the volume will increase.) The pressure of the balloon will also increase.

i. When you decrease the temperature of a balloon, the opposite happens. Both volume and pressure decrease.

6. The greater the speed of gas particles in a container, the temperature will (**rise**/ lower).

Therefore, the pressure will (**increase**/ decrease).

Chapter 3

1. Mendeleev organized the periodic table how?

- **By increasing atomic mass**

2. What is the periodic table?

3. What is atomic number? Mass number? Atomic mass?

- **Atomic number - number of protons an atom has**

- **Mass number - number of protons plus number of neutrons in an atom**

- **Atomic mass - average mass of an atom's isotopes**

4. What is an isotope?

- **An atom with the same number of protons but different number of neutrons**

5. From an element's location in the periodic table, you can predict what?

- **You can predict the element's properties.**

6. How is the modern periodic table organized?

- By increasing atomic number

7. What is a group? How many are on the periodic table?

- A group is a column on the periodic table. There are 18 columns. Elements in a group have similar properties.

8. What is a period? How many are on the periodic table?

- A period is a row on the periodic table. There are 7 rows.

9. What are three differences between metals and nonmetals?

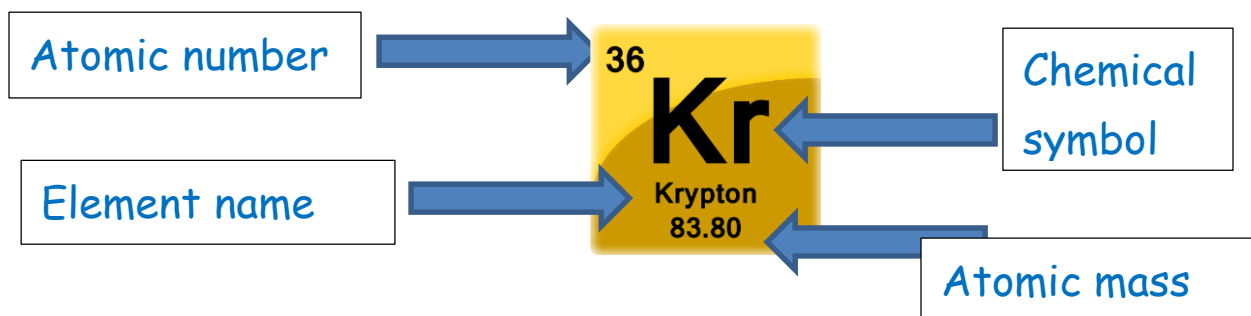
Metals = solid at room temperature, malleable (pound into different shapes), ductile (pull into wires), good conductors of heat and electricity, found on left side of periodic table

Nonmetals = mostly gas at room temperature, brittle, poor conductors of heat and electricity, not malleable or ductile, found in different states of matter, found on right side of periodic table

10. How can an atom be electrically neutral when it contains particles that are charged?

The amount of positively charged particles (protons) equals the amount of negatively charged particles (electrons)

11. Be able to identify the information in a square on the periodic table.



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12. What family of elements would you use in construction? Why wouldn't you use group 1 or group 17?

- Iron is less reactive, not as soft, and malleable, it is also found alone in nature, strong, durable
- Group 1 metals are highly reactive, too soft, and not found alone in nature
- Group 17 nonmetals are mostly gases, which does not make a good construction material

Extra Credit:

1. What is ionic bond? Covalent bond? Chemical bond?

ionic bond = attraction between two oppositely charged ions, bond between a metal and a nonmetal, metals gives its electrons to the nonmetal

covalent bond = chemical bond formed when 2 atoms share electrons

chemical bond = force of attraction that holds two atoms together

2. What is a valence electron?

- electrons that are in the highest energy level of an atom, the outermost shell, these electrons are involved in chemical bonding

3. How can the position of an element tell you its number of valence electrons?

- The elements in the same group (column) have the same number of valence electrons; for example, elements in group 1 have 1 valence electron; elements in group 17 have 7 valence electrons.