

Name: _____

Class: _____

CHEMISTRY UNIT ANTICIPATION

(Chemistry is the study of elements and compounds. It focuses on how these elements and compounds act under varying conditions, and how they combine or separate to form other substances.)

Section 1: In this section describe, using complete sentences, any information you know (or think you know) about Chemistry. (You may describe the structure of the atom, any specific element, or any chemical reaction.)

Section 2: In this section describe, using complete sentences, any personal experience you have had with this topic. (Have you seen a fireplace fire turn colors when specially coated pinecones are tossed into that fire? Have you ever made a volcano? Have you ever made raised bread?)

Section 3: In this section identify one question you have about chemistry.

④

Holt: Chapter 4/Sections 1+2
Outline

Glencoe-Chp 1/Sec 1 Outline ⑤
with

Holt - Chp 5/Sections 1+2
Outline

(6)

Holt: Chp1-Sections 1+2+3
Outline

Holt: Chp2-Sections 1,2,3+4 (7)
Outline

Holt: Chp3-Sections 1,2+3 (7a)

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The Development of Chemistry in History Video and Reading Notes

1. Matter is anything that takes up _____ and has _____.
2. Chemistry is the branch of science that studies the _____ by which matter is converted from one form to another and the _____ that is either _____ or _____ during the process.
3. When was Democritus around? _____
4. What did he theorize? All matter is composed of _____ called _____.
5. Aristotle said that all matter is composed of varying combinations of which 4 "elements"? _____, _____, _____, and _____.
6. The process by which the 4 elements combine is called _____.
7. What did Democritus and Aristotle lack to prove their ideas?

8. What did alchemists try to do to lead and tin?

9. What did alchemists invent to help them?

Note: There are more than 109 known elements. This is an old video.

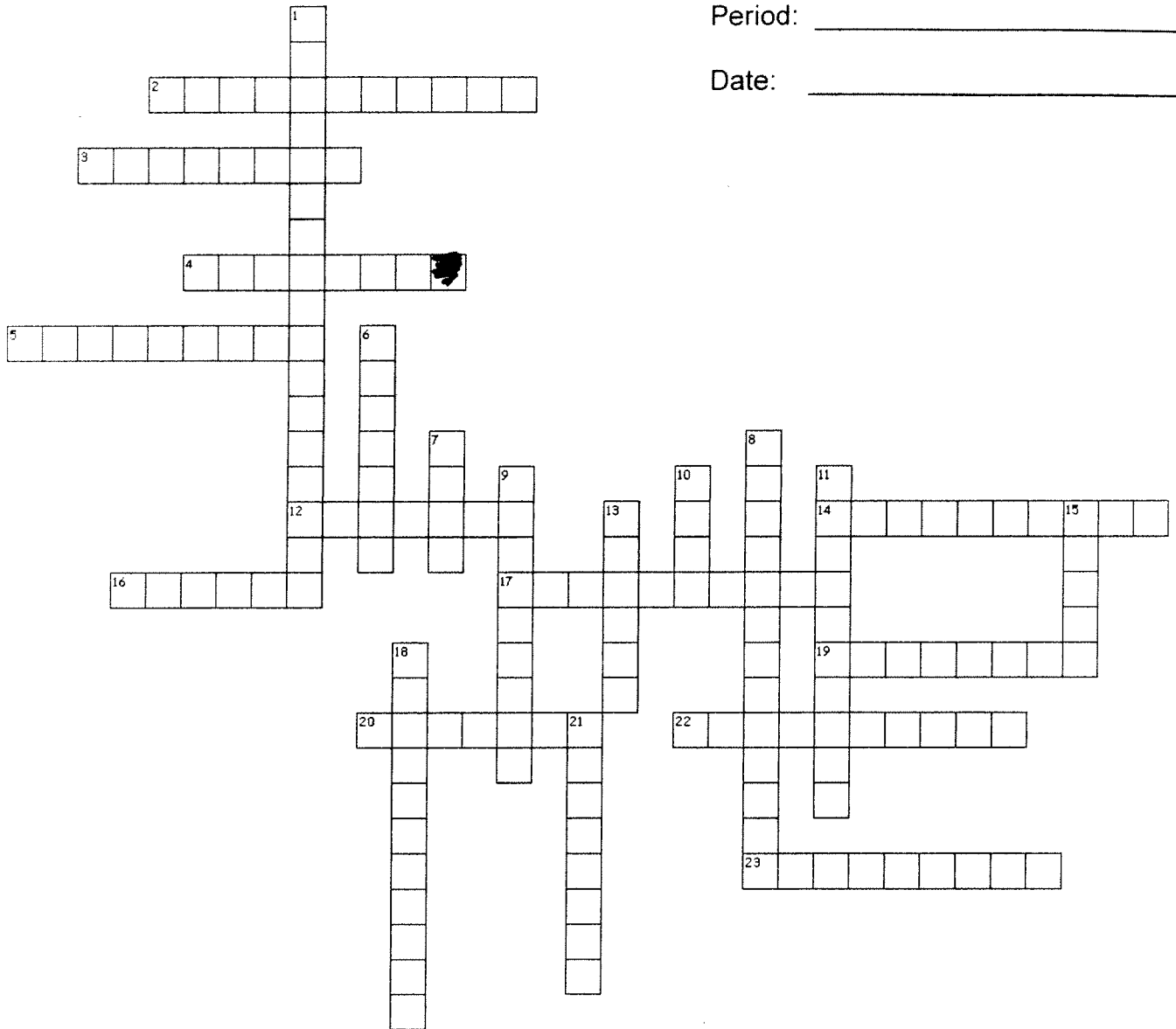
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Development of Atomic Theory

Name: _____

Period: _____

Date: _____



Across

- 2. type of element that produced Rutherford's beam
- 3. one of the two gases that led Dalton to his theories
- 4. discovered the electron
- 5. believed that matter was made of air, water, fire, and earth
- 12. an element with different numbers of neutrons
- 14. describes what atoms are mainly made of (2 words)
- 16. verb that describes what happens when 2 positive charges are close together
- 17. first person to use the word atom to describe matter
- 19. the charge of an electron
- 20. extremely dense, positively charged part of the atom
- 22. medieval scientists
- 23. verb that describes what happened to particles in Rutherford's experiment when shot at the gold target

Down

- 1. describes relationship of how atoms combine with each other (3 words)
- 6. discovered by Chadwick
- 7. the smallest particle into which an element can be divided and still be the same substance
- 8. describes where electrons are likely to be found (2 words)
- 9. developed the Periodic Table of the Elements
- 10. discovered electron levels
- 11. Schrodinger's fellow physicist who added to knowledge of electrons
- 13. one of the 2 particles in the nucleus
- 15. Dalton's theory regarding atoms of the same element
- 18. traditional analogy for Thompson's model of the atom
- 21. Thompson's description of the atom (2 words)

Name:

A-1

Building Atoms



Question: What is an atom?

1

What are the parts of an atom?

When asked to find the total charge for a group of subatomic particles, use the following formula:

$$\text{Number of particles} \times \text{Charge of one particle} = \text{Total charge}$$

a. Place four protons (red marbles) in the center of the board. What is the total charge of the protons?

b. Place five neutrons (blue marbles) in the center of the board with the protons. What is the total charge of the protons plus the neutrons?

c. If you have four electrons (yellow marbles), what is the total charge of these particles?

d. Finish building the atom by adding the four electrons to the outer levels on the board. Now, add the total charges of all the particles in the atom. What is the total charge of the atom you built?

e. Draw a diagram of the beryllium atom in the space below. Include all the parts of the atom. Label your diagram.

ATOMIC STRUCTURE

1. Use the above word bank to fill in the blanks. (Some words may be used more than once, some not at all.)

- a. The central core of an atom is the _____.
- b. A(n) _____ that contains the _____ surrounds the nucleus of an atom
- c. Protons and _____ are found in the nucleus.
- d. The nucleus is positively charged because it contains _____.
- e. The _____ charged nucleus and the _____ charged electron cloud are attracted to each other.
- f. If the positive charge of a nucleus is +7 then the charge to neutralize it is _____.
- g. The special name for the number of protons in the nucleus of an atom is _____.
- h. The number of electrons in the electron cloud is the same as the of _____ in the nucleus in an atom in a neutral atom.
- i. When the positive and negative charges are the same, an atom is considered to be electrically _____.

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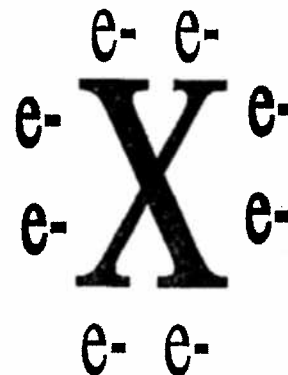
Atomic Structure-Isotopes-Forces Quiz – Period 9

- All neutral atoms have the following subatomic particles. _____
 - protons and neutrons
 - protons and electrons
 - neutrons and electrons
 - protons, neutrons, and electrons
- _____ orbit around the nucleus
 - Protons
 - Electrons
 - Neutrons
 - Atoms
- “Opposites attract and likes repel” is a phrase that can be applied to _____.
 - particles in the atom
 - magnets
 - Both A and B
 - Neither A nor B
- Electrons are attracted to the nucleus because _____.
 - electrons have a positive charge and protons have a negative charge
 - electrons have a positive charge and neutrons have a negative charge
 - electrons have a negative charge and protons have a positive charge
 - electrons have a negative charge and neutrons have a positive charge
- While this forces acts on all objects, it has little affect on atoms.
 - gravitational
 - electromagnetic
 - strong
 - weak
- Protons and neutrons stay together inside the nucleus primarily due to _____.
 - gravitational force
 - electromagnetic force
 - strong force
 - weak force
- Each element is different from every other element due to _____.
 - each element has a different number of neutrons.
 - each element has a different number of protons.
 - each element has a different number of electrons.
 - each element has a different mass.
- An atom that is not neutral is known as a(n) _____.
 - isotope
 - ion
 - element
 - compound
- The atomic mass of an element with 77 electrons, 77 protons, and 114 neutrons is _____.
 - 268
 - 154
 - 191
 - 77
- The number of neutrons is found by subtracting the number of protons from
 - atomic mass
 - atomic number
 - electrons
 - energy levels
- The nucleus of an isotope of zinc, atomic number 30, could have
 - 30 protons and 38 neutrons.
 - 32 protons and 38 neutrons.
 - 30 protons and 38 electrons.
 - 28 protons and 36 neutrons.

Electron Dot Diagrams and Bonding

To draw Electron Dot Diagrams:

1. For any element X, determine the electrons in the valence shell (not including any electrons from transition element area).
2. Draw the electrons around the element symbol so that they are as far apart as possible.
3. Recognize the pattern that Group 1 elements have 1 valence electron, Group 2 elements have 2 valence electrons, Groups 13 through 18 have 3 to 8 valence electrons respectively.



To determine the type of bonding:

1. Create an electron dot diagram for each element in the molecule or compound.
2. Determine whether each element needs to gain, lose, or share electrons in order to have enough electrons to look like a Noble Gas. Remember that looking like a Noble Gas doesn't mean it is one. The protons determine what element something is.
3. If there is a donating of electrons, as with alkali metals and alkaline Earth metals, bonding to halogens, then an ionic bond occurs.
 - 3a. When compounds that have ionic bonds are placed in water they will break apart to form ions, positive ions called cations and negative ions called anions.
4. If there is a sharing of electrons such as with carbon or most nitrogen not knowing exactly what to do, along with hydrogen not wanting to lose its only electron, then there is a covalent bond.
 - 4a. When compounds or molecules that are bonded with covalent bonds are placed in water no ions are produced.

Periodic Table Trends

- **Atomic Number:** This represents the number of protons and electrons in the atom. The atomic number increases sequentially as you move from left to right and makes increasing jumps as you travel down the Periodic Table.
- **Atomic Mass:** This represents the total number of protons, electrons, and neutrons in the atoms. Atomic mass increases both from left to right and from top to bottom. Why?
- **Energy Levels:** For Groups 1, 2, 13-18, there is no general energy level change as you travel from left to right. As you move down the Periodic Table, you change rows and thus increase the energy level. Electrons in energy levels farther away from the nucleus have higher energy.
- **Valence Electrons:** The number of valence electrons increases as you move from left to right. Does the number of valence electrons change as you move down the table?
- **Atomic Radius:** The radius of the atom increases as you increase the number of energy levels because new energy levels are farther away from the nucleus. The radius decreases as you move from left to right in any given row. As you move from left to right the number of protons in the nucleus increases, increasing the positive charge on the nucleus. While it is true that the number of electrons in the electron cloud is also increasing, each electron acts independent of the other electrons. The more positive nucleus pulls on each electron more, thus bringing closer in the overall electron cloud.
- **Desire for electrons and tendency to release electrons:** This trend needs to be taken on an individual basis between 2 elements. Things to consider include: the more tightly held the electron, the less the atom's willingness to give it up; inner energy levels tend to shield outer electrons from seeing the nucleus, thus the electrons are more easily given up; and every atom would like to *look*, from the standpoint of its electron configuration, like a Noble Gas.

Group Names: _____

Total Score: _____ / 34 points

Period: _____

Date: _____

INVESTIGATION OF FAMILY TRAITS

Purpose: This investigation will determine if elements in a family produce a similar reaction.

Background: Elements that are in the same family often have similar properties. Some of those properties can be color, texture, temperature it melts at and how they react with other elements. One type of reaction is the ability to form precipitates. A precipitate is a solid, powdery substance that can fall down, away from the two liquids, when two liquids/substances are combined. Note the change in names when certain anions bond; the -ine from the element name becomes -ide. The cation in these situations does not change its name. In this investigation, you will note both color and consistency change in the precipitate. When in doubt, use the consistency of the precipitate to group the elements.

Materials:

- 1 reaction well plate
- 1 each dropper bottles of silver nitrate (AgNO₃), potassium chloride (KCl), potassium bromide (KBr), potassium iodide (KI), and potassium sulfide (K₂S)

Procedure: Make certain that the lids are properly screwed onto the bottles immediately after using each bottle.

1. In well #1 place 4 drops of silver nitrate.
2. Place 4 drops of potassium chloride in well #5.
3. Place 4 drops of potassium bromide in well #6.
4. Place 4 drops of potassium iodide in well #7.
5. Place 4 drops of potassium sulfide in well #8.
6. Record observations of the appearance of all liquids prior to mixing.
7. Add 4 drops of silver nitrate to well #5. Make sure that you keep the tip of the bottle away from the potassium chloride and that you use free falling drops to avoid contaminating the contents of the silver nitrate bottle.
8. Tap the reaction plate lightly.
9. Observe for a minimum of 2 minutes and record changes in the solution.
10. Repeat Steps 7 to 9 for the remaining wells.
11. **Do each well one at a time!!!**

Chemical Bonding

- When atoms form either a molecule or a compound, electrons are involved in the bond. A molecule is made of 2 or more atom bonded, while a compound is made of 2 or more different atoms bonded. You can have a molecule of a compound but all molecules aren't compounds if they are made with the same atoms.
- The 2 types of bonds we are going to deal with now are ionic and covalent. To determine which type is used you must first draw out the dot diagram for all atoms involved. Plus, also determine how close each atom's diagram is to that of a Noble Gas. From this decide if a particular atom would like to donate, accept, or share electron(s) in order to appear, from an electron configuration only, a Noble Gas. You must use your Periodic Table for this.
 - If the atoms are involved in accepting or donating electrons, then the bond is ionic.
 - If one of the atoms involved needs 3 e- ^{Type or not of} less to fill/complete the Lewis Dot diagram (called a filled octet with all 8 e-) an ionic bond will often be used and the atom will gain (accept) electrons.
 - If an has only 1, 2, or 3 e- in its dot diagram, the atom will often be involved in an ionic bond and will lose (donate) electrons.
 - If the atoms share their electrons, then any bond formed will be covalent.
 - This occurs often, not always, when 4 electrons are in the Lewis Dot diagram.
- In addition, from the dot diagrams one can also tell how many atoms must combine in a given molecule or compound to be stable. Here stable means no longer looking for atoms to bond with.
- Ionic bonds are all polar and produce ions when the compound is placed in water. Ions have a charge resulting from either accepting or donating electrons. To identify the charge on the ion you must determine the number of protons and electrons both before and after bonding. Example: NaCl
- Covalent bonds can be either polar or non-polar, depending on the symmetrical position of electrons in the molecule. For a molecule to be non-polar, the structure must be symmetrical both vertically and horizontally.
Example Non-Polar: CH₄
Example Polar: CH₃Cl (use the paperclip test for symmetry)

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Counting Atoms Worksheet

Use the Periodic Table to complete the following charts.



Type of Atom	# of Atoms
Total	



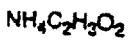
Type of Atom	# of Atoms
Total	



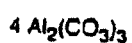
Type of Atom	# of Atoms
Total	



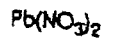
Type of Atom	# of Atoms
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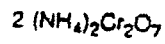
Type of Atom	# of Atoms
Total	



Type of Atom	# of Atoms
Total	



Type of Atom	# of Atoms
Total	



Type of Atom	# of Atoms
Total	

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BILL NYE CHEMICAL REACTIONS

1. Everything is made of _____; chemicals can _____ to make new chemicals.
2. Two examples of chemical reactions include _____ and _____.
3. Reactions occur when the _____, which are in everything, hook together.
4. When Bill ran electricity through water, the water broke into _____ and _____.
5. The column of hydrogen was _____ as high as the column of _____.
6. Describe what happens when electricity is run through steel wool.

7. Describe the difference in the chemical reaction when there is a high concentration of oxygen and electricity is run through steel wool.

8. The bright light is a result of high amounts of _____ being release.
9. Discuss the difference in energy when water is being broken into the two gases and the steel wool is burning.

10. In motorcycle and car engine, gasoline and oxygen combine in small, controlled _____.

11. Fire is a _____.

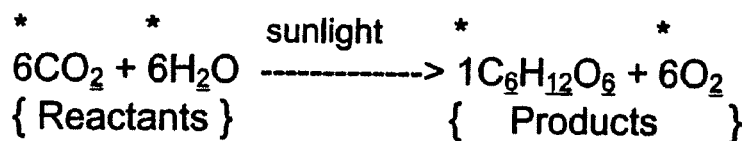
12. When you mix baking soda and vinegar, you get _____.

13. What are two poisons we can't live without? _____ and _____.

Chemical Reactions – Notes

- For a chemical reaction (rxn) to occur there must be a chemical change in the reactants. Think of as an example what occurs when you make up a batch of cookies. You don't eat the cookies until the batter is all mixed and you bake the cookies.
- The reactants are materials used at the beginning of a reaction.
- Products are materials created during the reaction and present at the end of the reaction.
- A chemical equation tells the relative amount of reactants needed, the reaction condition requirements, and the amount of products formed.

Example: Photosynthesis Reaction



- The underlined numbers are the subscripts: These numbers represent the number of atoms in that molecule.
- The asterisks (*) are above numbers called coefficients: These numbers tell how many of that molecule or atom is required in the reaction.

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Date _____

BALANCING EQUATIONS

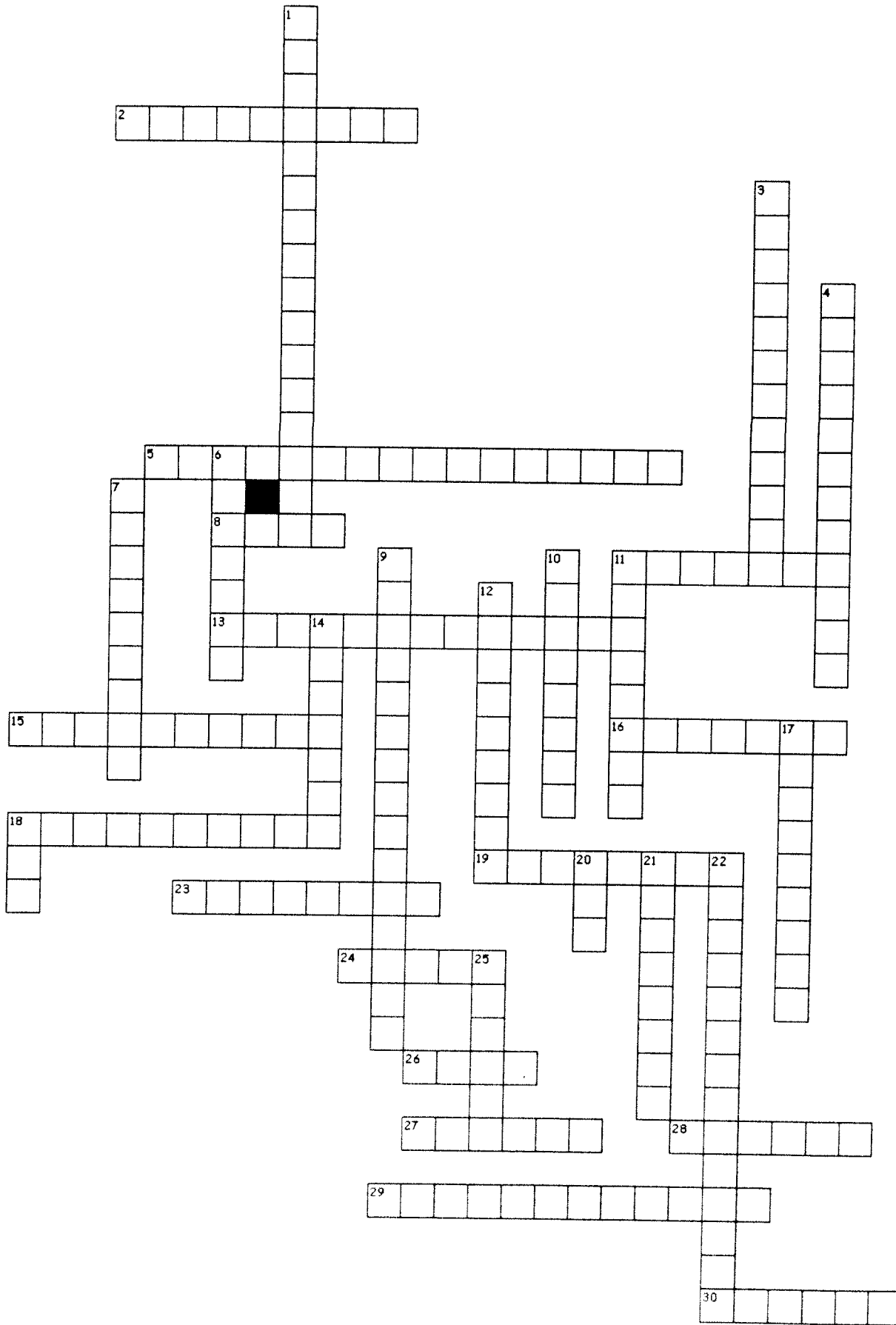
BALANCE EACH OF THESE EQUATIONS: If balanced, write balanced next to it.

1. $Zn + HCl \rightarrow ZnCl_2 + H_2$
2. $NaHCO_3 \rightarrow Na_2CO_3 + CO_2 + H_2O$
3. $Pb + H_3PO_4 \rightarrow Pb_3(PO_4)_2 + H_2$
4. $BaCl_2 + Na_2SO_4 \rightarrow BaSO_4 + NaCl$
5. $Cl_2 + KBr \rightarrow KCl + Br_2$
6. $Pb(OH)_2 \rightarrow PbO + H_2O$
7. $PbCl_2 + Li_2SO_4 \rightarrow LiCl + PbSO_4$
8. $NH_3 + HCl \rightarrow NH_4Cl$
9. $CdCO_3 \rightarrow CdO + CO_2$
10. $Al + HCl \rightarrow AlCl_3 + H_2$
11. $Cu + Cl_2 \rightarrow CuCl_2$
12. $O_2 + Sb_2S_3 \rightarrow Sb_2O_4 + SO_2$
13. $RbBr + AgCl \rightarrow AgBr + RbCl$
14. $CuO + H_2 \rightarrow Cu + H_2O$

See other side for more equations

Name: _____ Class Period: _____ Date: _____

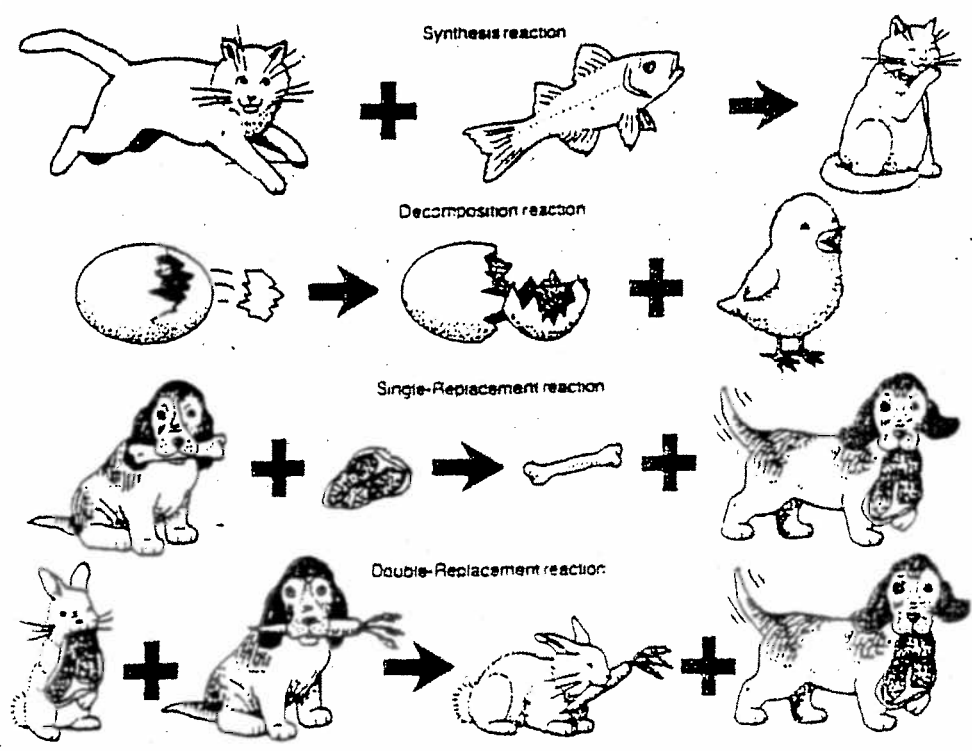
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4 Types of Reactions Synthesis, Decomposition, Single Replacement and Double Replacement

The following packet identifies the 4 different types of reactions. The picture below illustrates the essential components of these reactions. In the synthesis reaction, two reactants combine to make one product. In the decomposition reaction, one reactant (with many parts) breaks up into multiple parts. In the replacement reaction, parts of the reactants change places with each other. In the single replacement reaction, an element changes places with a different element in another reactant compound. In a double replacement reaction, parts of different reactant compounds change partners.



Rates of Reaction

How is it defined?

Defined as how fast or slow a reaction occurs. It is a measure of how much product is made in how much time.

Analogy: How many baskets can you shoot and make in 20 minutes?

What variables control this value?

Now, let's compare a chemical reaction. What are some of the reaction conditions or factors and their effect on the rate of the reaction?

- 1. Concentration:** This factor controls how much of each of the reactant is present in the reaction container. The more reactants are present, the more likely the chemicals will come in contact with each other and react to produce the product(s). ***Thus, as concentration increases, the rate of the reaction increases.***
- 2. Temperature:** This factor controls how energetic the atoms or molecules are. In other words, as the temperature of a reaction increases, the reactants move faster in the container. The faster they move, the more likely they will come in contact with each other and react to produce the product. ***Thus, as temperature increases, the rate of the reaction increases.***
- 3. Pressure:** This term most often applies to reactions with gases. Imagine you have 2 reactants, both gases, in a container. Considering these are gases, in all parts of the container you will find portions of each gas. As you increase the pressure in the container, you force (push) the gas molecules closer together. The closer they are, the more likely they will react. ***Thus, as the pressure increases, the rate of reaction increases.***

GROUP NAMES: _____

PERIOD: _____

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CHEMISTRY IN-THE-BAG

Endothermic in the Bag Investigation

Background: When ammonium chloride (NH_4Cl) dissolves in a small amount of water, the process absorbs heat from the surroundings and causes the temperature of the system (the water and ammonium chloride mixture) to decrease. This overall decrease in temperature is the definition of an endothermic process. In an endothermic process, heat energy is on the reactant side of the equation and is required for the process to proceed.

For ionic compounds three different processes are occurring. First, energy is required to break apart the crystal lattice of the ionic compound. In the next step, energy is required to move the water molecules apart in order to allow the ions to enter the solution. Finally, energy is released when the ions are fully in solution.

Materials:

- 1 Ziploc freezer bag
- Ammonium chloride
- Squeeze bottle full of water
- 50 ml graduated cylinder
- Thermometer, $^{\circ}\text{C}$
- Weigh boat
- Triple beam balance

Procedure:

1. Add 30 mL water to the freezer bag and record the temperature. _____ $^{\circ}\text{C}$
2. Add 20 gm of ammonium chloride to the bag.
3. Seal the bag. (Remove as much air from the bag before sealing.)
4. Knead (pushing the solid around with the liquid) the mixture to mix the ammonium chloride and water.
5. Wrap the bag around the thermometer after 15 seconds and record the temperature. _____ $^{\circ}\text{C}$
6. For your group's assigned option repeat the above procedure now systematically changing specific portion(s) of the procedure to see which part of the process most influences the change in temperature. You must write down the specific change you made. Be sure to also record the temperature of the bag once you have made the change
 - What happens if more ammonium chloride is added? (What amount of NH_4Cl did you use?)

Let There Be Light

Purpose: To investigate the property of flammability of oxygen gas and carbon dioxide gas.

Background: Since these gases may be flammable, caution must be taken to prevent an open fire.

Hypothesis: Decide which gas, O₂ or CO₂, is flammable.

Materials: Two 125 mL Erlenmeyer flasks, 3 mL hydrogen peroxide (H₂O₂), 0.5 g yeast, 1.0 g baking soda (NaHCO₃), 15 mL of vinegar (C₂H₄O₂), wooden splints, aluminum foil squares, alcohol burner, a beaker with sand, permanent marker and an aluminum pan.

Procedure: ***Prior to beginning this lab, safety procedures must be review with your teacher. Any misuse of chemicals or flammable materials will result in the immediate removal of that student from the lab activity. This experiment must be contained within the aluminum pan provided. ***

Special procedure note: You are going to evaluate the flammability of these gases both with a flaming splint and a splint with only a glow to it. These are two different situations. When using a flaming splint you are evaluating the ability of the gas to sustain (keep going) the flame. When using the glowing splint you are evaluating the ability of the gas to reignite the flame as shown by the glow getting larger or a flame reappearing. For all of the testing situations **do not let the splint touch the liquid.**

1. With the marker provided label one flask O₂ and one CO₂. Do not write on the white part of the flask.
2. Prepare the **oxygen flask** by pouring all of the hydrogen peroxide into one of the Erlenmeyer flasks sitting in the aluminum pan.
3. Add the yeast and cover the flask with a square of aluminum foil. Gently swirl the flask around to assist in generating the gas.
4. Prepare the **carbon dioxide flask** by placing the baking soda into the second flask sitting in the aluminum pan.
5. Add all of vinegar and cover the flask with a square of aluminum foil. Gently swirl the flask around to assist in generating the gas.
6. Have your instructor light your alcohol burner.

Name: _____

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What Are Elements?

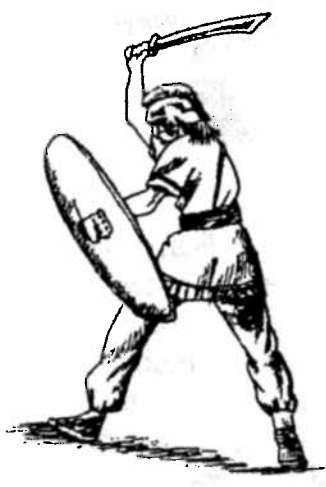
The History of Elements

Ancient Times

Some elements were known and used by ancient civilizations. These elements were:

- Carbon (pre-history)
- Sulfur (pre-history)
- Copper (~5000 BCE)
- Silver (~3000 BCE)
- Gold (~3000 BCE)

- Iron (~2500 BCE)
- Tin (~2100 BCE)
- Antimony (~1600 BCE)
- Lead (~1000 BCE)



Alchemy to the First Periodic Table (1000–1869)

During this time, 52 elements were discovered. Many of these elements were discovered by alchemists. Alchemists were people who tried to combine science and magic. They tried to change lead into gold. They discovered and used the scientific method. A few elements that were discovered during this period were:

- Arsenic (~1250)
- Zinc (~1500)
- Phosphorus (1669)
- Platinum (~1700)
- Nickel (1751)

- Nitrogen (1755)
- Oxygen (1774)
- Chlorine (1774)
- Aluminum (1825)



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Chapter 2: Uses of Elements: *The Uses of the Elements Booklet*

Hydrogen

- Hydrogen was used to keep blimps and manned balloons aloft.
- Hydrogen combines with oxygen to form water.
- Hydrogen is used to make ammonia, fertilizer, margarine, and rocket fuel.
- Isotopes are used in nuclear reactions and hydrogen bombs.

Helium

- Helium is used today to fill blimps, manned balloons, toy balloons, and weather balloons.
- Scuba divers use a mixture of oxygen and helium to breathe.
- Helium was used to make the first gas lasers. Today gas lasers are used in bar code scanners.
- Helium is used as a liquid to cool particle accelerators.
- Helium is used by astronomers to eliminate space noise on their detectors.

Lithium

- Lithium combines with aluminum to make a light metal used in aircraft and spaceships.
- Lithium is used to make small batteries for cameras, calculators, and pacemakers.
- Lithium is used to purify air in spacecraft and submarines.
- Lithium is used in some soaps.
- Lithium is used to manufacture lubrication grease.
- Lithium is used as medication for bipolar disease.
- Isotopes are used to make hydrogen bombs.

Beryllium

- Beryllium is found naturally in gems. It gives emeralds and aquamarines their color.
- Beryllium is used to make X-ray tubes.
- Beryllium is used in rocket fuel and explosives.
- Isotopes are used for neutron sources in nuclear laboratories.

Boron

- Boron is used in water softeners.
- Boron is used as an eyewash.
- Boron is used to make heat-resistant glass, such

Boron (continued)

- as Pyrex™, for baking dishes and measuring cups.
- Boron is used to make control rods in nuclear reactors.
- Boron is used for transistors in VCRs, computers, and calculators.

Carbon

- Many organic compounds are made from carbon.
- Many products such as petroleum and perfume are made from carbon.
- Natural diamonds are made of carbon.
- Graphite is made of carbon. Graphite is used in many products, such as pencils and synthetic diamonds.
- Carbon makes coal, which is used to make heat and electricity in some areas.
- Carbon is combined with oxygen to form carbon dioxide. Carbon dioxide is exhaled when we breathe, used in photosynthesis, used for carbonation in soft drinks, and used to make decaffeinated coffee.
- Dry ice is frozen carbon dioxide. It is used to freeze many things, such as ice cream.
- Carbon is used to remove pollutants from the air.
- Carbon is used in some inks, tires, and dry cells.
- Carbon combines with nitrogen to make cyanide, which is a very toxic poison.
- Isotopes are used to date rocks and fossils.

Nitrogen

- Nitrogen makes up 78% of air.
- Liquid nitrogen is used to freeze foods and biological specimens.
- Gaseous nitrogen is used to protect electronic materials.
- Nitrogen is used to store fruit for long periods of time. Apples stored in nitrogen gas can last 30 months without rotting.
- Nitrogen is used to pump oil from the ground.
- Nitrogen combines with carbon, hydrogen, and other elements to make protein.
- Nitrogen is used in the production of ammonia and fertilizer.

Neutron



Proton



Cut this section out!

Cut this section out!

(Fold on the dashed line)

Atomic Mass (Mass Number) = # _____ + # _____

protons
- # neutrons

Atomic Mass
- # neutrons

Atomic Mass
- # protons

Atomic Particle	Charge	Mass (in amu)	Location
Proton			
Neutron			
Electron			

AMU = _____