NAME: _____

PS FINAL EXAM STUDY GUIDE 2019

THIS IS A GUIDE ONLY AND A GREAT STARTING POINT. IT IS NOT INCLUSIVE OF ALL POSSIBLE QUESTIONS ON THE FINAL. ALL VOCABULARY, LABS, AND PROBLEMS THAT WE SOLVED OVER THE SEMESTER ARE CONCEPTS THAT COULD BE INCLUDED ON YOUR FINAL.

Characteristics of Science

1. What standard of measurement do most countries use and discuss why such a standard is beneficial?
   Most countries use the metric system
   The **metric system** is the **preferred system** of scientific units for several reasons: The majority of countries in the world employ the **metric system** of measurement. Because **metric** units are decimal-based, they are easily converted by moving the decimal point.
2. If a beaker contains 0.32L of water, how many mL of water is this? (Use KHDBDCM to convert.)
   320mL
3. The height of a person is 2.6m. How tall is this person in cm? (Use KHDBDCM to convert.)
   260 cm
4. A cube of PVC is 10cm long, 4cm wide, and 2cm tall. What is its volume? 80 cm3
5. What is the density of the acid in a car battery if 200 mL of the acid has a mass of 240 g? (Answer: 1.2 g/mL SHOW YOUR WORK!) 240/200=1.2 g/ml
6. What is the difference between dependent and independent variables?

The **difference** is that the value of the **independent variable** is controlled by the experimenter, while the value of the **dependent variable** only changes in response to the **independent variable**.

Elements, Compounds, Mixtures & Physical and Chemical Properties and Changes

7. What is a pure substance?
   Substances are basically classified into two types. They are: **Pure Substance:** The substances that are free from any kind of mixture and contain only one kind of particle are pure substances. Examples of pure substances include **iron, aluminum, silver, and gold**. Mixtures: Substances that have two or more different particles are mixtures.
8. What is a mixture?
   a mixture is a material made up of two or more different substances which are physically combined.A mixture is the physical combination of two or more substances in which the identities are retained and are mixed in the form of solutions, suspensions and colloids.
9. How are elements and compounds classified? (Substance or mixture?) Explain why they are classified this way. Elements and compounds are both classified pure substances. "Pure denotes a single type of material. Ostensibly, compounds contain more than one type of material. Yet both compounds and elements are considered pure substances. Pure compounds are created when elements combine permanently, forming one substance.
10. How is a compound similar to a homogenous mixture?
    A compound is similar to a homogeneous because **they are combined evenly throughout** and cannot be separated easily
11. How is a compound similar to a homogenous mixture?
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12. Describe the difference between a colloid and a suspension.
    The key **difference between suspension** and **colloid** is that the particles in a **suspension** are larger than the particles in a **colloid**. Another major **difference between suspension** and **colloid** is that **suspension** is a heterogeneous mixture whereas **colloid** can exist as either a homogeneous or heterogeneous mixture.
13. Compare a homogeneous and heterogeneous solution?
    A **homogeneous** mixture is a solid, liquid, or gaseous mixture that has the same proportions of its components throughout any given sample. Conversely, a **heterogeneous** mixture has components in which proportions vary throughout the sample.
14. Does a change in state mean that a new substance has formed? No, and example would be water. Water can change state from a solid to a liquid and remain the same substance.
15. What is the difference between a physical change and a chemical change?

Physical change refers to a **change** in which the molecules are rearranged but their internal composition remains same. **Chemical Change** is a process in which the substance transforms into a new substance, having **different chemical** composition.

16. What is the difference between physical properties and chemical properties?
    A Physical Property

    A **physical property** is an aspect of matter that can be observed or measured without changing its chemical composition. Examples of physical properties include color, molecular weight, and volume.

A Chemical Property

A **chemical property** may *only* be observed by changing the chemical identity of a substance. In other words, the only way to observe a chemical property is by performing a chemical reaction. This property measures the potential for undergoing a chemical change. Examples of chemical properties include reactivity, flammability and oxidation states.

Telling Physical and Chemical Properties Apart

Sometimes it can be tricky to know whether or not a chemical reaction has occurred. For example, when you melt ice into water, you can write the process in terms of a chemical reaction. However, the chemical formula on both sides of the reaction is the same. Since the chemical identity of the matter in question is unchanged, this process represents a physical change.

Thus melting point is a physical property. On the other hand, flammability is a chemical property of matter because the only way to know how readily a substance ignites is to burn it. In the chemical reaction for combustion, the reactants and products are different.

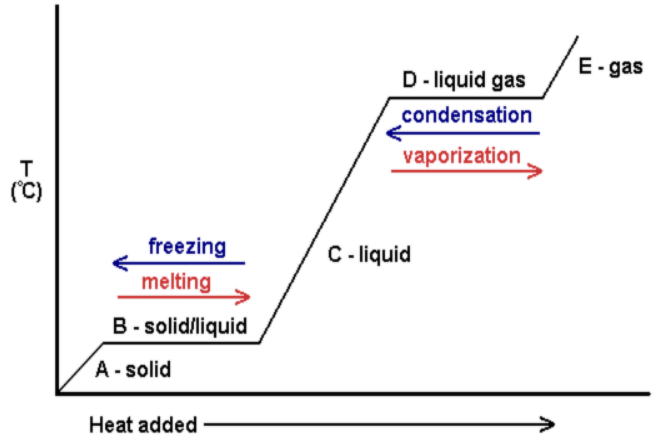
17. State the law of conservation of mass.
    The law of conservation of mass states that **mass** in an isolated system is neither created nor destroyed by chemical reactions or physical transformations. According to **the law of conservation of mass**, the **mass** of the products in a chemical reaction must equal the **mass** of the reactants.

States of Matter, Phase Changes, and Gas Laws

18. How are kinetic energy and temperature related?
    As temperature increases the kinetic energy of molecules increases..
19. What is Kinetic Theory?
    The kinetic molecular theory is a collection of several rules that describe the behavior of gases. The nature of gas molecules was examined by scientists, such as Robert Boyle and Jacques Charles, who outlined their observations in several laws that eventually became the Kinetic Molecular Theory. Volume, temperature and pressure are all taken into account when observing and understanding the behavior of gases.

20. List and describe the three assumptions of Kinetic Theory.
    The first assumption of the kinetic theory is that **gas is made of identical molecules traveling in various directions**. The second assumption is that the molecules do not lose energy when colliding with each other. The third assumption is that the energy transferred between the molecules is heat.
21. Describe the particle motion of the solid state of matter.
    Vibrates in place
22. Describe the particle motion of the liquid state of matter.
    Slide past east other
23. Describe the particle motion of the gaseous state of matter.
    Rapid movement in multiple directions.

24. Why do liquids flow?
    Liquids are fluid, able to flow and take any shape. This occurs due to the **weak intermolecular bonding** that allows the molecules to slide past each other freely. As a result of being fluid, liquids exhibit many interesting properties that solids do not, including capillary action and diffusion.
25. Sketch and label a phase change chart? What occurs on the graph at each point?



26. What is plasma?
    Plasma is a **state** of **matter** in which an ionized gaseous substance becomes highly electrically conductive to the point that long-range electric and magnetic fields dominate the behaviour of the **matter**. The **plasma state** can be contrasted with the other states: solid, liquid, and gas
27. Why does a gas have pressure?
    The **pressure** of a **gas** is the force that the **gas** exerts on the walls of its container. When you blow air into a balloon, the balloon expands because the **pressure** of air molecules is greater on the inside of the balloon than the outside. **Pressure** is a property which determines the direction in which mass flows.
28. True or False: The volume of a gas increases when the temperature increases at constant pressure. **Explain your answer.** **True**

Charles's law (also known as the law of volumes) is an experimental gas law that describes how gases tend to expand when heated. A modern statement of Charles's law is: This relationship of direct proportion can be written as: $V \propto T$ So this means: $V/T=k$, or $V=kT$ where: V is the volume of the gas, T is the temperature of the gas (measured in kelvins), and k is a non-zero constant. This law describes how a gas expands as the temperature increases; conversely, a decrease in temperature will lead to a decrease in volume.

29. True of False: The pressure of a gas increases when volume decreases at constant temperature. **Explain your answer.** True
    Boyle found that when the pressure of gas at a constant temperature is increased, the volume of the gas **decreases**. when the pressure of gas is decreased, the volume increases. this relationship between pressure and volume is called Boyle's law.

Atoms and the Periodic Table

30. What particles are found in the nucleus of an atom?
    Protons and neutrons
31. What is the particle that moves around the nucleus?
    electrons
32. What property of an atom determines it identity? (Hint: The number of _Protons_____.)
33. What is the mass number of an atom that has 26 protons, 26 electrons, & 30 neutrons?
    56
34. Define isotope.
    each of two or more forms of the same element that contain equal numbers of protons but different numbers of neutrons in their nuclei,
35. What are the horizontal rows of the periodic table called?
    periods

36. What are the vertical columns of the periodic table called?
    Groups or families
37. Lewis Dot Diagrams are used to represent what property of an atom?
    Valence eletrons
38. In an atom, each energy level has a maximum number of what that it can hold?
    electrons
39. What particles of matter make up protons and neutrons?
    quarks
40. In an element, what does the chemical symbol represent? N
    Name of the element Nitrogen

Radioactive Decay

41. Describe radioactivity.
    Radioactivity is the **process whereby unstable atomic nuclei release energetic subatomic particles or radiation** . This phenomenon can cause one element to turn into another
42. What is an alpha particle?
    Alpha particles, also called alpha ray or alpha radiation, consist of two protons and two neutrons bound together into a particle identical to a helium-4 nucleus.
43. What is a beta particle?

a fast-moving electron emitted by radioactive decay of substances. (The emission of beta particles was originally regarded as a ray.).

44. How is a beta particle formed?
    A **beta particle**, also called **beta** ray or **beta** radiation (symbol β), is a high-energy, high-speed electron or positron emitted by the radioactive decay of an atomic nucleus during the process of **beta** decay. There are two **forms** of **beta** decay, β − decay and β + decay, which produce electrons and positrons respectively.
45. What is gamma radiation?

A gamma ray, or gamma radiation (symbol γ or γ), is a penetrating electromagnetic radiation arising from the radioactive decay of atomic nuclei. It consists of the shortest wavelength electromagnetic waves and so imparts the highest photon energy. Paul Villard, a French chemist and physicist, discovered gamma radiation in 1900 while studying radiation emitted by radium. In 1903, Ernest Rutherford named this radiation gamma rays based on their relatively strong penetration of matter; in 1900 he had already named two less penetrating types of decay radiation (discovered by Henri Becquerel) alpha rays and beta rays in ascending order of penetrating power.

46. Write the three types of nuclear radiation in increasing order of penetration.
    Alpha, Beta, Gamma
47. Define half-life.
    The rate at which a **radioactive isotope** decays is measured in **half-life**. The term **half-life** is **defined** as the time it takes for one-**half** of the atoms of a **radioactive** material to disintegrate. **Half-lives** for various radioisotopes can range from a few microseconds to billions of years.
48. Describe one way we can use half-life and why it is important to know.
    The half-lives of several radioactive isotopes are known and are used often to figure out the age of newly found fossils. Different isotopes have different half-lives and sometimes more than one present isotope can be used to get an even more specific age of a fossil. Below is a chart of commonly used radiometric isotopes, their half-lives, and the daughter isotopes they decay into.

Parent Isotope	**Half-Life**	**Daughter Isotope**
Carbon-14	5730 yrs.	Nitrogen-14
Potassium-40	1.26 billion yrs.	Argon-40
Thorium-230	75,000 yrs.	Radium-226
Uranium-235	700,000 million yrs.	Lead-207
Uranium-238	4.5 billion yrs.	Lead-206

49. What fraction of radioactive nuclei remain after 3 half-lives have passed?

12.5%

50. If the half-life of iodine-131 is 8 days, how much of a 100 gram sample is left after 24 days?
    12.5 grams of iodine-131 will remain
51. What is nuclear fission?

a nuclear reaction in which a heavy nucleus splits spontaneously or on impact with another particle, with the release of energy.

52. List at least two applications for nuclear fission reactions. (how can we use these reactions?)

Nuclear fission is one of the most cost-effective forms of energy we have today.
Over 10% of the energy that we use as humans comes from the nuclear fission process. Over 30 different countries use this form of power to create the electricity needed to manage the tasks of modern life. The stability of the energy that it produces makes it suitable for virtually all devices, while the transmission of it combines with what we receive from hydropower, renewables, and even coal-fired plants to provide a complete network of convenience for homes and businesses.

We can transmit the power from nuclear fission over long distances.
When we produce electricity from nuclear fission, then we have the ability to transmit it over long distances to ensure everyone can have access to the power they need. When using high-voltage direct current, studies from the 1980s found it was cost-efficient to send the power up to 4,300 miles away. If an alternating current were used instead, then it could go as far as 2,500 miles. Since almost all transmission lines are shorter than this, we have the ability to create electricity with this process to send it to almost anyone in the world today.

53. What is nuclear fusion?
    Both fission and fusion are nuclear reactions that produce energy, but the applications are not the same. Fission is the splitting of a heavy, unstable nucleus into two lighter nuclei, and fusion is the process where two light nuclei combine together releasing vast amounts of energy.
54. The sun is an example of nuclear _____ reactions.
    fusion
55. Which nuclear reaction produces more energy, fission or fusion?
    It depends on the atomic number of the element, fusion produces much more energy for lighter elements and fission produces more energy for heavier elements.
56. The stability of an isotope nucleus depends on the ratio of _____.
    depends on the number of protons compared to number of neutrons i.e ratio. the neutrons are neutral components of the atom and are needed in the same ratio for isotope stability.
57. When solving a half-life problem, the first step is always to do what?
    1. Determine the initial amount of a substance. For example, N (0) = 2.5 kg.
    2. Determine the final amount of a substance - for instance, N (t) = 2.1 kg.
    3. Decide how long did it take for that much of material to decay...

58. Explain the difference between a nuclear reaction and a chemical reaction.

The main difference between nuclear reaction and chemical reaction can be understood on the basis of **'how the reaction takes place in the atom**'. Nuclear Reaction takes place in the atom's nucleus; whereas the electrons in the atom.

More on the Periodic Table

59. How many valence electrons to the elements in Group 1 have? What about Group 2?
    Group 1-1 valence electron Group 2-2 valence electrons
60. List the number of valence electrons for the elements in Groups 13 through 18. (Group 13 has _____. Group 14 has _____. And so on and so forth….)

Group 13-3 valence electrons, Group 14-4 valence electrons, Group 15-5 valence electrons, Group 16-6valence electrons, Group 17-7 valence electrons, Group 18-8 valence electrons

61. Metals tend to have only 1, 2, or 3 valence electrons. Consequently, they will tend to _____ those electrons and form _____ ions.

Metals will lose there valence electrons to form ionic bonds. Metal atoms form **positive ions**, while non-metal atoms form negative ions.

62. Non-metals tend to have only 5, 6, or 7 valence electrons. Consequently, they will tend to _____ electrons and form _____ ions.

Non-metals will typically gain electrons and form negative ions. Also, non-metals that bond with non-metals form covalent bonds.

63. What is the difference between groups and periods?

Groups also known as families are in columns (vertical). Periods also known as rows are horizonal.

64. Where are inner transition metals located on the periodic table?

Inner transition **metals** are usually put at the bottom of the **periodic table**. These elements were sometimes called rare earth elements or rare earth metals due to their extremely low natural occurrence.

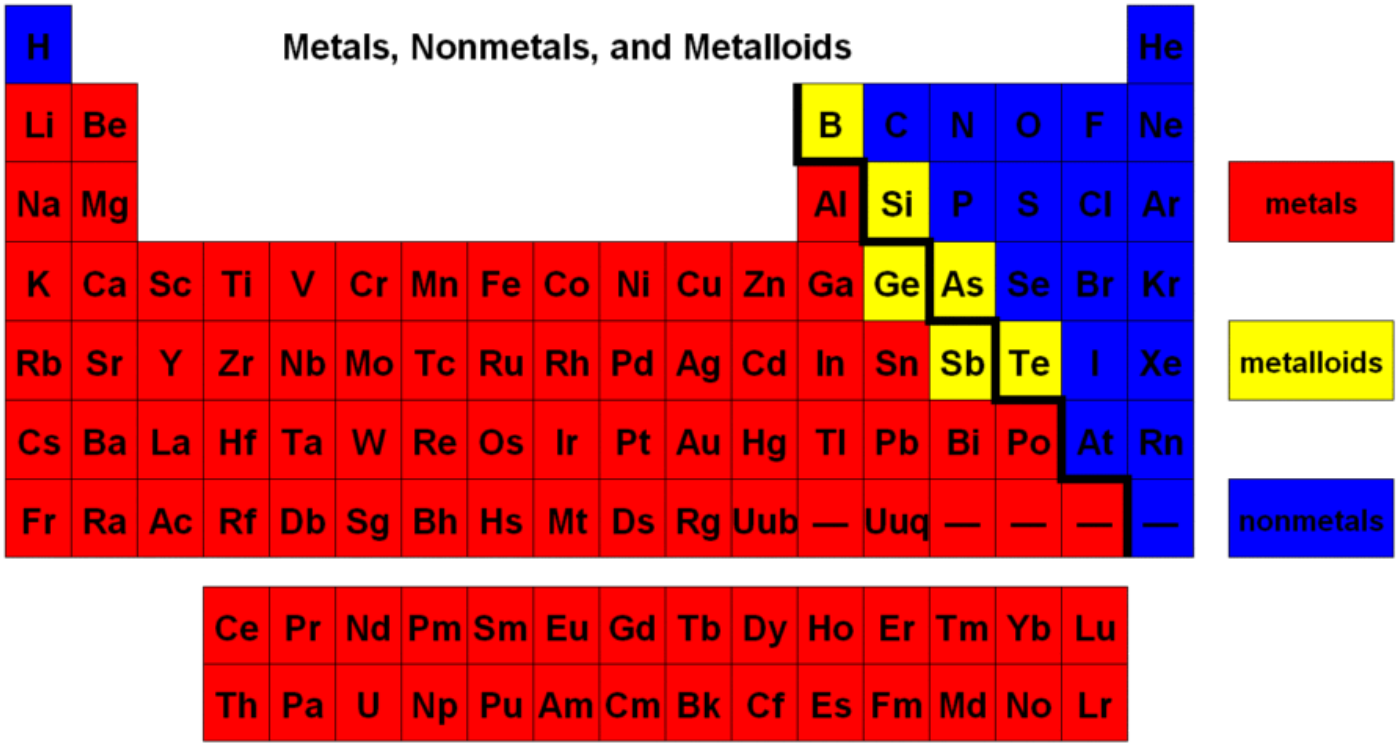
65. What is the difference between transition metals and inner transition metals?

• **Transition metals** consist of d-block elements whereas **inner transition metals** consist of f-block elements. • **Inner transition metals** have low availability than **transition metals** and hence called 'rare earth **metals**'. This is in relation to the electron configuration. Electron configuration will not be part of the final!

66. What are 7 common diatomic molecules?

The seven diatomic elements are hydrogen, nitrogen, oxygen, fluorine, chlorine, bromine and iodine.

67. List the location of metals, non-metals and metalloids on the periodic table.



68. List which state of matter metals and non-metals are typically found in.

Metals are mainly found in nature as solids, will non-metals are typically found as gases.

69. What makes noble gases so unique?

Because noble gases have 8 valence electrons, they will not bond with any other elements.

70. Why do noble gases not form compounds?

Because noble gases have a full valence electron count, this makes this staple and less likely to bond with any other element

71. What is an allotrope? List at least two allotropes of carbon.

is the property of some chemical elements to exist in two or more different forms, in the same physical state, known as **allotropes** of the elements. Allotropes are different structural modifications of an element;[1] the atoms of the element are bonded together in a different manner. For example, the allotropes of carbon include diamond (the carbon atoms are bonded together in a tetrahedral lattice arrangement), graphite (the carbon atoms are bonded together in sheets of a hexagonal lattice),

72. What are semiconductors and where are they typically found on the periodic table?

The elemental semiconductors are those composed of single species of atoms, such as silicon (Si), germanium

Germanium is a chemical element with symbol Ge and atomic number 32. It is a lustrous, hard-brittle, grayish-white metalloid in the carbon group, chemically similar to its group neighbours silicon and tin. Pure germanium is a semiconductor with an appearance similar to elemental silicon. (Ge), and tin (Sn) in column IV and selenium (Se) and tellurium (Te) in **column VI** of the periodic table.

73. Where are the most reactive metals on the periodic table?
    These are located in Group 1 of the periodic table. (Alkali metal family)
74. Where are the most reactive non-metals on the periodic table?
    Group 17 of the periodic table (Halogen Family)
75. What happens to atomic radius moving down a group? Across a period?
    As you move down the column of a group, the atomic radius will increase by 1 shell. In period 1 all the elements in that row have 1 atomic shell. Period 2, all the elements in this row will have two shells, and so forth.
    As you move across a period or row, atoms are being added to the atomic shells.

76. What is the periodic law?

a law stating that the elements, when listed in order of their atomic numbers (originally, atomic weights), fall into recurring groups, so that elements with similar properties occur at regular intervals.

Bonding and Naming Compounds

77. Why do atoms form bonds with other atoms?
    The atoms of most elements form chemical bonds because the **atoms become more stable** when bonded together. Reaching 8 valence electrons typically makes the elements stable.
78. What is a chemical formula?
79. In a chemical formula, the number of each type of atom in the compound is shown by numbers called _____.
    Coefficents
80. What is an ion and how is it formed?
    An **ion is an atom or group of atoms with a positive or negative charge**. Ions form **when atoms lose or gain electrons to obtain a full outer shell:** metal atoms lose electrons to form positively charged ions.
81. How are ionic bonds formed?
    An ionic bond forms **between two ions of opposite charges**. In ionic bonding, electrons transfer from one atom to another. The elements take on either a negative or positive charge.
82. What types of elements make up an ionic bond?
    Ionic bonds are formed when a metal bonds with a non-metal

83. How are covalent bonds formed?
    A covalent bond is formed when two atoms share one or more pairs of electrons.
84. What types of elements make up a covalent bond?
    Two non-metal elements form a covalent bond.
85. A chemical bond that occurs when atoms gain/lose electrons is a (n) ____ bond.
    Ionic

86. A chemical bond that occurs when atoms share electrons is a (n) ____ bond.
Covalent
87. A group of covalently bonded atoms that acts together as one charged atom is a ____.
a group of covalently bonded atoms that acts together as one charged atom is. **polyatomic ion**.
88. The ____ tells you how many electrons an atom must gain, lose, or share to become stable.
The number of electrons in the outer energy level (shell) determines (tells us) the atom s valence. To become stable, the number of electrons as atom must lose or gain **<choose the lowest one>**. to have **8 electrons** in its outer most shell (octet rule) is the atom s valence (it is a number).
89. What is the sum of the oxidation numbers in a neutral compound?
The sum of oxidation numbers in a neutral compound must equal **zero**.
90. Write the correct formula for the following compounds:
    1. magnesium nitrate- **Mg(NO3)2.**
    2. calcium oxide- **CaO**
    3. tetraphosphorous trisulfide
    4. carbon dioxide- CO_2
    5. aluminum chloride- **AlCl3**
91. Write the correct name for each of the following compounds:
    1. NaBr-sodium bromide
    2. Fe_2O_3- iron (III) oxide
    3. $Ni_3(PO_4)_2$- Nickel II Phosphate
    4. As_2O_5- Arsenic pentoxide
    5. NCl_3- Nitrogen trichloride
92. How many hydrogen atoms are in one molecule of ammonium acetate, $NH_4C_2H_3O_2$?
7

Chemical Reactions

93. Define reactants and products in terms of a chemical reaction.
Reactants and products are the two major components of a **chemical reaction**. **Reactants** are the starting material of a **chemical reaction**. **Products** are the **chemical** species that can be found after the completion of the **reaction**.

94. Explain how a chemical reaction obeys the Law of Conservation of Mass.
The **law of conservation of mass** states that **mass** in an isolated system is neither created nor destroyed by **chemical reactions** or physical transformations. According to the **law** of **conservation of mass**, the **mass** of the products in a **chemical reaction** must equal the **mass** of the reactants.
95. Where are subscripts located in a chemical formula?
The subscripts in a chemical equation is the number on the **lower right-hand side of a chemical element** that tells a chemist how many atoms of that element are present in the equation. On the other hand, superscripts in a chemical equation are the notations for a positive or negative ionic charge.
96. Where are coefficients located?
In front of a chemical formula of
97. What are the differences between subscripts and coefficients in a balanced chemical equation?
Coefficients and subscripts are essetibal components when writing longhand chemical formula compounds or equations. A coefficient, reflecting the number of molecules in a given substance, is a number placed in front of a given molecule's abbreviation. A subscript, however, reflecting each element's atomic contribution to a given molecule, appears following or between elemental abbreviations and is typically smaller in size and set below the type line.
98. What is the difference between a chemical symbol, chemical formula, and chemical equation? Give an example of each.

The **key difference** between chemical symbol and chemical formula is that **we use a chemical symbol to name a certain chemical element whereas a chemical formula is used in naming a chemical compound.**

Chemical symbols are codes for chemical elements. Chemical elements are chemical species that include a set of atoms having the same atomic number (same number of protons in the atomic nucleus). A chemical

formula shows the chemical elements present in a certain chemical compound and also, the ratios between these elements.

A chemical equation is the symbolic representation of a chemical reaction in the form of symbols and **formulae**, wherein the reactant entities are given on the left-hand side and the product entities on the right-hand side.

99. Balance the following chemical equations:

$N_2 + O_2 \rightarrow N_2O$

2,1,2

$K_3PO_4 + HCl \rightarrow KCl + H_3PO_4$

1,3,3,1

$Mg(NO_3)_2 + K_3PO_4 \rightarrow Mg_3(PO_4)_2 + KNO_3$

3,2,1,6

$H_2O_2 \rightarrow H_2O + O_2$

2,2,1

100. Define the 5 general types of chemical equations. (synthesis, decomposition, single displacement, double displacement, combustion)

- **Synthesis Reaction:** Two or more elements/compounds combine to form a more complex product.
- **Decomposition Reaction:** One chemical species breaks down to simpler elements/compounds.
- **Single Replacement Reaction:** An uncombined element replaces a less reactive element in a compound, creating a new compound and a single element.
- **Double Replacement Reaction:** Involves two ionic compounds (in solution) that trade cations, creating two new compounds.
- **Combustion Reaction:** A hydrocarbon (or other organic molecule) burning in oxygen, producing carbon dioxide and water.

101. Indicate which type of reaction each of the following is and then balance each of them!

$Mg + N_2 \longrightarrow Mg_3N_2$

3,1,1 synthesis

$CaBr_2 + Na_2CO_3 \longrightarrow CaCO_3 + NaBr$

1,1,1,2 double

$KClO_3 \longrightarrow KCl + O_2$

2,2,3 decomposition

$Zn + AgNO_3 \longrightarrow Zn(NO_3)_2 + Ag$

1,2,1,2 single

$C_2H_6O + O_2 \longrightarrow H_2O + CO_2$

1,3,2,3 combustion

102. Compare and contrast exothermic and endothermic reactions.

An **endothermic** reaction occurs when energy is absorbed from the surroundings in the form of heat. Conversely, an **exothermic reaction is one in which energy is released from the system into the surroundings**.

103. What is the difference between a solvent and solute?

Solvent is present in the greater amounts while the solute is present in the lesser amount. Solute's are typically present in multiples

104. In a salt water solution which is the solvent and which is the solute?

Solvent is the water the solute is the salt.

105. Describe three ways to increase the rate a solute dissolves in a solvent.

Heat

Increase the surface area

Agitation

106. How is solubility a gas in a liquid affected by the temperature?

As temperature raises solubility in a liquid increases while the solubility of a gas decreases as the temperature rises.

107. What is the difference between saturated, supersaturated and unsaturated solution?

An **unsaturated solution** contains less than the maximum soluble material, while a **saturated solution** contains all of the material that it is able to dissolve in its current state, with excess material remaining **undissolved**. A **supersaturated solution** holds more of the solvent than it would be able to under normal circumstances.

108. A solution which conducts electricity well is known as a(n) _____.

Solutions that conduct electricity are electrolytes. Sometimes "electrolyte" refers to the ions in the solution that conduct electricity. Solutions of acids, bases and salts conduct electricity. In each case there are positive and negative ions in solution which conduct electricity.

109. An electrolyte has a lot of _____ in solution which allows electric current to flow easily.

110. A solution which does not conduct electricity well is known as a(n) _____.

A **nonelectrolyte** is a chemical that dissolves in water without producing ions. An aqueous solution of a nonelectrolyte usually doesn't conduct an electric current.

111. Why do polar molecules dissolve better in water?

Substances that have ionic **molecules** or **polar molecules** generally **dissolve** in **water** because **water molecules** have the ability to surround the those **molecules** completely and disperse them in solution. Non-**polar molecules** do not interact with **water molecules** and are therefore insoluble in **water**. **Water** is a **polar molecule**.

112. What is dissociation?

The dissociation of salts by solvation in a solution like water means the **separation of the anions and cations**. The salt can be recovered by evaporation of the solvent.

Acids, Bases and Salts

113. What is the symbol for hydronium ions and hydrogen ions?

Acids dissociate in water to form hydrogen ions (H^+)

Bases dissociate in water to form $OH^-(aq)$

114. List three characteristics of acids and bases.

General Characteristics of Acids:

- pH < 7
- Sour taste (though you should never use this characteristic to identify an acid in the lab)
- Reacts with a metal to form hydrogen gas
- Increases the H+ concentration in water
- Donates H+ ions
- Turns blue litmus indicator red

General Characteristics of Bases:

- pH > 7
- Bitter taste
- Slippery feel
- Increases the OH- concentration in water
- Accepts OH- ions

Turns red litmus indicator blue

115. What is pH? Draw and label the scale.

The pH scale measures how acidic or basic a substance is. It ranges from 0 to 14. If a pH is lower than 7 it indicates the solution is an acid. If it is above 7 it is a base or Alkaline. If a pH is a 7 it is neutral. Strong acids have lower pHs than weak acids and strong bases have lower pHs than weak bases. A neutral solution is neither an acid or base. It has a pH of 7. Scientists use a pH number to show the strength of an acid or base. A pH is measured by dipping litmus into solution such as water or other substances. Chemicals that are very basic or acidic are called "reactive." Automobile batteries have acids which are reactive and contain a stronger form of some of the same acid that is in acid rain. Also household drain cleaners often contain lye, a very alkaline that is reactive. Vinegar and lemon juice are acidic substances and laundry detergents and ammonia are basic. Pure water is neutral witch means that it has a pH of 7.0 . It is not reactive

116. What is an indicator?

chemical indicator is a substance that undergoes a distinct observable change when conditions in its solution change. This could be a color change, precipitate formation, bubble formation, temperature change, or other measurable quality.

117. How does a salt form?

Salt, such as **sodium** chloride, is **formed** when an acid and a base are neutralized in a chemical reaction.

118. What determines if a substance is a weak or strong acid or base?

The terms "**strong**" and "**weak**" give an indication of the **strength** of an **acid** or **base**. The terms **strong** and **weak** describe the ability of **acid** and **base** solutions to conduct electricity. If the **acid** or **base** conducts electricity strongly, it is a **strong acid** or **base**. If the **acid** or **base** conducts electricity **weakly**, it is a **weak acid** or **base**.

119. What is the difference between concentration and neutralization?

Molar **concentration** is exactly What it says. The **concentration** expressed in moles per litre. A **neutralization** indicator is a chemical that changes colour at a fixed pH, if chosenproperly it will be the equivalence point also.

120. What are some common acidic/basic household beverages?

Acids

Two of the most sour items in any kitchen are lemon juice, which contains citric acid, and vinegar, which contains acetic acid. Both have pH values around 2.5, which means that they are strongly acidic; any solutions with a pH below 7 are acidic, and any with a pH above 7 are alkaline. In fact, any sour juice is acidic, as are tangy carbonated beverages that contain phosphoric acid.

Bases

One of the most common bases in any home is baking soda, or sodium bicarbonate, although with a pH of 8.2, it is only slightly alkaline. The chemicals you use to clean your drain are far more alkaline; sodium hydroxide, also known as caustic soda, has a pH of 12.0. Ammonia and laundry detergent, with pH values of 8.3 and 9.4, respectively, are also bases.

121. What do you take to neutralize an upset stomach?

Take a common over the counter base such as Tums