Study Guide – Chapter 4 (Matter and Energy) Part II.

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Name: Key Date: _____ Period: _____

1. For the following descriptors, place a box around the terms that chiefly relate to the properties of metals and an oval around those related to nonmetals.

dull | high density | brittle | low melting point | silver/gray | ductile

insulator | conducts heat | gas phase | react w/only nonmetals | malleable

2. An element that is silvery/gray in color, brittle and does not conduct electricity very well would be best classified as a metalloid (semi-metal).

3. The element that is commonly used in the semiconductor industry is Silicon, Si.

4. The identity of an element is determined by the number of Protons in the nucleus.

5. For the following elements, place a box around the elements that are metals, an oval around those that are nonmetals and underline those that are metalloids.

Al	C	Kr	Sn	I	Ca	As
Ge	Pb	N	Rb	Si	Te	O
K	Cl	Cu	Fe	Rn	U	Au

6. The only two elements that are liquids under normal conditions are mercury (Hg) and bromine (Br).

7. The top three elements in the Earth's crust (in descending order) are classified as nonmetal (O), Semi-metal (Si) and metal (Al) (choices are metal, nonmetal, semi-metal)

8. The top three elements in the human body (in descending order) are classified as nonmetal (O), nonmetal (C) and nonmetal (H) (choices are metal, nonmetal, semi-metal)

9. In 1799, Joseph Louis Proust stated that "Compounds always contain the same elements in a constant proportion by mass". This statement is known as the Law of definite composition (Constant proportion.).

10. Determine how many of each type of element are contained within the following compounds:

a. $CaCO_3$ Calcium 1 Carbon 1 Oxygen 3

b. $Mg_3(PO_4)_2$ Magnesium 3 Phosphorus 2 Oxygen 8

c. $C_8H_9NO_2$ Carbon 8 Hydrogen 9 Nitrogen 1 Oxygen 2

11. Place a box around the following descriptors that are physical properties and an oval around those that are chemical properties:

conductivity | solubility | rusts | malleable | water reactive

combusts | density | corrodes | mass | color

12. The group IA elements combine with oxygen in a 2 : 1 ratio, group IIA elements combine with oxygen in a 1 : 1 ratio and group IVA element combine with oxygen in a 1 : 2 ratio.

13. Classify each of the following changes as *physical* or *chemical*:

a. Condensation forms on a window: Physical b. A log burns: Chemical

c. An egg is fried: Chemical d. An antacid relieves indigestion: Chemical

e. A pop fizzes when opened: Physical f. A saw cuts a piece of wood: Physical

14. In 1789 Antoine Lavoisier announced after careful experimental measurement that mass is neither lost nor gained in any chemical reaction. This statement is commonly known as the law of conservation of mass.

15. Sodium chloride (NaCl) is the chemical name for table salt. If 12.71 grams of sodium chloride is made in a chemical reaction that takes place between sodium metal and chlorine gas and it is known that 5.00 grams of sodium metal were used, then the number of grams of chlorine gas that were used is 7.71 g. If instead, 15.00 grams of sodium are reacted, then the number of grams of sodium chloride that can be produced is 38.13 g. The mass ratio of chlorine to sodium in sodium chloride is 1.542 to 1. The number of grams of sodium that would be required to react exactly with 10.00g of chlorine is 6.485 g.

16. Energy is a measure of an object's ability to do work, whereas temperature is a measure of the average kinetic energy of its constituent particles.

17. Energy that an object possesses due to its position or composition is known as Potential energy.

Energy due to an object's state of motion is known as kinetic energy.

18. The Law of Conservation of Energy states that energy can be converted from one type to another, but cannot be created or destroyed. The six different forms of energy are: heat, light, Chemical, electrical, mechanical, nuclear.

Einstein showed that mass and energy can be interconverted through his equation $E = mc^2$.

19. Give the percentage of energy required for producing each of the following from recycled materials versus from their "raw" form. Aluminum: 5 %, Iron: 25, Paper: 30 %

20. Why did the price of aluminum plummet in the year 1886?

Charles Hall invented a method of extracting aluminum from its ore (e.g. bauxite).