

**A. Safety/Equipment**

- List the basic safety attire that is worn in the lab – goggles and apron must be worn over long pants and closed toe shoes. Hair must be tied back.
- The location of the fire extinguisher is front/by exits and the fire blanket is next to fire extinguisher.
- When mixing acid and water, you should always mix the acid into the water.
- If an accident or spill occurs, you should always tell the teacher.
- What is the proper procedure when heating materials in lab? Light match before turning on gas
- To dispose of all chemicals you should ask teacher. Secure hair & clothing
- What do you do for an acid burn? Wash skin 15min + Point test tubes away from others
- What material are you allowed to put in the sink? ASK teacher!!
- What should you do if you get a chemical in your eye? Eye wash/kinse 15min
- Know the basic equipment and uses. (ring stand, Bunsen burner, clay triangle, wire gauze, beakers, flasks, graduated cylinders, etc)




↓  
measuring

↓  
Heating

↓  
Temporary  
Storing  
measuring  
Heating

**B. Matter and Change**

11. Be able to differentiate between the 3 states of matter and the various phase changes.

	Solid	Liquid	Gas
shape	<u>Definite Shape</u>	<u>No definite Shape</u>	<u>No definite Shape</u>
volume	<u>Definite Volume</u>	<u>Definite Volume</u>	<u>No definite volume</u>
Particle arrangement	 <u>Close together Organized</u>	 <u>Farther apart Less Organized</u>	 <u>Far Apart Disorganized</u>
Effect of pressure change	<u>No effect</u>	<u>Effects Solubility.</u>	<u>Adding pressure decreases volume at constant temperature</u>

12. Classify the following as physical (P) or chemical changes (C):

food spoils <u>C</u>	Wick burns <u>C</u>	Rusting <u>C</u>
candle melts <u>P</u>	salt dissolves in water <u>P</u>	burning coal <u>C</u>
Banana turns black <u>C</u>	Combustion of firework <u>C</u>	Tarnishing <u>C</u>
Hair is cut <u>P</u>	Sugar is <u>dissolved</u> in water <u>P</u>	Oxidation <u>C</u>

13. Classify the following as physical properties (PP) or Chemical Properties (CP)

Density <u>PP</u>	Ability to react <u>CP</u>	Flammability <u>CP</u>	Combustibility <u>CP</u>
Boiling Point <u>PP</u>	Mass <u>PP</u>	Color <u>PP</u>	Ability to oxidize <u>CP</u>

14. What is the difference between a mixture and a pure substance? Mixtures are physically combined whereas pure substances like compounds are chemically bonded.

15. Classify as elements (E), compounds (C) and mixtures (M).

zinc	<u>E</u>	River water	<u>M</u>	Water	<u>C</u>
Cola drink	<u>M</u>	Salt	<u>C</u>	Calcium Sulfide	<u>C</u>
Oxygen	<u>E</u>	Sugar	<u>C</u>	Lithium oxide	<u>C</u>
Copper	<u><del>M</del> E</u>	Kool-aid	<u>M</u>	Cu SO <sub>4</sub>	<u>C</u>

16. Classify as homogeneous (HO) or heterogeneous (HE).

Sugar water (dissolved)	<u>HO</u>	iced tea	<u>HO</u>
Soil	<u>HE</u>	M&M's	<u>HE</u>
oreo cookie	<u>HE</u>	Gatorade	<u>HO</u>
Trail mix	<u>HE</u>	Vegetable soup	<u>HE</u>
Clear hand sanitizer	<u>HO</u>	Brass	<u>HO</u>
Sterling Silver	<u>HO</u>	Salt dissolved in water	<u>HO</u>
Sand	<u>HE</u>	A Solution	<u>HO</u>
Lava Lamp	<u>HE</u>	Cough syrup	<u>HO</u>
Air	<u>HO</u>	Honey	<u>HO</u>

### C. Measurement and Density

17. Write the formula for density. Density =  $\frac{\text{mass}}{\text{volume}}$

18. What is the volume of a sample that has a mass of 20 g and a density of 4 g/ml?

Work:  $\frac{4}{1} = \frac{20\text{g}}{x}$   $4x = 20$   $x = 5$  Answer: 5ml

19. How many significant figures are in the following numbers:

340.0 4      0.0090 2      4.30 3      890 2

20. In proper significant figures and units find the area of a rectangle that is 4.32 cm by 31 cm? ← 2SF

Work:  $4.32 \times 31 = 133.92$  Answer: 130

21. Define precision. How reliable an instrument is based on repeatable results. Does not have to be accurate

22. True or False: The number of decimal places a measurement has indicates the precision of the instrument used to acquire that measurement.

0.01  
0.00001  
 This #  
 more precise  
 b/c more decimal  
 places

(correct.)



23. Which of the following sets of measurements is most precise? C

Instrument	First Measurement	Second Measurement	Third Measurement
A	4.52	3.52	5.52
B	4.42	4.31	4.50
C	4.48	4.51	4.47

High/Low Difference

-2  
-19  
-04

24. Convert the following to scientific notation

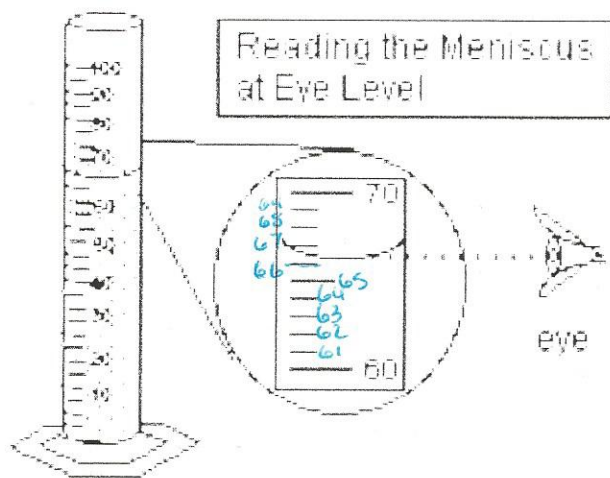
0.00076  $7.6 \times 10^{-4}$   
233000  $2.33 \times 10^5$

24,000,000  $2.4 \times 10^7$   
0.003  $3 \times 10^{-3}$

25. Convert to expanded notation

$6.03 \times 10^8$  603,000,000  
 $9.3 \times 10^{-3}$  .0093

$4.1 \times 10^{-6}$  .0000041  
 $3.2 \times 10^4$  32,000



26. What is the volume in the graduated cylinder? Include estimated digit! 66.3

I estimated the last digit.

2 prefixes = 2 steps!!

27. Which of the following is a correct set-up for converting 380 centiliters into kiloliters?

☒ a.  $380 \text{ cL} \times \frac{1 \text{ kL}}{100 \text{ cL}}$

☒ c.  $380 \text{ cL} \times \frac{1000 \text{ cL}}{1 \text{ L}} \times \frac{1000 \text{ kL}}{1 \text{ L}}$

☒ b.  $380 \text{ cL} \times \frac{100 \text{ cL}}{1 \text{ L}} \times \frac{1 \text{ kL}}{1000 \text{ L}}$

☒ d.  $380 \text{ cL} \times \frac{1 \text{ L}}{100 \text{ cL}} \times \frac{1 \text{ kL}}{1000 \text{ L}}$

28. Convert 396 mg into kg using dimensional analysis. Show your work!

$0.000396 \text{ kg}$  or  $3.96 \times 10^{-4} \text{ kg}$  =  $396 \text{ mg} \left| \frac{1 \text{ g}}{1000 \text{ mg}} \right| \frac{1 \text{ kg}}{1000 \text{ g}}$

29. Convert 30 centimeters to millimeters.

$30 \text{ cm} \left| \frac{1 \text{ m}}{100 \text{ cm}} \right| \frac{1000 \text{ mm}}{1 \text{ m}}$

300 mm

## D. Periodic Table and Atomic Structure

30. The smallest particle of an element that retains the properties of the element is called a/an atom.

31. What does atomic number represent? proton + neutron is equivalent to the mass number of an atom.

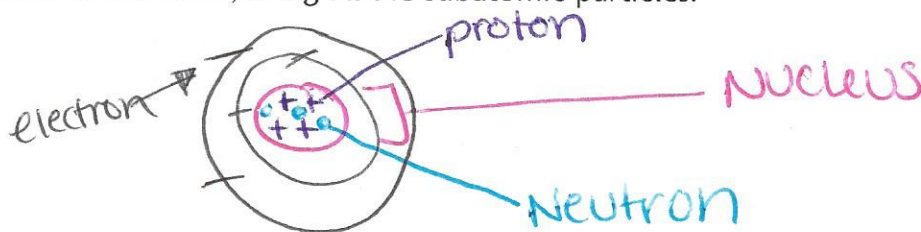
32. How many of each of the following does a neutral atom of fluorine have?

protons 9 neutrons 10 electrons 9  
 $19 - 9 =$

33. What charge does each of the following subatomic particles have?

protons + neutrons neutral electrons -  
No charge

34. Draw the basic structure of the atom, using all the subatomic particles.



35. What is an isotope? An atom with a fewer or more neutrons than average Ex: Carbon-13 has 1 extra neutron  
Carbon-11 has 1 fewer electron

36. How many of each of the following does  $^{123}_{51}\text{Sb}$  have?

protons 51 neutrons 72 electrons 51

37. Calculate the average atomic mass of the element X. Then use the periodic table to identify the element. Show all your work on your answer sheet.

Isotope	Mass (amu)	Percent Abundance
$^{27}\text{X}$	27.977	92.23 = <u>25.803</u>
$^{28}\text{X}$	28.976	4.67 = <u>1.353</u>
$^{29}\text{X}$	29.974	3.10 = <u>+ 0.929</u>

Work:

\*multiply mass by percent

Answer:

28.085 g/mol



38. A blank periodic table is provided below. Label the groups numbers and period numbers.  
 Shade in the metalloids and write where the metals and nonmetals are located.

39. A blank periodic table is provided below. Label the transition metals, alkali metals, alkaline earth metals, halogens and noble gases.

40. Which is the least reactive group? Noble Gas
41. Which is the most reactive group of metals? Alkali metals
42. Atoms of elements that are in the same group have the same number of –  
 a. protons      b. neutrons      c. valence electrons      d. protons and neutrons
43. Explain the octet rule. All atoms desire to fill outer shell with 8 electrons

44. Next to each element list the charge of the ion and how many valence electrons are present and whether that element will gain or lose electrons. Hydrogen is the example below.

Example- Hydrogen

# PERIODIC TABLE ELEMENTS 1-20

<p>1 H<sup>+</sup> 1v.e. Lose 1 electron</p>	<p>2 He</p>	<p>3 Li<sup>+</sup> 1v.e. Lose 1 electron</p>	<p>4 Be<sup>2+</sup> 2v.e. Lose 2 electron</p>	<p>5 B<sup>3+</sup> 3v.e. Lose 3 electron</p>	<p>6 C<sup>4+</sup> 4v.e. Gain or Lose 4 electron</p>	<p>7 N<sup>3-</sup> 5v.e. Gain 3 electron</p>	<p>8 O<sup>2-</sup> 6v.e. Gain 2 electron</p>	<p>9 F<sup>-</sup> 7v.e. Gain 1 electron</p>	<p>10 Ne 8v.e. NO Reaction</p>
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## E. Ionic Bonding and Nomenclature

45. When an atom loses one or more valence electrons, it is called a cation and has a + charge.

46. Describe the formation of an ion (How does Li become Li<sup>+</sup>).

Loses 1 electron  
when bonding.

47. An ionic bond is an attraction between oppositely charged ions.

48. Ionic bonds form between Metals (cations) and nonmetals.

49. What happens to electrons in an ionic bond?

electrons are  
TRANSFERRED

50. How do you determine the correct subscripts in a chemical formula?

criss cross  
charges (oxidation #'s)

51. How many electrons do the following elements need to satisfy the octet rule?

Phosphorous 3 Oxygen 2 Bromine 1 Neon 0

52. How many valence electrons does Aluminum have? 3

53. What will Aluminum's ionic charge become when it bonds with a nonmetal? Al<sup>+3</sup>



54. Determine the correct formula for the ionic compound composed of the following pairs of ions:

sodium and nitrate  $\text{NaNO}_3$

cesium and nitrogen  $\text{Cs}_3\text{N}$

aluminum and bromine  $\text{AlBr}_3$

iron (II) and sulfate  $\text{FeSO}_4$

55. Name the following compounds:

$\text{NaBr}$  Sodium Bromide

$\text{CaCl}_2$  Calcium chloride

$\text{Cu}(\text{NO}_3)_2$  Copper II Nitrate

56. Write the formulas for the following

Iron III oxide  $\text{Fe}_2\text{O}_3$

Aluminum sulfide  $\text{Al}_2\text{S}_3$

Iron II oxide  $\text{FeO}$

Aluminum sulfite  $\text{Al}_2(\text{SO}_3)_3$

Iron III sulfate  $\text{Fe}_2(\text{SO}_4)_3$

Aluminum sulfate  $\text{Al}_2(\text{SO}_4)_3$

### E. The Beloved Mole

57. What is the name of the unit used to measure the amount of a substance? mole

58. How many particles (atoms, molecules, or formula units) are in a mole? What is this number called?  $6.02 \times 10^{23}$   
Avogadro's #

59. What is molar mass? The mass of one mole of a substance  
Mass of a formula

60. What is the molar mass of bromine? 79.9

$\text{Br}_2 = 159.8$

61. What is **molar mass** of Calcium Phosphate?

Work:

$$\begin{array}{l} \text{Ca } 3(40) = 120 \\ \text{P } 2(31) = 62 \\ \text{O } 8(16) = 128 \\ \hline 310 \end{array}$$

$\text{Ca}_3(\text{PO}_4)_2$  Answer: 310g/mol

62. What is the **percent composition** of sodium in sodium phosphate?

Work:

$$\begin{array}{l} \text{Na } 3(23) = 69 \\ \text{P } 1(31) = 31 \\ \text{O } 4(16) = 64 \\ \hline 164 \end{array}$$

$\text{Na}_3\text{PO}_4$  Answer: 42% Na

$$\frac{69}{164} \times 100 =$$

63. How many **particles** are in 26 moles of Aluminum Bromide?

Work:

$$\frac{26 \text{ mole}}{1 \text{ mole}} \times 6.02 \times 10^{23} \text{ particle} =$$

Answer:  $1.56 \times 10^{25}$  part.

64. If you have 0.125 moles of aluminum, how many **atoms** of aluminum do you have?

Work:

$$\frac{0.125 \text{ mole}}{1 \text{ mole}} \times 6.02 \times 10^{23} \text{ a} =$$

Answer:  $7.53 \times 10^{22} \text{ atom}$

65. If you have 25.25 moles of aluminum, how many **grams** of aluminum do you have?

Work:

$$\frac{25.25 \text{ mole}}{1 \text{ mole}} \times 27.0 \text{ g} =$$

Answer:  $681.8 \text{ g}$

66. How many **moles** are in 120.5 grams of calcium chloride?

Work:

$$\frac{120.5 \text{ g}}{111 \text{ g}} \times 1 \text{ mol} =$$

Answer:  $1.086 \text{ mole}$

Ca (+2) Cl (-1)  $\text{CaCl}_2$

Ca 1(40) = 40  
Cl 2(35.5) = 71  
111

67. What is the formula of a compound which has the smallest whole number ratio of the elements called? Empirical Form

68. What is the empirical formula for  $\text{C}_6\text{H}_3\text{O}_3$ ?  $\text{C}_2\text{HO}$

The law of conservation of mass states that mass cannot be –

- a. burned      b. changed in form      c. created or destroyed      d. heated or cooled

69. According to the law of conservation of mass states the total mass of the reactants must be equal the mass of the products in a chemical reaction? (SEE BELOW)

- a. more than      b. equal to      c. less than

