Chemistry Final Review Semester One

1. Draw a picture AND use words to explain where the alcohol went that was on the alcohol swab that we put wiped on our desk.

The alcohol swab particles went into the atmosphere (evaporated).

2. Below are some examples of things you can find in our world. Which of them, if any, are made up of tiny particles/matter? How do you know?

a. sound
b. pure water (H_20)
c. wind
d. heat
e. a taco
f. copper (Cu)

All matter is made of tiny particles. Energy is not matter so it is not made of tiny particles

3. How would you expect the final volume to change if water and rubbing alcohol were added together?

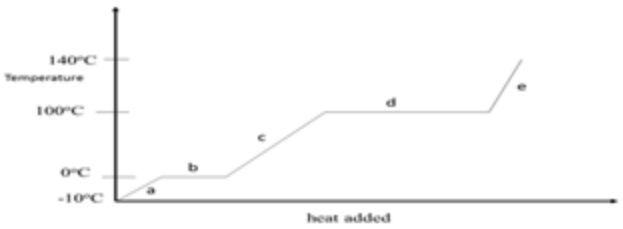
The volume decreases because of how the particles pack around each other.

4. How would you expect the final mass to change if water and rubbing alcohol were added together?

The mass should not change because there is still the same amount of matter present.

Phase Change Lab

5.Match the letter(s) on the graph to the following phase(s).



Just solid ___A_ Solid & liquid__B___

Just liquid_C___ Liquid & gas___D__

Just gas___E__

5. List the particle model of matter ideas that we investigated.

1. All matter is made of tiny particles
2. Particles have stickiness. They are attracted to themselves and other particles
3. There is space between particles. Different types of particles are arranged differently
4. The particles are always moving. They move faster and spread out at higher temperatures

6. Review the “gold” penny lab. How did you determine if the penny was transformed into gold?

We tested the density of the penny to see if it matched the density of gold.

7. What is the formula for density? Does the density of an object change if the size of the object changes?

Density= Mass/ Volume

The density of an object never changes because density is an intensive property, meaning it does not depend on the amount of matter present. For example, aluminum always has a density of 2.7g/mL regardless if it’s a small piece of foil or a large block.

8. A sample of a mineral has a volume of 14.5 mL and a mass of 135.5 g. What is its density?

135.5/ 14.5= 9.34g/mL

9. Use the density of the mineral sample in question #19 above to calculate the volume of 3.2 grams of that mineral.

V= M/D 3.2/ 9.34= 0.34mL

10. How would you determine the volume of an object based on water displacement in a graduated cylinder?

Final volume- initial volume= volume of object

11. What is the difference between extensive and intensive properties?

Extensive properties depend on the amount of matter (mass and volume). Intensive properties do not depend on the amount of matter (color, hardness, density)

12. Explain how the flames (flame test lab) and elements produce the colors you observed? Which element in LiCl produced the color?

The electrons in the atoms were excited and then as they return to their ground state, they emitted light proportional to the energy they gained. The metal determines the color of the flame so Lithium produced the color

13. When you looked through the spectroscope at the emission tubes what was emitted?

Bands of visible light

14. This model illustrates the atom as having a nucleus made up of subatomic particles with electrons circling the nucleus. Most of the atom is empty space. ___D___

15. This model illustrates the atom as having a nucleus with electrons circling the nucleus. Most of the atom is empty space. ___A____

16. This model looks solid.___C____

17. This model looks like a fluid with electrons in it. __B____

18. For the following isotope symbol, indicate the number of protons, neutrons and electrons.

$^{84}_{36}Kr$

a. Number of Protons___36___ c. Number of Electrons__36__

b. Number of Neutrons___48__ d. Mass number__84___

e. Atomic number__36___

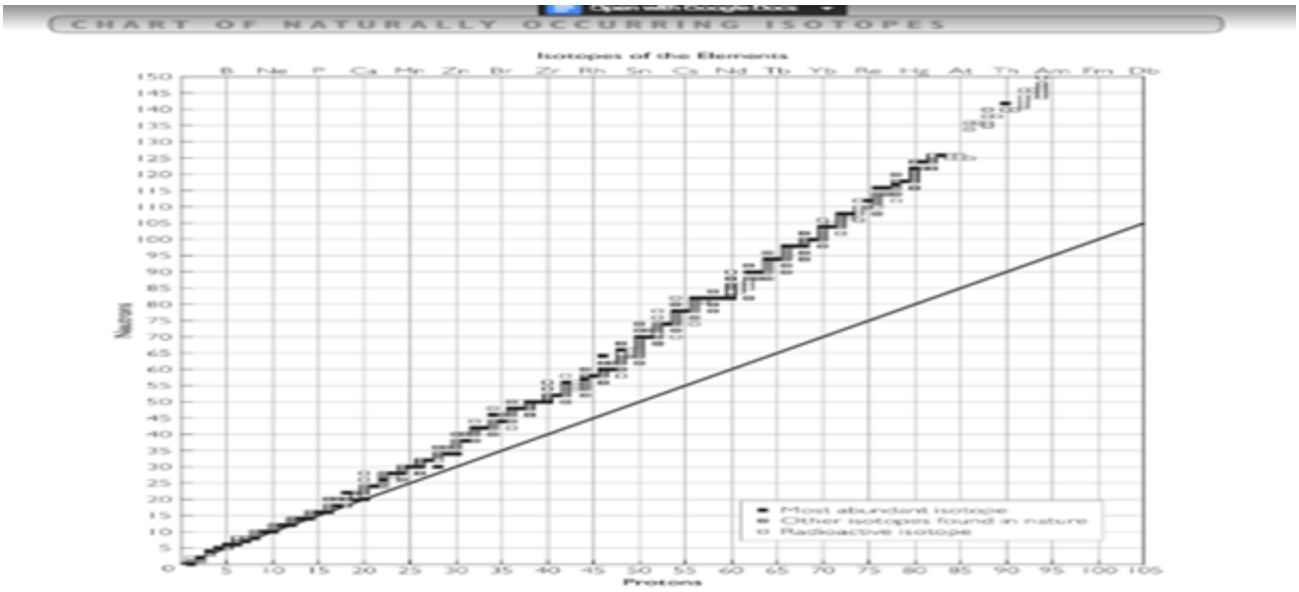
19. What is an isotope?

Different versions of the same element.

How many isotopes are there for Nitrogen? __2____ What is the nuclear symbol for the most abundant isotope?

$^{14}_{7}N$

20. List four types of general information that you can obtain from the isotope graph below.



Number of isotopes, mass number and neutrons for isotopes, most abundant isotope, radioactive isotopes.

22. Name three things the proton number reveals about an atom. Atomic number, protons and electrons

23. Count the the total number of <u>each type of element</u> present in one formula unit.

a. $Al_2(CO_3)_3$ b. $(NH_4)_3PO_4$

Al-2 C-3 O-9 N-3 H-12 P-1 O-4

24. When writing formulas and names for ionic and molecular compounds, what clues do you use to determine if the compound is ionic or molecular?

Metal + Nonmetal = Ionic All nonmetals= Molecular

25. Write the correct name for each compound.

a. $Mg(OH)_2$ b. $BaSO_4$ c. $Fe(NO_3)_3$ d. $CuCl_2$

Magnesium Hydroxide Barium Sulfate Iron (III) Nitrate Copper (II) Chloride

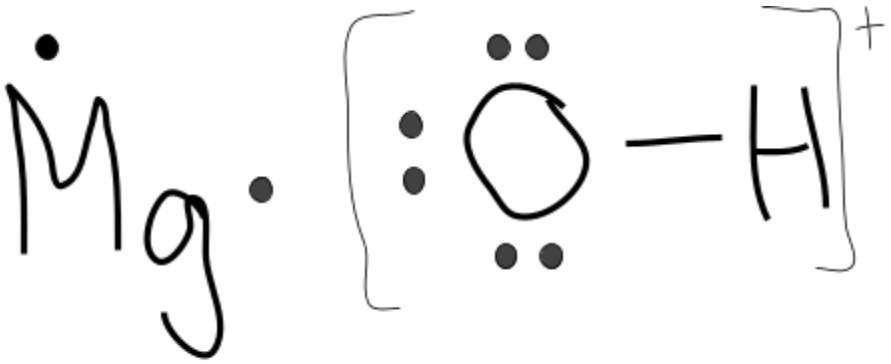
25. Write the correct formula for the following compounds

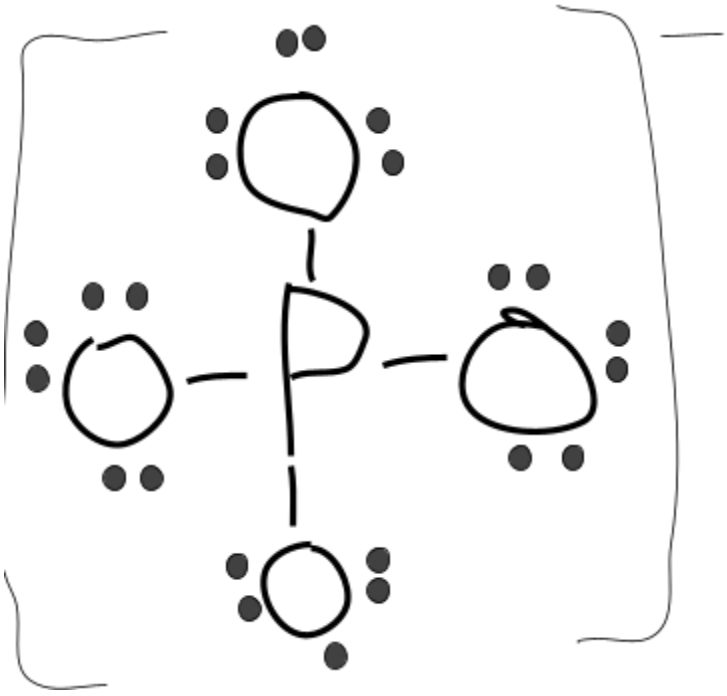
Calcium oxide CaO Aluminum bromide $AlBr_3$ Iron (II) phosphide Fe_3P_2

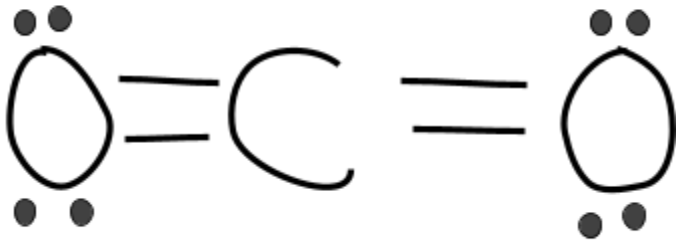
Tin(IV) fluoride SnF_4 Ammonium sulfate $(NH_4)_2SO_4$ Calcium phosphate Ca_3P_2

27. Show the Lewis dot structure for the following compounds, atoms or ions:

a) Mg b) OH^- c) HF d) PO_4^{3-} e) CO_2







28. Sodium chloride, NaCl is bonded ionically. Chlorine gas, Cl_2 is bonded covalently. Explain why there is a difference in the bonding in these two molecules.

NaCl is held together by the attraction of opposite charges. Na^+ is attracted to Cl^- and their charges balance so overall the compound has zero charge. Cl_2, is 2 chlorine atoms that are sharing electrons between them so they each have a full octet.

29. If an element has an atomic number of 17 and a mass number of 37

(a) Identify the element _____Chlorine _____

(b) Identify the number of electrons _____17_____

(c) What state is this element in at room temperature?___Gas_____

(d) Draw the electron distribution of an atom of this element.

30. As your eyes move across the periodic table from left to right in the second period the atomic radii gets ___smaller____. Explain this pattern. What happens to ionization energy across a period?

Radii get smaller because there are more protons and electrons which causes more attraction, this makes the atom smaller. Since the atom is smaller, it is harder to remove a valence electron so it requires more ionization energy to do so.

31. What is true about the element immediately below the element that has an atomic number 17 in the periodic table.

a) 17 electrons in its outer most level

b) 7 electrons in its outermost level

c) 17 protons in nucleus

d) 7 protons in its nucleus

32. Two atoms that are isotopes have the same number of which subatomic particles? _____protons__ and ____electrons__.

33. Two atoms that are isotopes have the same_____atomic__number but different ___mass__number.

34. What is the number of valence electron in an atom of element number 19?____1_____

35. An ion is formed by the transfer of _____valence electrons__(what subatomic particles)

36. Compare & contrast ionic bonding and covalent bonding .What particle determines which type of bond will form.

Valence electrons determine bond type. In ionic bonds, electrons are transfered from one atom to another to create opposite charges, these charges are attracted to each other. In covalent bonds, electrons are shared so all atoms involved have a full valence shell (usually 8 electrons).

37. Define half life. The time it takes for half of a sample to decay

38. A 200g sample of Carbon-14 decays to 50g in 30 days. What is the half-life of Carbon-14? 15 days

39. What's the difference between nuclear fission and fusion?

Fission is when a nucleus breaks down into 2 lighter nucleii. Fusion is when two lighter nucleii combine to form a heavier nucleus.

40. Power plants use which process, fusion or fission? Why?

Power plants use fission because fusion requires too much energy to start.

41. Show the alpha particle decay of radium - 222 to radon - 218.

42. What happens to the atomic number and mass number of an atom when it undergoes alpha decay? Give an example.

The atomic number decreases by 2 and the mass number decreases by 4.

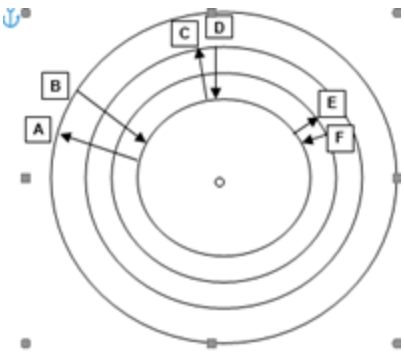
43. What happens to the atomic number and mass number of an atom when it undergoes beta decay? Give an example.

The atomic number increases by 1 and the mass number does not change. When Polonium-234 undergoes beta decay it becomes Astatine- 234.

44. Where in an atom does this decay occur? Nucleus

45. Circle the type of radiation with the largest penetration: Alpha, Beta, Gamma

46. What macromolecule in cells are very sensitive to radiation?__DNA_____



47. Which **3** of the lettered energy changes show absorption of energy by the atom?_____A, C, E____

48. Which **3** of the lettered energy changes show emission of light energy by the atom?___B,D,F____

49. Which of the arrows results in the highest energy light? __B____

50. Which of the arrows results in the lowest energy light? __F____

51. Which of the changes results in violet light? __B____

52. The element bromine has two isotopes. One isotope has a mass of 78.92 amu and a relative abundance of 50.69%. The second isotope has a mass of 80.92 amu and a relative abundance of 49.31%. Calculate the atom mass (weighted average) of the element bromine. Show your work.

79.90 amu

53. The substance *calcium chloride* is a chemical combination of which particles?

a. calcium atoms and chlorine molecules (Cl_2)

b. calcium atoms and chlorine atoms

c. Calcium ions and chlorine molecules

d. calcium ions and chlorine ions

54. Answer the following for the element Magnesium:

a. Atomic number ___12_____ d. Number of protons ___12_____
b. Atomic mass ____24.31 amu_____ e. Number of electrons ____12_____
c. Mass number ___24_____ f. Number of neutrons ___12_____

55. Fill in the following chart according to each element's properties:

Element	Cesium	Bromine	Calcium
Solid at room temp	Yes		Yes
Liquid at room temp		Yes	
Gas at room temp			
Metal	Yes		Yes
Non-metal		Yes	
Metalloid			
Group Name	Alkali Metals	Halogens	Alkaline Earth Metals

56. Indicate which of the following two compounds conduct an electric current in solution:

	Conductor	non-conductor	
A) KBr	__ Yes _	_____	Explain: KBr is an ionic compound so it dissolves in water and conducts electricity when dissolved
B) P_2O_5	_____	____ Yes __	Explain: P_2O_5 is a covalent compound so it may or may not dissolve in water and it will not conduct electricity in any form

57. State the rule of zero charge.

Ionic compounds must have an overall charge of zero. The positive and the negative ions must be in ratios so that they add up and equal zero.

Matching: Write the letter of the term on the blank line that best answers each question. Answers may be used once, more than once or not at all, only one answer per blank.

A) Covalent bond B) Transition metal C) Noble gases D) Ionic bond M) Metallic Bond
E) Oxygen family F) Metals G) Non-metals H) Representative element
I) Halogens J) Nitrogen family K) Molecule L) Formula unit

__C___58. What family of elements has a full valence energy level?
__J___59. Members of what family of elements have five valence electrons?
___A__60. What type of chemical bond is formed in molecular compounds?
___B__61. What type of element often requires a Roman numeral in the name?
__A___62. Compounds formed by which type of bond can have a low melting point?
___M__63. What type of chemical bond hold pure gold atoms together?
__D___64. What type of chemical bond form between opposite ions?
_D____65. What type of chemical bond forms between a metal and nonmetal?
__A___66. What type of chemical bond forms between a nonmetal and nonmetal?

67. Review writing the formula and name for:
    Ions
    Ionic compounds
    Polyatomic compounds and ions
    Covalent molecules
68. Review Lewis dot structure