Characteristics of Compounds Based on Bonding

	Covalent	Ionic	Metallic
Phase @ Room Temp	Varies	solids	solid except Hg
Melting Pt.	Low	High	High
Boiling Pt.	Low	High	High
Easy to turn into a gas?	Yes	no	no
When pounded they...	N/A	breaks (brittle)	Bend Bends] malleable
Conduct Electricity?	NO except dipoles	yes when dissolved H_2O	Yes
Smallest unit is called ..	molecule	Formula Unit	Atom
Structure of solid?	N/A	Crystalline	Sea of electrons
IMF?	Yes London Dipole Dipole Hydrogen	Some	No

Chemistry Common Assessment #2 Study Guide **Name:** Kay

1. atomic # is equal the number of protons in an atom. It is found at the top of the periodic squares.
2. atomic mass is the average mass of all the isotopes for an element. It's found at the bottom of the squares.
3. Mass # is the sum of the protons and neutrons of an atom.
4. isotopes are forms of the same element, but different numbers of neutrons.
5. ions are atoms that have gained or lost electrons.
6. group Vertical columns on the periodic table. All elements in these columns have similar properties.
7. periods Horizontal rows on the periodic table. All elements in these rows have same # of energy levels.
8. ox # the number of electrons gained or lost in order to become stable
9. valence is the term for the outermost electrons of an atom.
10. ionic type of bonding where electrons are transferred. Formed between a metal and nonmetal .
11. covalent type of bonding where electrons are shared. Formed between two nonmetals.
12. metals are to the left of the staircase and have positive oxidation #'s, this means they lose electrons.
13. nonmetals are to the right of the staircase and have neg oxidation #'s, this means they gain electrons.
14. metalloids are the elements that touch the staircase. They have properties of both metals and nonmetals.
15. net charge the sum of the oxidation numbers in an ionic bond.
16. Fill in the following chart

NAME	SYMBOL	ATOMIC #	MASS #	PROTONS	ELECTRONS	NEUTRONS	CHARGE
Nickel	$^{59}_{28}Ni$	28	59	28	28	31	0
Strontium	$^{88}_{38}Sr$	38	88	38	40 ?	50	-2
Phosphorus	$^{31}_{15}P$	15	33	15	18	18	-3
Sulfur	[illegible]	16	32	16	18	17	-2
Manganese	$^{56}_{25}Mn^{+1}$	25	56	25	24	31	-1
Molybdenum	$^{92}_{42}Mo$	42	92	42	40	50	+2

17. The amount of energy it takes to remove a valence electron is called ionization Energy.

18. The tendency for the nucleus of one atom to attract electrons of another atom into a chemical bond is electroneg.

19. The size of an atom is referred to as it's atomic radius.

20. Why is the electronegativity of bromine more than gallium? more protons

21. Why is the ionization energy of potassium much lower than that of iron? less protons

22. Rank Sodium, Lithium and Potassium from lowest to highest electronegativity: K < Na < Li

23. Rank Sulfur, Phosphorus, and Chlorine from smallest to largest in size: P > S > Cl (lgst ... smallest)

24. Rank Silicon, Carbon, and Tin from lowest to highest ionization energy: Sn, Si, C

25. Which element from the Halogen family would have the greatest shielding effect? Why? Astatine

26. Explain the process of light emission. each element has its own quantized E which causes electrons absorb that E & work out to higher levels (excited state), when the E is released it is in the energy light as the moves back to it's ground state

27. What are the relationships between wavelength, frequency, and energy of a wave? $E = hf$ $E = hc/\lambda$

28. Which element is represented by the following electron configurations?

A) $1s^2 2s^2 2p^6 3s^2 3p^1$ Al

B) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2 4f^{14} 5d^{10} 6p^6 7s^2 5f^6$ Rg

C) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^9$ Cu

29. Write the complete configuration for the following:

A) Silver

B) Antimony

C) Phosphorous

30. Write the noble gas configuration (shorthand configuration) for the following elements:

A) Magnesium

B) Bromine

C)Gold

31. (HONORS ONLY) Calculate the wavelength of red light with a wavelength of 450 Hz. $c = f\lambda$ $3.0 \times 10^8 = 450/s \cdot \lambda$ $\lambda = 3.0 \times 10^8 / 450$ $c = 3.0 \times 10^8 \, m/s = 450/s \, \lambda$

32. (HONORS ONLY) An element emits a spectral line with a wavelength of 5.18×10^{-7} m. Determine the frequency of the wave. $3.0 \times 10^8 \, m/s = f \cdot 5.18 \times 10^{-7} m$ $f = 0.579 \times 10^{15}/s$

33. (HONORS ONLY) Determine the energy of the wave in question 32.

34. Identify if the diagram or configuration is incorrect. If it is incorrect, explain why. If it is correct, identify the element.

a. ⟋⟋
1s 2s 2p

b. ⟋
1s 2s 2p 3s 3p

c. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2$

d. [Xe] $5s^2 4d^{10} 5p^4$

e. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 4d^{10} 4p^5$

35. Name the following compounds:

A) $CaBr_2$ = Calcium bromide

B) NiP = _____

C) N_3O_7 =

D) AlF_3 = Aluminum fluoride

E) H_2S = Hydrogen sulfide

F) $CuBr_2$ =

G) KNO_3 = potassium nitrate

H) CCl_4 = Carbon tetrachloride

I) S_2F_3 =

J) H_2SO_4 = Sulfuric acid

K) ZnI_3 = Zinc (III) iodide

L) H_2PO_3 =

36. Write the correct formulas for the following compounds:

A) Lithium Sulfite = _____

B) Iron (II) Phosphide= _____

C) Tetrasulfur Pentafluoride = _____

D) Phosphoric Acid = _____

E) Barium Nitride= _____

F) Hydronitric Acid = _____

G) Copper (III) Iodide = _____

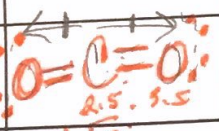
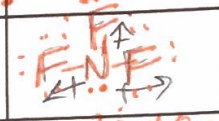
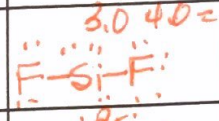
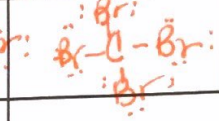
H) Aluminum Phosphate= _____

I) Calcium Oxide= _____

J) Barium Oxide = _____

K) Gallium Hydroxide = _____

L) Silicon Heptabromide =

Chemical Formula	Lewis Dot Structure	Polar or Nonpolar Bonds	Polar or Nonpolar molecule	VSEPR Shape and bond angle	(HONORS) Strongest Intermolecular Force Present
37. CO_2		2 Polar bonds	Nonpolar	2e- regions Linear	London Disp force
38. NF_3		Polar bonds	Polar	4e regions 3 Bonds 1 LP trigonal pyramidal	Dipole Dipole
39. SiF_2		Polar	Polar	4e regions 2 B 2 LP Bent	Dipole Dipole
40. CBr_4		Nonpolar	Nonpolar	Tetrahedral	London Dispersion Forces

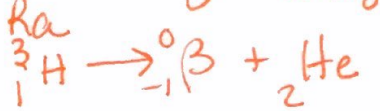
41. Explain which intermolecular force would act between molecules of NH_3 and draw a picture to support your answer. State whether you would expect this compound to have a relatively low or relatively high boiling point in comparison to other types of molecules *and why*.

Relatively high BP due to hydrogen bonding.

46. List all three types of radiation (including symbols) from strongest to weakest.

α Weakest
β
γ strongest

47. Write the nuclear reaction for the alpha decay of Radon-224



48. Write the nuclear reaction for the beta decay of Hydrogen-3.

49. Carbon has a half life of 250 years. How much of a sample will be left after 500 years?

2 half lives 25%

0 100 %
1 50
2 25 %

50. Ac-222 has a half life of 29 hours. If you start with a 82.0 gram sample, how much remains Ac-222 after 87 hours?

$29\overline{)87}$ 3 half lives

half life	% remaining
0	100
1	50
2	25
3	12.5

12.5% after 3 half lives
$0.125 \times 82.0g = 10.25$
Nuclear bomb = 10.3 g

51. List at least 5 uses for nuclear chemistry in the world.

medical imaging
nuclear power
Smoke detectors

52. What are 3 differences between fission and fusion (i.e. atoms involved, conditions for, fuels)

	FISSION	FUSION
1.	one large nucleus	2 small nuclei
2.	to 2 small	to one large
3.	uranium fuel	Hydrogen requires high
	chain reaction	