General Chemistry Chapter 2 Pre-Test

Essays

1.) (16 pts total, 4 pts each) 8-10 Briefly answer each of the following essay questions. (The actual test will contain 8 to 10 of these questions.)

a) Describe the three main tenets of Dalton's atomic theory.

law of conservation of matter

- All things made up of atoms (indivisible)
- All atoms are distinct - uniform/characteristics - elements defined by # of protons
- All matter cannot be created or destroyed

b) In Rutherford's experiment, why did most of the positively charged alpha particles travel through the thin gold foil sheet? What two main characteristics of an atom did these experiments prove?

Atoms are mostly space.

Atoms have dense, positive nuclei.

c) Why are the atomic masses of some elements non-whole numbers?

Isotopes → elements with different numbers of neutrons. Atomic Mass is an average.

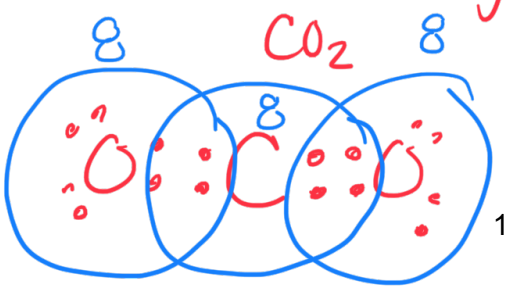
d) Which subatomic particle contributes most to the reactivity of an atom or compound? What do we specifically call this location?

Electrons → specifically outer or valence electrons

e) Describe what is meant by the "octet rule".

8 valence electrons provide stability → low reactivity

CO_2



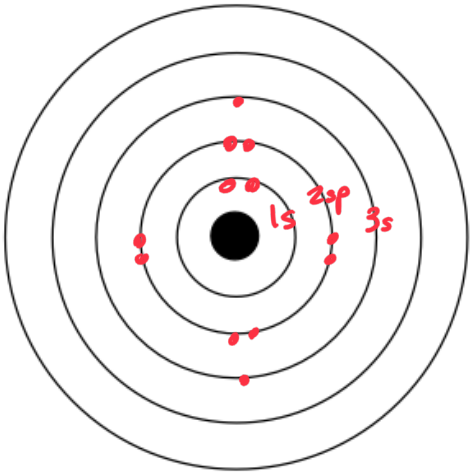
2.) (10 pts total, 0.5 pts each) Using the periodic table, provide the atomic mass, atomic number, and <u>complete profile of subatomic particles</u> for each. Please round to the nearest whole number when necessary.

Atom	Atomic Mass	Atomic Number	Protons (p^+)	Neutrons (n^0)	Electrons (e^-)
Potassium	39	19	19	39-19=20	19
Iron					
Cadmium	112	48	48	112-48=64	48
Arsenic					

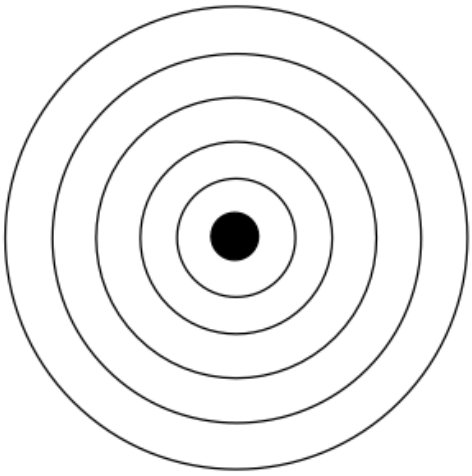
3.) (12 pts total, 6 pts each) Draw the electron distribution for each of the following neutral atoms. Include the number of protons and neutrons in the appropriate place. Draw an arrow where the atom could form a bond.

a) Magnesium

$12e^{\ominus}$

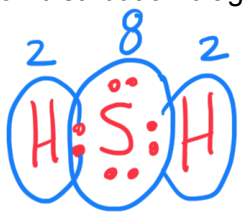


b) Sulfur



4.) (8 pts total, 4 pts each) Draw the structural form of each molecule, starting first with individual electron distribution diagrams (Lewis Structures).

a) H_2S



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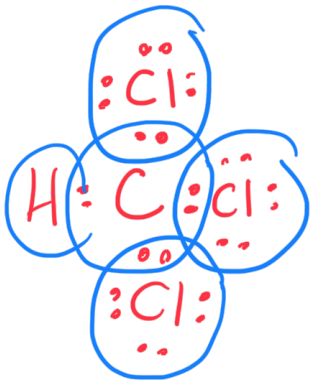
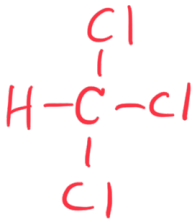
b) $CHCl_3$





5.) (8 pts total, 4 pts each) Write the empirical formula for each of the following:

reduced

a) $C_5H_{10}O_5$

5 5 5

$\boxed{CH_2O}$

b) $C_8H_{14}O_2$

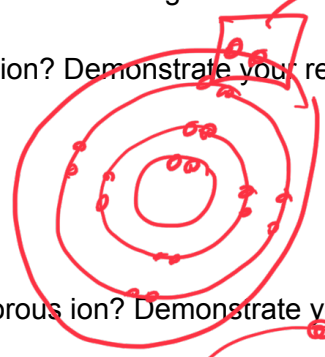
2 2 2

$\boxed{C_4H_7O}$

6.) (12 pts total, 4 pts each) Answer each of the following.

a) What is the charge of a calcium ion? Demonstrate your reasoning with an electron distribution diagram.

Ca^{+2}



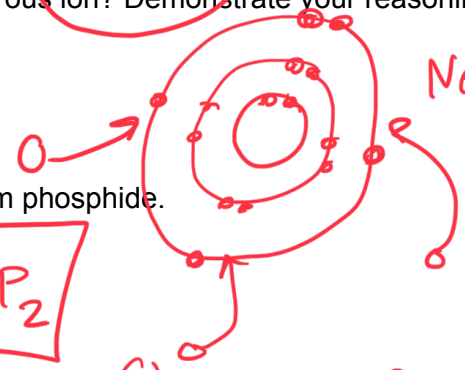
$2e^{\ominus}$ leave

Neutral $20p^{+}$ $20e^{-}$

$20p^{+}$ $18e^{-}$

b) What is the charge of a phosphorous ion? Demonstrate your reasoning with an electron distribution diagram.

P^{-3}



Neutral $15p^{\oplus}$ $15e^{\ominus}$

$15p^{\oplus}$ $18e^{\ominus}$

c) Write the ionic formula for calcium phosphide.

Ca^{+2} P^{-3}

$(+2)3$ $(-3)2$

$+6$ -6

$\boxed{Ca_3P_2}$

2, 4, 6, 8, 10, 12... 3, 6, 9, 12, 15...

7.) (16 pts total, 4 pts each) Write the ionic formula for each of the following:

a) Potassium sulfide

K^{+1} S^{-2}

K_2S

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ite

b) Sodium bromide

Na^{+1} Br^{-1}

$\boxed{NaBr}$

c) Magnesium fluoride

Mg^{+2} F^{-1}

$\boxed{MgF_2}$

d) Barium nitride

8.) (8 pts total, 1 pt each) Provide the molecular or ionic formula for each of the following compounds:

a) nitrogen tribromide

NBr_3 covalent

b) aluminum sulfate

Al^{+3} → SO_4^{-2} ionic

$Al_2(SO_4)_3$

c) trihydrogen monophosphide

covalent

H_3P

d) magnesium hydroxide

Mg^{+2} OH^{-1}

$Mg(OH)_2$

e) mercury (II) nitrate

Hg^{+2} → NO_3^{-1}

$Hg(NO_3)_2$

f) dinitrogen trioxide

g) iodine pentafluoride

h) sodium bicarbonate

9.) (10 pts total, 1 pt each) Provide the proper name for each of the following molecular formulas.

a) $(NH_4)_2SO_4$ ammonium sulfate

covalent

b) Si_2Br_6 disilicon hexabromide

c) P_4S_5 tetraphosphorous pentasulfide

d) $MgCO_3$ Magnesium carbonate

e) Li_3PO_4 lithium phosphate

f) NO_5

g) $Mg(NO_3)_2$

h) $FeCl_3$

i) NF_3

j) $Cu(OH)_2$