NAME_____

Sec 11am 1:30pm

PH-218 EXAM II

Wednesday, March 12, 2003

I SHORT ANSWER

1. (2 pts each) Using the periodic chart, write the element's symbol that is described by each statement below

a. _____ There are 18 electrons in this element's **ion** that has a charge of -2.

b. _____ There are 22 electrons in the neutral atom.

c. _____ There are 54 electrons in the **ion** that has a charge of +3.

d. _____ In Group IVA and Period 5

e. _____ Its atomic number is 39

f. _____ An atom in group VA that forms a +5 ion

g. _____ An atom with 2 valence electrons

h. _____ An atom with 6 protons and 8 neutrons

2. Match the descriptions on the left with the items on the right. Items may be used more than once or not at all. (2 pts each).

a. _____could have a pH of 2	A. water
b. _____orange juice	B. acid
c. _____always has a pH greater than that of HCl	C. soap
d. _____ tastes bitter	D. base
e. _____turns blue litmus to blue	
f. _____ can neutralize NaOH	
g. ____ product of neutralization	

3. (12 pts) Complete the following.

a. Imagine that the symbols below represent two basic units. Indicate what the products would look like

If a physical change takes place: X-X + Y-Y →

If a chemical change takes place: X-X + Y-Y →

b. Write the Lewis dot symbol for Tin (#50)

c. Write the Lewis dot symbol for the Tin ion

4. (14 pts) Complete the following.
   a. State the Periodic Law:

   b. Assume that elements with atomic numbers greater than 110 will eventually be made. If so, what would be the atomic number and group number (indicate A or B) of the next **nonmetal**?

      Atomic # = _____ Group # = _____

   c. What is the charge on the ion of the element that naturally occurs as a diatomic gas in Group VI?

   d. Give the formula for the compound formed between the elements V(#23) and oxygen.

   e. A transition metal **ion** with a charge of +3 has 25 electrons. It forms a compound with a negative ion with a charge of –1. The anion has 36 electrons. What is the formula of this compound?

II MULTIPLE CHOICE

Place an X across the letter corresponding to the answer for each question (3 pts each).

4.	a	b	c	d		8.	a	b	c	d
5.	a	b	c	d		9.	a	b	c	d

6. a b c d

7. a b c d

10. a b c d

11. a b c d

4. How many hydrogen atoms are in the formula $C_4H_6N(CH_3)_2S_2(NH_2)_3$
   a. 16
   b. 18
   c. 10
   d. 11

5. How many different **kinds** of subunits are there in $C_4H_6N(CH_3)_2S_2(NH_2)_3$?
   a. 2
   b. 3
   c. 12
   d. 5

6. Which of the following describes a neutron?
   a. +1 charge, mass = 1 amu
   b. +1 charge, mass = 0 amu
   c. 0 charge, mass = 1 amu
   d. –1 charge, mass = 1 amu

7. The atomic weight of an atom with 39 electrons, 50 neutrons and 39 protons would most likely be
   a. 78.96
   b. 88.9059
   c. 39.0983
   d. 138.9055

8. Element X is in Group IIIA. It is a dull, brownish-black solid. Element X is most likely
   a. Ga
   b. In
   c. B
   d. It is impossible to tell

9. The hydrogen ion
   a. is produced in large quantities by a base
   b. has a formula of OH^{-1}
   c. is produced in large quantities by an acid
   d. two of the above

10. The reaction HCl + NaOH
   a. represents a neutralization reaction
   b. has no observable color change
   c. results in the formation of a precipitate
   d. two of the above

11. The acid-base indicator BTB
   a. is colorless in acid
   b. is hot pink in acid
   c. is yellow in acid
   d. is blue in acid

III PROBLEMS *Use the rules for significant figures in all of your calculations!!!!*

12. (15 pts) Pure magnetite is composed of an iron and oxygen compound. Barry adds heat to a 3.85 g sample of magnetite and produces 2.79 g of iron and some oxygen gas.

a. Write a word equation for Barry's reaction, using all the appropriate symbols.

b. How many grams of oxygen did Barry produce? (Show your set-up and work)

c. Find the % composition of Barry's magnetite. (Show your work)

d. He knows that the formula of magnetite is either Fe_2O_3 or Fe_3O_4. Which formula is correct? (Support your answer with mathematics)

13. (5 pts) Describe in full one of the teaching techniques below (circle the one you are describing).

LEARNING CYCLE INQUIRY CONCEPT ATTAINMENT

EXTRA CREDIT

Trace the historical development of atomic models by drawing at least 3 different models. Name their scientific creators. Explain why the previous model was discarded.

NAME KEY

PH-218 EXAM II

Wednesday, March 12, 2003

I SHORT ANSWER

1. (2 pts each) Using the periodic chart, identify the element that is described by each statement below

a. **Ar** There are 18 electrons in this element's **ion** that has a charge of -2.

b. **Ti** There are 22 electrons in the neutral atom.

c. **La** There are 54 electrons in the **ion** that has a charge of +3.

d. **Sn** In Group IVA and Period 5

e. **Y** Its atomic number is 39

f. **Sb/V/Bi** An atom in group V that forms a +5 ion

g. **He, Be, Mg, Zn** An atom with 2 valence electrons

h. **C** An atom with 6 protons and 8 neutrons

2. Match the descriptions on the left with the items on the right. Items may be used more than once or not at all. (2 pts each).

a. **B** could have a pH of 2

b. **A** Orange juice

c. **C/A/D** always has a pH greater than that of HCl

d. **C/D** tastes bitter

e. **A/C/D** turns blue litmus to blue

f. **B** can neutralize NaOH

g. **A** product of neutralization

A. H_2O

B. acid

C. soap

D. base

3. (12 pts) Complete the following.

a. Imagine that the symbols below represent two basic units. Indicate what the products would look like

If a physical change takes place: X-X + Y-Y → **X-X + Y-Y**

If a chemical change takes place: X-X + Y-Y → **X-Y + X-Y , etc.**

b. Write the Lewis dot symbol for Tin (#50)

c. Write the Lewis dot symbol for the Tin ion

Sn^{+4}

4. (14 pts) Complete the following.
   a. State the Periodic Law:
   When the elements are arranged in increasing atomic number, certain properties occur at periodic intervals.

   b. Assume that elements with atomic numbers greater than 110 will eventually be made. If so, what would be the atomic number and group number (indicate A or B) of the next **nonmetal**?

   Atomic # = **118** Group # = **VIII (noble gases)**

   c. What is the charge on the ion of the element that naturally occurs as a diatomic gas in Group VI?

   -2

   d. Give the formula for the compound formed between the elements V(#23) and oxygen.

   V_2O_5

   e. A transition metal **ion** with a charge of +3 has 25 electrons. It forms a compound with a negative ion with a charge of –1. The anion has 36 electrons. What is the formula of this compound?

   $NiBr_3$

II MULTIPLE CHOICE

Place an x across the letter corresponding to the answer for each question (3 pts each).

4.	a	**b**	c	d	8.	a	b	**c**	d
5.	**a**	b	c	d	9.	a	b	**c**	d

6. a b **c** d

7. a **b** c d

10. a b c **d**

11. a b **c** d

4. How many hydrogen atoms are in the formula $C_4H_6N(CH_3)_2S_2(NH_2)_3$
   a. 16
   b. 18
   c. 10
   d. 11

5. How many different **kinds** of subunits are there in $C_4H_6N(CH_3)_2S_2(NH_2)_3$?
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7. The atomic weight of an atom with 39 electrons, 50 neutrons and 39 protons would most likely be
   a. 78.96
   b. 88.9059
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8. Element X is in Group IIIA. It is a dull, brownish-black solid. Element X is most likely
   a. Ga
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   c. B
   d. It is impossible to tell

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10. The reaction HCl + NaOH
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11. The acid-base indicator BTB
   a. is colorless in acid
   b. is hot pink in acid
   c. is yellow in acid
   d. is blue in acid

III PROBLEMS

12. (15 pts) Pure magnetite is composed of an iron and oxygen compound. Barry adds heat to a 3.85 g sample of magnetite and produces 2.79 g of iron and some oxygen gas.

a. Write a word equation for Barry's reaction, using all the appropriate symbols.

Magnetite $\xrightarrow{?}$ iron$_{(s)}$ + oxygen$_{(g)}$

b. How many grams of oxygen did Barry produce? (Show your set-up and work)

g O = 3.85g – 2.79g = 1.06g

c. Find the % composition of Barry's magnetite. (Show your work)

%Fe = 2.79 g/3.85 g x 100 = 72.5% Fe

%O = 1.06 g/3.85g x 100 = 27.5% O

d. He knows that the formula of magnetite is either Fe_2O_3 or Fe_3O_4. Which formula is correct? (Support your answer with mathematics)

By formula:

Fe_2O_3

2 Fe = 2 x 55.85 amu = 111.7
3 O = 3 x 16.00 amu = 48.00 Total = 159.7

so…% Fe = 111.7/159.7 x 100 = 69.94% Fe

Fe_3O_4

3 Fe = 3 x 55.85 amu = 167.5
4 O = 4 x 16.00 amu = 64.00 Total = 231.5

so…%Fe = 167.5/231.5 x 100 = 72.36 % Fe

Comparison gives closer match to Fe_3O_4

13. (5 pts) Describe in full one of the teaching techniques below (circle the one you are describing).

Answers will vary, but an example for CONCEPT ATTAINMENT would be

- **Data must be collected and organized into a grid**
- **Teacher is in control: "I'm thinking of an idea"**
- **Teacher gives examples of idea**
- **Students find properties in common and define the concept via the attributes**
- **Teacher gives idea a name**
- **Teacher begins with another idea (must be at least 2)**