CHEM 130.917
EXAM Ch.1-3

SHOW YOUR WORK
IN THE SPACES PROVIDED

NAME:_____

1. How many significant figures should be reported for the following calculation?

$$\frac{22.813 + 0.6}{(224.0 + 0.23) \times (8.320 \times 10^5)} =$$

a) 2 b) 3 c) 4 d) 5 e) none of these

2. In each case, tell whether the following changes in properties is a **physical** or **chemical change**.

a) Forming a bar of copper into wire _____

b) A tomato ripens _____

c) Frying an egg _____

d) The formation of dew on grass _____

3. Perform the following conversions.

a) 200.0 dm = _____km

b) 37.5 mL = _____L

c) 254 cm = _____ in

d) 3.0 qt. = _____mL

4. A fish tank holds 25.0 gallons of water. Given that the density of water is 1.00 g/mL, how many **pounds of water** does the fish tank hold?

_____lb

5. The speed of sound in air at room temperature is about 343 meters/second. Calculate this **speed in miles per hour.** (1 mi. = 1609 m)

_____**mph**

6. The density of ethanol, a colorless liquid commonly known as grainalcohol, has a density of 0.798 g/mL. Calculate the **mass** of 17.4 mL of the liquid.

_____**g**

7. The highest mountain in the United States is Alaska's Mt. McKinley, 6264 meters. **How high is it in feet** , rounded to four sig figs.?

_____ft

8. Tungsten melts at 3410ºC. What is this temperature in **ºF**? What is the temperature in **Kelvin**?

_____ºF

_____K

9. On April 15, 2017, gold was selling for $1,182 per ounce. How much would **1.00 gram of gold** be worth at this price?

$_____

10. A sample of silicon of natural origin is found to consist of three isotopes $^{28}_{14}Si$ (abundance 92.21%), $^{29}_{14}Si$ (abundance 4.70%) and $^{30}_{14}Si$ (abundance 3.09%). Show the calculation for the atomic weight of silicon.

_____amu

11. Complete the following table.

Atomic Number	Mass Number	Protons	Neutrons	Electrons	Name	Symbol
17			20			
	36		18			
	29					Si

12. The **<u>nucleus</u>** of a zirconium atom, $^{92}_{40}Zr$, contains:

a) 40 protons and 92 neutrons.
b) 40 protons and 40 electrons.
c) 92 protons and 40 neutrons.
d) 40 protons, 52 neutrons, and 40 electrons.
e) 52 neutrons and 40 protons.

13. Predict the ionic **charges** of the monoatomic ions formed by these main-group elements.

a) Ba _____ c) Rb _____

b) F _____ d) Ga _____

14. Determine the number of protons and the number of electrons in each of the following.

	protons	electrons
a) Ni^{+2}	_____	_____
b) Fe^{+3}	_____	_____

15. Indicate whether the following compounds are **ionic** or **covalent (molecular)**.

a) MgF_2 _____ c) N_2O_5 _____

b) PCl_3 _____ d) CF_4 _____

16. Give names or formulas for the following **ionic** compounds.

a) Li_2SO_3 _____ c) $Pb(ClO_4)_2$ _____

b) cobalt(II)sulfide_____ d) calcium carbonate_____

17. Give names or formulas for the following **covalent** compounds.

a) phosphorus triiodide_____ c) sulfur dibromide _____

b) N_4O_{10} _____ d) Cl_2O_7_____

18. Indicate the **"pet" name** associated with the groups containing each of the following. (ie. 'halogen'...'alkali metal'....etc.)

a) He _____ c) Ba _____

b) Cl _____ d) Li _____

19. Balance the following equations.

____ $KClO_3$ ---------> ____$KClO_4$ + ____KCl

____ Cl_2 + _____NaOH --------> _____NaOCl + _____NaCl + _____ H_2O

20. Completethe following.

a) 180 g $Ba(C_2H_3O_2)_2$ = _____moles $Ba(C_2H_3O_2)_2$

c) 3.50 moles $Ca_3(PO_4)_2$ = _____grams $Ca_3(PO_4)_2$

21. If you weigh 60.0 kg and you are 12.2% carbon by mass, how many **individual carbon** atoms do you have?

_____C atoms

22. What is the **percentage chlorine** by mass in DDT, $C_{14}H_9Cl_5$?

_____%Cl

23. List the seven elements that naturally occur as **diatomic molecules.**

24. A compound contains 63.1% carbon, 11.92% hydrogen and 24.97% fluorine. Derive its **empirical formula**.

_____

25. Combustion analysis of naphthalene, a hydrocarbon containing only carbon and hydrogen used in mothballs, produces 8.80 g CO_2 and 1.44 g H_2O. Calculate the **empirical formula** of naphthalene.

_____

Extra Credit (5 pt.)

The Honda Insight, a hybrid electric vehicle, has a USEPA mileage rating of 57 mi/gal. How many kilometers can the Insight travel on the amount of gasoline that would fit in a soda can (355 mL)?