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Period: 2 Date: 12/8/10

Define the following terms:

1. chemistry

science that studies the matter of the universe and change it undergoes

2. hypothesis

an educated guess about what will happen or why something happened.

→ Answer the following question(s) on the back of this paper or on a separate sheet of paper.

3. Give me four safety rules for the lab.

- always wear goggles when working with chemicals or fire

Classify each of the following as a physical (P) or a chemical (C) change.

- A. P
- B. C

B 4. cooking an egg

A 5. boiling water

A 6. grinding grain

B 7. fermenting fruit juice

Classify each of the following.

- A. element
- B. compound
- C. homogenous mixture
- D. heterogeneous mixture

A 13. chlorine gas

D 14. sand in water

C 15. petroleum

B 16. caffeine

Answer the following question(s) on the back of this paper or on a separate sheet of paper.

17. When writing in your lab notebook what are three things you must always put in the header of the lab notebook?

title, lab partner, date

What are the four questions you must answer as your discussion for every lab?

a) summary of your results

b) hypothesis of why they were what they were

c) how would you test your hypothesis

d) potential for error in your lab

18. Name the following phase changes:

a) Liquid to solid

freezing

b) solid to gas

sublimation

c) gas to liquid

condensation

- D 8. A _____ change involves a change in one or more physical properties, but no change in the fundamental components that make up the substance.
- A. chemical
 - B. mixed
 - C. potential
 - D. physical
 - E. kinetic

- B 9. A _____ change involves a change in the fundamental components of the substance; a given substance changes into a different substance or substances.
- A. physical
 - B. chemical
 - C. mixed
 - D. potential
 - E. kinetic

10. If iodine melts at 114°C and boils at 184°C , what is its physical state at 120°C ?

liquid

11. If iodine melts at 114°C and boils at 184°C , what is its physical state at 250°C ?

gas

12. If iodine melts at 114°C and boils at 184°C , what is its physical state at 98°C ?

solid

D 23. How many hydrogen atoms are indicated in the formula $(\text{NH}_4)_2 \text{C}_8\text{H}_4\text{O}_2$?

- A. 20
- B. 8
- C. 24
- D. 12
- E. None of the above

F 24. Which of the following did Dalton discuss in his atomic theory?

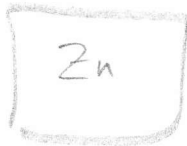
- A. isotopes
- B. ions
- C. protons
- D. electrons
- E. neutrons
- F. Dalton's theory did not discuss any of these topics.

Identify each of the following:

25. The transition metal that has 24 electrons as a +3 ion

$P - 27 e^- = +3$

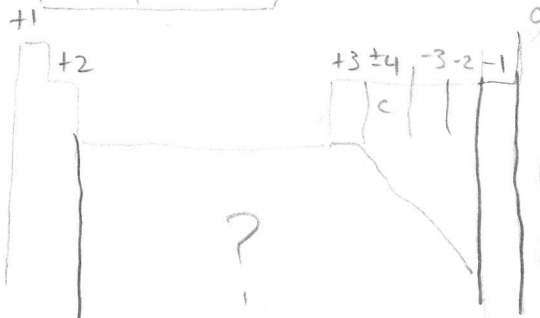
$P = 30$



$\# P = \# e$

$\ast \# P - \# e = \text{charge}$

26. The alkaline earth metal that has 18 electrons as a stable ion = +2

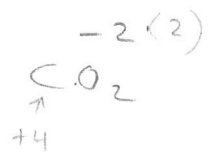


atom \equiv neutral

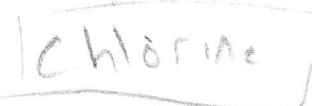
↑
Not
neutral

$P - e = \text{charge}$

$P - 18 = +2$



27. The halogen in the third period



19. Write the name for Ar. Argon

20. Write the name for W. tungsten

21. Write the name for Pb. Lead

22. Write the symbol for mercury. Hg

$$60 - 26 =$$

For the element Iron, with a mass of 60 amu and a charge of +2.

$$* p - e = \text{charge}$$

How many protons, neutrons and electrons does it have?

26 34 24

26 protons

34 neutrons

24 electrons

35. The name for Li_2O is Lithium Oxide

36. The name for SO_2 is sulfur dioxide

- D 28. The scientist whose alpha-particle scattering experiment led him to conclude that the nucleus of an atom contains a dense center of positive charge is
- A. William Thomson
 - B. J. J. Thomson
 - C. Lord Kelvin
 - D. Ernest Rutherford ←
 - E. James Chadwick

- D 29. Which atomic particle determines the chemical behavior of an atom?
- A. nucleus
 - B. neutron
 - C. electron
 - D. proton
 - E. None of the above

- B 30. How many protons are there in an atom of ${}^{238}_{92}\text{U}$? ← mass #
- A. cannot be determined from information given
 - B. 92 ←
 - C. 146
 - D. 184
 - E. 238

~~22.99~~ Na
 11
 23 Na
 11
 22 Na
 11

- B 31. An atom with 46 protons has a mass number of 102. The atom is
- A. U
 - B. Pd
 - C. Ba
 - D. No
 - E. None of the above

- B 32. How many neutrons are present in a ${}^{234}_{91}\text{Pa}$ nucleus? ← mass # = p + n
- A. 325
 - B. 143
 - C. 234
 - D. 91
 - E. None of the above

Select the letter of the term, name, or phrase that best matches each description.

- X 33. Please match the name on the left to what they contributed towards the making of the modern periodic table on the right.
- | | |
|----------------|---|
| ___ Rutherford | A. Rearranged the periodic table by atomic number as opposed to atomic mass. |
| ___ Moseley | B. Discovered elements 94-102 and added the Lanthanide series to the periodic table. |
| ___ Mendeleev | C. Used gold foil and alpha particles to discover a small positively charged nucleus. |
| ___ Seaborg | D. Arranged atoms into a chart according mass, reactivity and chemical properties. |

41. The name for the compound $\text{Sn}(\text{NO}_3)_2$ is Tin(II) Nitrate.

42. The name for the acid $\text{HC}_2\text{H}_3\text{O}_2$ is acetic acid.

43. The name for the acid H_2SO_4 is sulfuric acid.

44. The name for the compound KH is Potassium Hydride.



37. The name for ClO_4^- is Perchlorate.

38. The correct name for the Sn^{4+} species is Tin (IV).

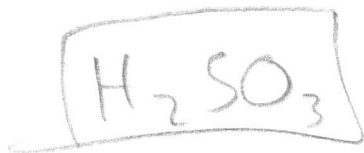
39. What is the name of the compound $\text{Fe}(\text{OH})_2$?

Iron (II) hydroxide

40. The name for the compound NH_4F is _____.

Ammonium fluoride

Give the formula for sulfurous acid.



50. Give the formula for hydroiodic acid.



51. Give the formula for silicon tetrafluoride.

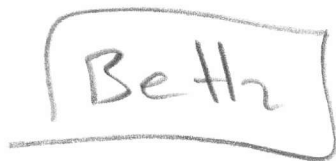


Express the following in scientific notation:

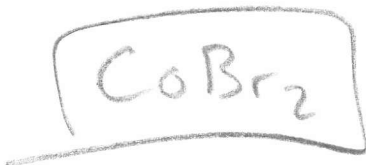
52. 0.00832

$$8.32 \times 10^{-3}$$

45. Write the correct formula for beryllium hydride.



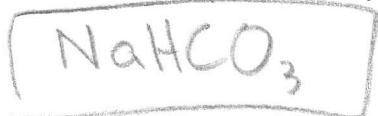
46. Write the correct formula for cobalt(II) bromide.



47. Give the formula for potassium chloride.



48. Give the formula for sodium hydrogen carbonate.



A 60. Which represents the greatest mass?

- A. 1.0 mol Zn
- B. 1.0 mol Cu
- C. 1.0 mol Al
- D. 1.0 mol Fe
- E. all the same

B 61. What is the molar mass of H₂S?

- A. 64.11 g/mol
- B. 34.08 g/mol
- C. 51 g/mol
- D. 17 g/mol
- E. 78.16 g/mol

34.086

D 62. Calculate the number of moles of water molecules of 25.0 g of water.

- A. 0.720 mol
- B. 2.78 mol
- C. 4.17 mol
- D. 1.39 mol
- E. 6.98 mol

$$25.0 \text{ g H}_2\text{O} \left(\frac{1 \text{ mol}}{18.016 \text{ g}} \right) = 1.39 \text{ mol}$$

63. Calculate the percentage composition (by mass) of all the elements in Cd₃(AsO₄)₂.

MW

Cd = 54.82%

As = 24.36%

O = 20.81%

Cd	337.23
As	149.84
O	128
	615.07

64. A compound has 40.68% carbon, 5.12% hydrogen, and 54.20% oxygen (by mass) the molar mass is 118 g/mol. Calculate its empirical and molecular formulas.

C = 48.00	4 mols
H = 6.042	6 mols
O = 63.96	4 mols

C₄H₆O₄ - molecular

C₂H₃O₂ empirical = ratio

53. 6020

6.020×10^3

D 54. How many significant figures are in the number 0.0908?

- A. 5
- B. 1
- C. 4
- D. 3
- E. 2

B 55. How many significant figures are in the number 0.020300?

- A. 1
- B. 5
- C. 4
- D. 2
- E. 3

C 56. How many significant figures are there in the result of the following calculation?

$$(4.321/2.8) \times (6.9234 \times 10^5)$$

- A. 4
- B. 1
- C. 2
- D. 3
- E. 5

C 57. The result of the following calculation has how many significant figures?

$$(0.4333 \text{ J/g } ^\circ\text{C})(33.12^\circ\text{C} - 31.12^\circ\text{C})(412.1 \text{ g})$$

- A. 5
- B. 3
- C. 4
- D. 2
- E. 1

C 58. What is the mass of 2.00 moles of $\text{Ca}(\text{OH})_2$?

- A. 56 g
- B. 122.5 g
- C. 148.2 g
- D. 222.4 g
- E. 74.1 g

$$2 \text{ mol} \left(\frac{74.1 \text{ g}}{1 \text{ mol}} \right) =$$

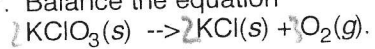
A 59. How many atoms are there in 58.7 g of nickel?

- A. 6.02×10^{23}
- B. 1
- C. 1.204×10^{23}
- D. 28
- E. None of the above

$$58.7 \text{ g} \left(\frac{1 \text{ mol}}{58.69 \text{ g}} \right)$$

58.7 g	1 mol	6.02×10^{23}
	58.69 g	1 mol

68. Balance the equation



K 2

K

2 K 2

Cl

Cl

2 Cl 2

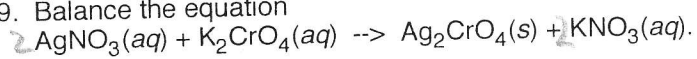
O

O

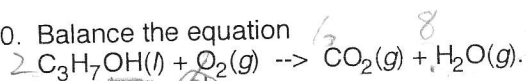
6 O 6



69. Balance the equation



70. Balance the equation



6 C 6

16 H 16

20 O 20



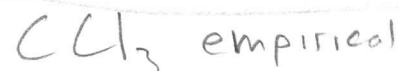
65. A compound contains 10.13% C and 89.87% Cl (by mass). Determine both the empirical formula, and the molecular formula of the compound, given that the molar mass is 237 g/mol.

$$C = 24.00$$

$$Cl = 213$$

$$2 \text{ mols } C$$

$$6 \text{ mols } Cl$$



66. A compound has a molar mass of 86 g/mol and has the percent composition (by mass) of 55.8% C, 37.2% O, and 7.0% H. Determine the empirical formula and the molecular formula.

$$C = 47.9$$

$$O = 31.9$$

$$H = 6.0$$

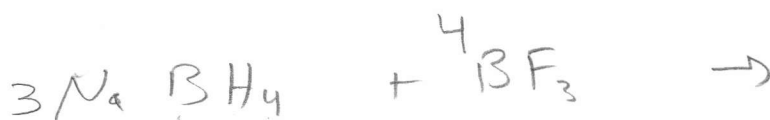
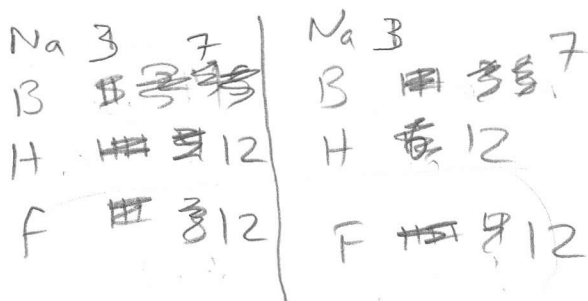
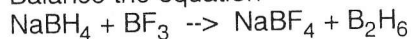
$$4 \text{ moles } C$$

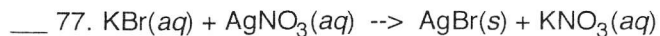
$$2 \text{ moles } O$$

$$6 \text{ moles } H$$



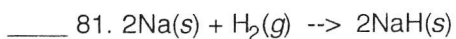
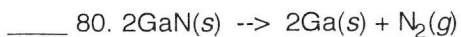
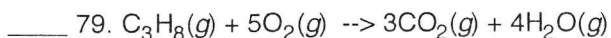
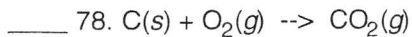
67. Balance the equation





Use the following choices to classify each of the following reactions (more than one choice may apply).

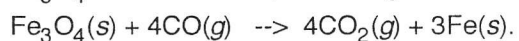
- A. oxidation-reduction
- B. combustion
- C. synthesis
- D. decomposition



Answer the following question(s) on the back of this paper or on a separate sheet of paper.

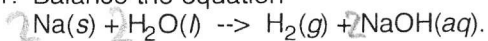
82. Please write the molecular equation that describes the combustion of Methane gas (CH_4)

83. Fe_3O_4 reacts with CO , according to the reaction



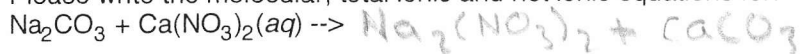
If 234 g CO is reacted with excess Fe_3O_4 , what mass of CO_2 will be produced?

71. Balance the equation

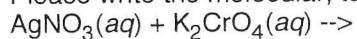


Identify the solid product that forms when the following aqueous solutions are mixed:

72. Please write the molecular, total ionic and net ionic equations for:

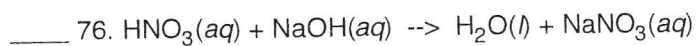
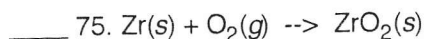
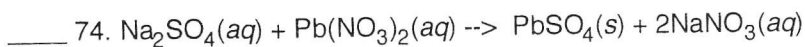


73. Please write the molecular, total ionic and net ionic equations for:



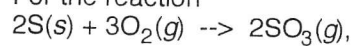
Use the following choices to classify each reaction given below (more than one choice may apply).

- A. oxidation-reduction
- B. acid-base
- C. precipitation



7. In the reaction of $C_8H_{18}(l)$ with $O_2(g)$, to form $CO_2(g)$ and $H_2O(g)$, 4.78 g C_8H_{18} is reacted with 7.00 g of O_2 . Determine the amount of carbon dioxide formed and how much of the nonlimiting reagent is left over.

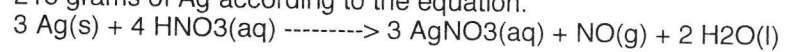
88. For the reaction



how many moles of SO_3 can be produced from 8.0 g O_2 and excess S?

Answer the following question(s) on the back of this paper or on a separate sheet of paper.

89. Calculate the number of mL of 2.00 M HNO_3 solution required to react with 216 grams of Ag according to the equation.



84. In the reaction



how many grams of sodium chloride can be produced from 10.9 g of NaOH?

85. For the reaction



11.9 g Cl_2 is reacted with 12.0 g NaOH. Determine which is the limiting reactant and how much excess is left over of the nonlimiting reagent.

86. Consider the reaction



Which of the reactants is in excess if we start with 50.0 g of each reactant? How much SiH_4 will be produced?

- ___ 97. Calculate the molarity of a solution prepared by dissolving 4.09 g of NaI in enough water to prepare 312 mL of solution.
- A. 1.66 M
 - B. 0.175 M
 - C. 0.0131 M
 - D. 0.0875 M
 - E. 76.3 M

- ___ 98. What is the mass of H_2SO_4 in 1.00×10^2 mL of 0.200 M H_2SO_4 solution?
- A. 19.6 g
 - B. 1.00×10^2 g
 - C. 20.0 g
 - D. 1.96 g
 - E. None of the above

Answer the following question(s) on the back of this paper or on a separate sheet of paper.



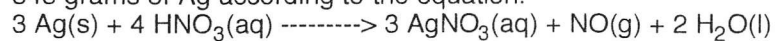
a) How many liters of 0.100 M HCl would be required to react completely with 5.00 grams of calcium hydroxide?

b) If I combined 15.0 grams of calcium hydroxide with 75.0 mL of 0.500 M HCl, how many grams of calcium chloride would be formed?

c) What is the limiting reagent from the reaction in part b? _____

d) How many grams of the excess reagent will be left over after the reaction in problem 3 is complete?

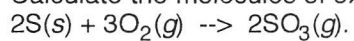
100. Calculate the number of mL of 5.00 M HNO₃ solution required to react with 343 grams of Ag according to the equation.



- ____ 101. Calculate the volume of 0.500 M KOH required to neutralize 150 mL of 0.100 M HCl.

- A. 30. mL
- B. 150 mL
- C. 75 mL
- D. 750 mL
- E. None of the above

102. Calculate the molecules of oxygen required to react with 16.0 g of sulfur in the following reaction:



n.