

Name: _____

Answer key

CHEMISTRY 1211

EXAM #1 VERSION 1

This exam is 8 pages long. Please read through all of the questions first and ask about anything you do not understand. You will have one hour and 15 minutes to complete this exam. Exams will be picked up at the end of the class period. No late exams will be accepted!

You are allowed to use a calculator. If you do not have a calculator, setting up the problem correctly will gain you some points but you will not receive full credit for any question you do not answer completely.

Included in this exam is a periodic table, which should be stapled to the back of the exam.

CHEATING IS NOT ALLOWED. ANYONE CAUGHT CHEATING WILL RECEIVE A ZERO ON THIS EXAM.

The exam is worth a total of 100 points. Each question is labeled with its exact point value. Be sure to answer all of the questions on the exam.

Good Luck!

Multiple Choice: Circle all correct answers! (3 points each)

1.) Convert 46.72 inches into micrometers.

a.) $1.949 \times 10^6 \mu\text{m}$

b.) $1.187 \times 10^6 \mu\text{m}$

c.) $3.692 \mu\text{m}$

d.) $1.950 \mu\text{m}$

e.) $7.672 \times 10^5 \mu\text{m}$

$$\frac{46.72 \text{ in} \mid 2.54 \text{ cm} \mid 1 \text{ m} \mid 1 \times 10^6 \mu\text{m}}{1 \text{ in} \mid 100 \text{ cm} \mid 1 \text{ m}} =$$

$$1.187 \times 10^6 \mu\text{m}$$

2.) Of the following _____ is an extensive property.

a.) Density

b.) Mass

c.) Boiling point

d.) Freezing point

e.) Volume

3.) What is the density (in g/cm^3) of a gold nugget that has a volume of 1.68 mL and a mass of 32.4 g?

a.) 0.0519

b.) 19.3

c.) 54.4

d.) 0.0184

e.) 32.4

$$D = \frac{m}{V} = \frac{32.4 \text{ g}}{1.68 \text{ mL}} = 19.3 \text{ g/mL}$$

4.) Cathode ray tube experiments provided the first evidence of _____.

a.) microwave rays

b.) x-rays

c.) fluorescence

d.) electrons

e.) atoms

5.) An atom of the most common isotope of gold, ^{197}Au , has 79 protons, 118 neutrons, and 79 electrons.

a.) 197, 79, 118

b.) 118, 79, 39

c.) 79, 197, 197

d.) 79, 118, 118

e.) 79, 118, 79

6.) The elements in groups 1, 16, and 17 are called,

alkali, chalcogens and halogen, respectively.

a.) Alkaline earth metals, halogens, and chalcogens

b.) Alkali metals, chalcogens, and halogens

c.) Alkali metals, halogens, noble gases

d.) Alkaline earth metals, transition metals, halogens

e.) Halogens, transition metals, alkali metals

7.) When a metal and a nonmetal react, the metal tends to lose electrons and the nonmetal tends to gain electrons.

a.) Metal, metal

b.) Nonmetal, nonmetal

c.) Metal, nonmetal

d.) Nonmetal, metal

e.) None of these, these elements share electrons equally

8.) The empirical formula of a compound with molecules containing 12 carbon atoms, 14 hydrogen atoms and 6 oxygen atoms is _____.

a.) $\text{C}_{12}\text{H}_{14}\text{O}_6$

b.) CHO

c.) CH_2O

d.) $\text{C}_6\text{H}_7\text{O}_3$

e.) $\text{C}_2\text{H}_4\text{O}$

$$\text{C}_{12}\text{H}_{14}\text{O}_6 \div 2 = \text{C}_6\text{H}_7\text{O}_3$$

9.) The formula weight of potassium phosphate is _____.

a.) 173.17

b.) 251.37

c.) 212.27

d.) 196.27

e.) 86.07



10.) Calculate the number of moles of copper ions in 26.34 g of Copper oxide.

a.) 0.2634 moles Cu^{2+} ions

b.) 0.6221 moles of Cu^{2+} ions

c.) 0.3311 moles of Cu^{2+} ions

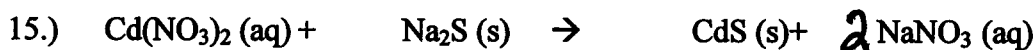
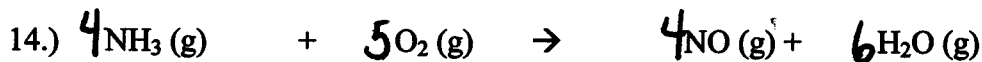
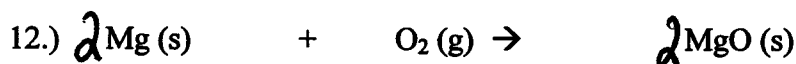
d.) 1.241 moles of Cu^{2+} ions

e.) 2.634 moles of Cu^{2+} ions

$$\frac{26.34g \text{ CuO}}{79.55g} \times \frac{1 \text{ mole CuO}}{1 \text{ mole Cu}^{2+}} =$$

0.3311 mol Cu^{2+} ions

Balance the following reactions. (2 points each)



Fill in the Blank (2 points each)

16.) The formula for aluminum hydroxide is $Al(OH)_3$.

17.) The formula for sodium sulfate is Na_2SO_4 .

18.) The name of the binary compound N_2O_4 is dinitrogen tetroxide

19.) The name of the ionic compound NH_4CN is ammonium cyanide

20.) The name of the oxyacid $HClO_4$ is perchloric acid.

(10 points)

21.) What is the atomic weight of an element if the two known isotopes of the element have the following characteristics?

Isotope	Mass (amu)	% Abundance
1	31.163	35.16
2	34.296	64.84

$$(31.163)(.3516) + (34.296)(.6484)$$

$$10.9569 + 22.2375 = \boxed{33.1944 \text{ amu}}$$

4 sig figs

(5 points)

22.) Calculate the percentage by mass of chlorine in $PtCl_2(NH_3)_2$

$$\%Cl = \frac{2(35.45)}{300.068} \times 100 = \boxed{23.63\%}$$

(10 points)

23.) How many grams of nitrogen are in 10. g of NH_4NO_3 ? How many atoms of oxygen are in 10. g of NH_4NO_3 ?

$$\frac{10 \text{ g NH}_4\text{NO}_3}{80.052 \text{ g}} \times \frac{1 \text{ mol NH}_4\text{NO}_3}{1 \text{ mol NH}_4\text{NO}_3} \times \frac{2 \text{ mol N atoms}}{1 \text{ mol NH}_4\text{NO}_3} \times 14.01 \text{ g N} = \boxed{3.50 \text{ g N}}$$

2 sig figs

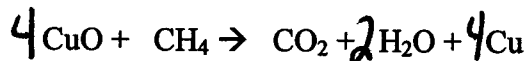
$$\frac{10. \text{ g NH}_4\text{NO}_3}{80.052 \text{ g}} \times \frac{1 \text{ mol NH}_4\text{NO}_3}{1 \text{ mol NH}_4\text{NO}_3} \times \frac{6.022 \times 10^{23} \text{ molecules}}{1 \text{ molecule}} \times \frac{3 \text{ O atoms}}{1 \text{ molecule}} =$$

$$2.26 \times 10^{23} \text{ Oxy atoms}$$

$$\boxed{2.3 \times 10^{23} \text{ oxygen atoms}}$$

2 sig figs

(10 points)

24.) How many grams of CH_4 are required to produce 43 g of Cu according to the following equation? Be sure to balance the reaction.

$$\frac{43 \text{ g Cu}}{63.55 \text{ g Cu}} \times \frac{1 \text{ mol Cu}}{4 \text{ mol Cu}} \times \frac{1 \text{ mol CH}_4}{1 \text{ mol CH}_4} \times 16.042 \text{ g CH}_4 = 2.714 \text{ g CH}_4$$

$$\boxed{2.7 \text{ g CH}_4}$$

2 sig figs

(15 points)

25.) What mass of hydrogen gas is produced by the reaction of 4.73 g of magnesium with 1.83 g of water? Be sure to balance the reaction.



$$\frac{4.73 \text{ g Mg}}{24.30 \text{ g}} \left| \frac{1 \text{ mole Mg}}{24.30 \text{ g}} \right. = 0.1947 \text{ mol Mg}$$

$$\frac{1.83 \text{ g H}_2\text{O}}{18 \text{ g H}_2\text{O}} \left| \frac{1 \text{ mol H}_2\text{O}}{18 \text{ g H}_2\text{O}} \right. = 0.1016 \text{ mol H}_2\text{O} \leftarrow \text{limiting}$$

$$\frac{0.1016 \text{ mol H}_2\text{O}}{2 \text{ mol H}_2\text{O}} \left| \frac{1 \text{ mol H}_2}{2 \text{ mol H}_2\text{O}} \right| \frac{2.016 \text{ g H}_2}{1 \text{ mol H}_2} = 0.1024 \text{ g H}_2$$

0.102 g H₂

3 sig figs