Exam I General Chemistry I (CHEM 101) Fall 2012 8:30 am T,R Dr. Hahn 8:30 A Exam # _____

Name Key (print) Name no partial Credit Multiple Choice (sign)

Please show work for partial credit on the Long Answers and in some ~~of the Short Answer Questions~~. Multiple choice questions have no partial credit. Please write anything you want graded legibly. If I cannot read your work, I obviously cannot grade it. (2 pts print and sign exam) NA = not attempted

Part I MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. (2 pts per question, 28 pts total) 2pts each mc

1) Determine the volume of an object that has a mass of 455.6 g and a density of 19.3 g/cm^3. 1) B
A) 42 .4 mL B) 23.6 mL C) 31.2 mL D) 87.9 mL E) 18.5 mL

d = 19.3 g/cm^3
$455.6\,g \times \frac{cm^3}{19.3\,g} = 23.6\,mL$

2) The statement, "In a chemical reaction, matter is neither created nor destroyed" is called 2) D
A) Dalton's Atomic Theory.
B) the Scientific Method.
C) the Law of Definite Proportions.
D) the Law of Conservation of Mass.
E) the Law of Multiple Proportions.

3) Which of the following are examples of a chemical change? 3) D
A) copper building materials develop a green patina over time
B) a match burns
C) ethanol evaporates
D) Both A and B are examples of chemical change.
E) All of the above are examples of chemical change.

4) Write the name for $Sn(SO_4)_2$. Remember that Sn forms several different charged ions. 4) E
A) tin (II) sulfite
B) tin (I) sulfite
C) tin sulfide
D) tin (I) sulfate
E) tin (IV) sulfate

SO_4 is (-2) (2 x -2) = 4
so Tin (IV)

5) Identify the charges of the protons, neutrons, and electrons. 5) A
A) protons +1, neutrons 0, electrons -1
B) protons 0, neutrons -1, electrons +1
C) protons +1, neutrons -1, electrons 0
D) protons 0, neutrons +1, electrons -1
E) protons -1, neutrons 0, electrons +1

6) Which of the following is a molecular (covalent) compound? 6) B
A) RbBr B) CH_3Cl C) KCl D) $CuCl_2$ E) $NaNO_3$

rest have 2 elements or opposite side of periodic table

7) The outside temperature is 35°C, what is the temperature in K? 7) D
A) 95 K B) -238 K C) 63 K D) 308 K E) 31 K

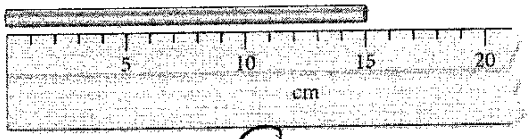
K = 35°C + 273.15 = 308.15 → 308 w sig. fig.

8) How many molecules of N_2O_4 are in 76.3 g N_2O_4? The molar mass of N_2O_4 is 92.02 g/mol. 8) B

A) 7.26×10^{23} N_2O_4 molecules
B) 4.99×10^{23} N_2O_4 molecules
C) 4.59×10^{25} N_2O_4 molecules
D) 1.38×10^{24} N_2O_4 molecules
E) 5.54×10^{25} N_2O_4 molecules

$76.3\ g\ N_2O_4 \times \frac{mol\ N_2O_2}{92.02\ g\ N_2O_2} \times \frac{6.02 \times 10^{23}}{mol\ N_2O_2} =$

9) Read the length of the metal bar with the correct number of significant figures. 9) B



read in between lines for sig. fig. (estimated is last significant #)

A) 20 cm B) 15.0 cm C) 15.000 cm D) 15 cm E) 15.00 cm

10) Choose the pure substance from the list below. 10) D
A) lemonade B) sea water C) milk D) sugar E) air

11) How many silver atoms are contained in 3.75 moles of silver? 11) B

A) 6.23×10^{24} silver atoms
B) 2.26×10^{24} silver atoms
C) 6.50×10^{25} silver atoms
D) 2.44×10^{26} silver atoms
E) 1.61×10^{23} silver atoms

$3.75\ mol\ Ag \times \frac{6.02 \times 10^{23}\ atoms\ Ag}{mol\ Ag} = 2.2575 \times 10^{24}$ (3 sig fig)

12) Which of the following elements is a noble gas? 12) A
A) Ar B) N C) Br D) O E) K

(Br: halogen; O: chalcogen; K: alkali metal)

13) Determine the name for H_2CO_3. 13) A
A) carbonic acid
B) dihydrogen carbonate
C) hydrocarbide acid
D) carbonous acid
E) hydrocarbonic acid

name acids -ic acid & on memorize list

14) How many mg does a 433 kg ~~sample~~ contain? 14) B
A) 4.33×10^{7} mg
B) 4.33×10^{8} mg
C) 4.33×10^{6} mg
D) 4.33×10^{-4} mg
E) 4.33×10^{-3} mg

$433\ kg \times \frac{1000\ g}{1\ kg} \times \frac{1000\ mg}{1\ g} = 4.33 \times 10^{8}\ mg$

Part II Short Answer: Write the word or phrase or circle the choice that best completes each statement or answer the question. (42 pts)

15)

For the following, given the metric prefix, fill in the blank with the number which matches (6 pts)

kilo 1000 (10^3) centi 0.01 (10^{-2}) milli 0.001 (10^{-3})

16)

For the symbol given below fill in the blanks (6 pts)

$^{20}_{10}$Ne # protons 10 # electrons (for a neutral atom) 10 # neutrons 20 − 10 = 10

reversed? −2

17)

Fill in the blank or circle the correct choice (2 pts per blank , 24 pts)

a. The element symbol for the element hydrogen H

b. The name of the element with the symbol Li lithium

c. one mole of the element Mg weighs 24.3 grams and contains 6.02×10^{23} atoms of magnesium

d. An example of a (period) or (group) [circle one] is the column going from H to Fr

e. An example of one of the elements which is an Actinide/Lanthanide

is the element Nd (fill in with the symbol for an element) reversed −2

f. For the element S the atomic mass is 32.1 and the atomic number is 16

g. The charge for the ionic form of the element Na is +1.

sign (−, +)

This number is the same as the (group) or (period) [circle one] number}

h. The charge for the ionic form of the element Se is −2

This number is derived from the equation {(group) or (period) number minus 8}

18) The formula weight (molecular weight) of $Ba_3(PO_4)_2$ is (show work) (6 pts)

2pts each

$3(137.3) + 2(30.97) + 8(16.0) =$ math −2

Ba P O

$411.9 + 61.94 + 128 = 601.84 \rightarrow 602$ sig fig

19) Part III: Long Answers: Please answer the following question Please show work for partial credit. I can only grade what I can read. Please write legibly. (28 pts)

For the formula Na_2SO_4 (formula mass or molecular weight = 142.1 grams / mole)

a. How many moles of Na_2SO_4 is in 937.4 grams of the compound ? (14pts)

$937.4\text{ g } Na_2SO_4 \times \frac{1\text{ mol } Na_2SO_4}{142.1\text{ g } Na_2SO_4} = 6.60\text{ mol } Na_2SO_4$

6pts

6pts

extra wrong step −3

2pts math

upside down −3

serious attempt −8

b. How many atoms of Na is in 937.4 grams of the compound Na_2SO_4 ? (14 pts)

3pt 2pt 3pt 3pt

$937.4\text{ g } Na_2SO_4 \times \frac{1\text{ mol } Na_2SO_4}{142.1\text{ g } Na_2SO_4} \times \frac{2\text{ mol Na}}{1\text{ mol } Na_2SO_4} \times \frac{6.022\times10^{23}\text{ atoms}}{1\text{ mol Na}}$

$= 7.943\times10^{24}$ atoms

1 pt math

1 pt sig. fig.

used wrong # from 19a no pts off

serious attempt has Avogadro's # in answer −8

Exam I General Chemistry I (CHEM 101) Fall 2012 8:30 am T,R Dr. Hahn 8:30 B Exam # _____

Name Key (print) Name no partial credit multiple choice (sign)

Please show work for partial credit on the Long Answers and in some of the Short Answer Questions. Multiple choice questions have no partial credit. Please write anything you want graded legibly. If I cannot read your work, I obviously cannot grade it. (2 pts print and sign exam) NA = not attempted

Part I MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. (2 pts per question, 28 pts total) rest are between metal & non metal

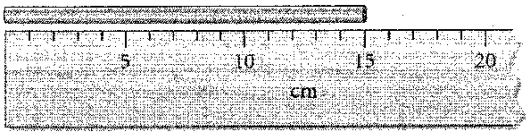
1) Which of the following is a molecular (covalent) compound? 1) A
A) P_4O_{10} B) SrI_2 C) LiOH D) NaCN E) ZnS

2) Determine the volume of an object that has a mass of 455.6 g and a density of 19.3 g/cm^3. 2) E
A) 42 .4 mL B) 87.9 mL C) 31.2 mL D) 18.5 mL E) 23.6 mL

3) Identify the charges of the protons, neutrons, and electrons. 3) B
A) protons 0, neutrons +1, electrons –1
B) protons +1, neutrons 0, electrons –1
C) protons +1, neutrons –1, electrons 0
D) protons 0, neutrons –1, electrons +1
E) protons –1, neutrons 0, electrons +1
2pts each mc

4) How many mg does a 433 kg sample contain? 4) A
A) 4.33×10^8 mg
B) 4.33×10^{-3} mg
C) 4.33×10^{-4} mg
D) 4.33×10^7 mg
E) 4.33×10^6 mg

$433\,kg \times \frac{1000\,g}{1\,kg} \times \frac{1000\,mg}{1\,g} = 4.33 \times 10^8\,mg$

5) Read the length of the metal bar with the correct number of significant figures. 5) E


A) 20 cm B) 15.000 cm C) 15 cm D) 15.00 cm E) 15.0 cm
you read between 2 of the marks - 1 # which you estimated

6) Which of the following elements is a noble gas? (group VIIIA) 6) B
A) N B) Ar C) K D) Br E) O

7) How many silver atoms are contained in 3.75 moles of silver? 7) C
A) 6.50×10^{25} silver atoms
B) 1.61×10^{23} silver atoms
C) 2.26×10^{24} silver atoms
D) 2.44×10^{26} silver atoms
E) 6.23×10^{24} silver atoms

$3.75\,mol\,Ag \times \frac{6.02 \times 10^{23}}{1\,mol\,Ag} = 2.26 \times 10^{24}$ Ag atoms

8) Determine the name for H_2CO_3. 8) B

A) hydrocarbide acid
B) carbonic acid
C) hydrocarbonic acid
D) carbonous acid
E) dihydrogen carbonate

9) Write the name for $Sn(SO_4)_2$. Remember that Sn forms several different charged ions. 9) E

A) tin (II) sulfite
B) tin (I) sulfate
C) tin sulfide
D) tin (I) sulfite
E) tin (IV) sulfate

10) How many molecules of N_2O_4 are in 76.3 g N_2O_4? The molar mass of N_2O_4 is 92.02 g/mol. 10) D

A) 5.54×10^{25} N_2O_4 molecules
B) 4.59×10^{25} N_2O_4 molecules
C) 1.38×10^{24} N_2O_4 molecules
D) 4.99×10^{23} N_2O_4 molecules
E) 7.26×10^{23} N_2O_4 molecules

$$76.3\ g\ N_2O_4 \times \frac{1\ mol\ N_2O_4}{92.02\ g\ N_2O_4} \times \frac{6.02 \times 10^{23}}{1\ mol\ N_2O_4} = 4.99 \times 10^{23}$$

11) Choose the pure substance from the list below. 11) A

A) sugar B) lemonade C) milk D) air E) sea water

(N_2, O_2 etc.) (lemon + H_2O) (water + protein) (salt + H_2O)

12) The outside temperature is 35°C, what is the temperature in K? 12) A

A) 308 K B) 31 K C) 63 K D) 95 K E) -238 K

$K = 35 + 273.15 = 308$

13) Which of the following are examples of a chemical change? 13) D

A) a match burns
B) copper building materials develop a green patina over time
C) ethanol evaporates (physical)
D) Both A and B are examples of chemical change.
E) All of the above are examples of chemical change.

14) The statement, "In a chemical reaction, matter is neither created nor destroyed" is called 14) E

A) the Law of Definite Proportions.
B) the Scientific Method.
C) the Law of Multiple Proportions.
D) Dalton's Atomic Theory.
E) the Law of Conservation of Mass.

Part II Short Answer: Write the word or phrase or circle the choice that best completes each statement or answer the question. (42 pts)

15)

For the following, given the metric prefix, fill in the blank with the number which matches (6 pts)

milli 0.001 10^{-3} centi 0.01 10^{-2} kilo 1000 10^{3}

16)

For the symbol given below fill in the blanks (6 pts)

reversed -2

$^{75}_{33}$As # protons 33 # electrons (for a neutral atom) 33 # neutrons 75-33 → 42

17)

Fill in the blank or circle the correct choice (2 pts per blank , 24 pts)

a. The element symbol for the element sulfur, S

b. The name of the element with the symbol Na sodium

c. one mole of the element Sr weighs 87.6 grams and contains 6.02×10^{23} atoms of strontium

d. An example of a (period) or (group) [circle one] is the row going from K to Kr

e. An example of one of the elements which is a Nonmetal is the element F (fill in with the symbol for an element)

f. For the element N the atomic mass is 14.01 and the atomic number is 7

-2 reversed

g. The charge for the ionic form of the element Mg is +2 Sign (+2)

This number is the same as the { (group) or (period) }[circle one] number

h. The charge for the ionic form of the element F is -1

This number is derived from the equation {(group) or (period) number minus 8}

18) The formula weight (molecular weight) of $(NH_4)_2O$ is (show work) (6 pts)

2 pts each

$2(14.01) + 8(1.01) + 16.0 =$ math −Σ

N H O

$28.02 + 8.08 + 16.0 = 52.1$

19) Part III: Long Answers: Please answer the following question Please show work for partial credit. I can only grade what I can read. Please write legibly. (28 pts)

For the formula $Ba_3(PO_4)_2$ (formula mass or molecular weight = 601.9 grams / mole)

a. How many moles of $Ba_3(PO_4)_2$ is in 937.4 grams of the compound ? (14pts)

$937.4\ g\ Ba_3(PO_4)_2 \times \frac{mol\ Ba_3(PO_4)_2}{601.9\ g\ Ba_3(PO_4)_2} = 1.557\ mol\ Ba_3(PO_4)_2$

6 pts 6 pts

extra wrong step −3

2 pts math

upside down −3

serious attempt −8

b. How many atoms of Ba is in 937.4 grams of the compound $Ba_3(PO_4)_2$? (14 pts)

3 pt 3 pt 3 pt

$937.4\ g\ Ba_3(PO_4)_2 \times \frac{mol\ Ba_3(PO_4)_2}{601.9\ g\ Ba_3(PO_4)_2} \times \frac{3\ mol\ Ba}{1\ mol\ Ba_3(PO_4)_2} \times \frac{6.02 \times 10^{23}\ atoms\ Ba}{1\ mol\ Ba} = 2.813 \times 10^{24}\ atoms\ Ba$

3 pt 1 pt math 1 pt sig fig

used wrong # from (19a) no pts off

serious attempt −8

Exam I General Chemistry I (CHEM 101) Fall 2012 9:55 am T,R Dr. Hahn 9:55 A Exam #

Name Key (print) Name (sign)

no partial credit
Multiple Choice

Please show work for partial credit on the Long Answers and in some of the Short Answer Questions. Multiple choice questions have no partial credit. Please write anything you want graded legibly. If I cannot read your work, I obviously cannot grade it. (2 pts print and sign exam)

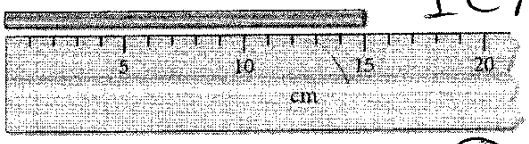
NA = not attempted

Part I MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. (2 pts per question, 28 pts total)

2pts each MC

1) Read the length of the metal bar with the correct number of significant figures. 1) C

1 estimated # is last significant #



A) 15 cm B) 15.000 cm C) 15.0 cm D) 15.00 cm E) 20 cm

2) Which of the following is an ionic compound? all the rest between elements close together in periodic table 2) E

A) NO_2 B) $SeBr_2$ C) CF_4 D) PCl_3 E) LiCl

3) Which of the following elements is an alkali metal? 3) C

A) Zn B) Xe C) Li D) F E) Ca

gray IA

4) How many moles of N_2O_4 are in 76.3 g N_2O_4? The molar mass of N_2O_4 is 92.02 g/mol. 4) B

A) 1.21 moles
B) 0.829 moles
C) 1.42×10^{-4} moles
D) 1.00 mole
E) 7.02×10^{3} moles

$$76.3\text{g } N_2O_4 \times \frac{\text{mol } N_2O_4}{92.02\text{g } N_2O_4} = 0.829\text{ mol}$$

5) In a chemical reaction, matter is neither created or destroyed. Which law does this refer to? 5) E

A) Law of Modern Atomic Theory
B) First Law of Thermodynamics
C) Law of Definite Proportions
D) Law of Multiple Proportions
E) Law of the Conservation of Mass

6) How many mg does a 433 kg sample contain? 6) E

A) 4.33×10^{-4} mg
B) 4.33×10^{-3} mg
C) 4.33×10^{7} mg
D) 4.33×10^{6} mg
E) 4.33×10^{8} mg

$$433\text{kg} \times \frac{1000\text{g}}{1\text{kg}} \times \frac{1000\text{mg}}{1\text{g}} = 4.33 \times 10^{8}\text{ mg}$$

7) Identify a cation. 7) C

A) An atom that has gained a proton.
B) An atom that has lost a proton.
C) An atom that has lost an electron.
D) An atom that has gained an electron.

8) Which of the following are examples of intensive properties? 8) C

A) mass
B) volume
C) density
D) None of the above are examples of intensive properties.
E) All of the above are examples of intensive properties.

property which is independent of how much of substance you have

9) Write the name for $Ca_3(PO_4)_2$. Remember that Ca only forms one charged ion. 9) A

A) calcium phosphate
B) calcium (III) phosphite
C) tricalcium phosphorustetraoxide
D) calcium phosphite
E) calcium (II) phosphite

binary ionic with polyatomic ion

10) How many iron atoms are contained in 354 g of iron? 10) C

A) 2.62×10^{25} Fe atoms
B) 4.69×10^{24} Fe atoms
C) 3.82×10^{24} Fe atoms
D) 9.50×10^{22} Fe atoms
E) 2.13×10^{26} Fe atoms

$$354\text{g Fe} \times \frac{1\text{ mol Fe}}{55.85\text{ g Fe}} \times \frac{6.02 \times 10^{23}\text{ atoms Fe}}{1\text{ mol Fe}} =$$

11) Determine the mass of an object that has a volume of 88.6 mL and a density of 9.77 g/mL. 11) E

A) 568 g B) 1100 g C) 298 g D) 907 g E) 866 g

$$88.6\text{ mL} \times \frac{9.77\text{ g}}{1\text{ mL}} = 866\text{ g}$$

12) Give the name for H_2SO_4. 12) B

A) persulfuric acid
B) sulfuric acid
C) hyposulfurous acid
D) sulfurous acid
E) persulfurous acid

13) The outside temperature is 35°C, what is the temperature in K? 13) A

A) 308 K B) 95 K C) -238 K D) 63 K E) 31 K

$$K = 35^\circ C + 273.15$$

14) Choose the element from the list below. 14) E

A) rust — iron oxide
B) carbon dioxide
C) water — H_2O
D) sodium chloride NaCl
E) helium He (one of the elements you memorized the symb.

Part II Short Answer: Write the word or phrase or circle the choice that best completes each statement or answer the question. (42 pts)

15)

For the following, given the metric prefix, fill in the blank with the number which matches (6 pts)

kilo $\frac{1000.}{10^{+3}}$ centi $\frac{0.01}{10^{-2}}$ milli $\frac{0.001}{10^{-3}}$

16)

For the symbol given below fill in the blanks (6 pts)

$^{127}_{52}$Te # protons 52 # electrons (for a neutral atom) 52 # neutrons $\frac{127-52}{75}$

reversed −2

17)

Fill in the blank or circle the correct choice (2 pts per blank , 24 pts)

a. The element symbol for the element phosphorus P

b. The name of the element with the symbol Br bromine

c. one mole of the element Rb weighs 85.47 grams and contains 6.02×10^{23} atoms of rubidium

d. An example of a (period) or (group) [circle one] is the c olumn going from C to Pb

e. An example of one of the elements which is a Metal is the element Ca (fill in with the symbol for an element)

f. For the element Cl the atomic mass is 35.5 and the atomic number is 17

reversed −2

g. The charge for the ionic form of the element Sr is +2.

This number is the same as the {(group) or (period) [circle one] number}

sign −2

h. The charge for the ionic form of the element O (oxygen) is −2

This number is derived from the equation {(group) or (period) number minus 8}

2 pts each

18) The formula weight (molecular weight) of Be $(NO_3)_2$ is (show work) (6 pts)

$9.01 + 2(14.01) + 6(16.0) =$ math -½

Be N O

$9.01 + 28.02 + 96.0 = 133.0$

19) Part III: Long Answers: Please answer the following question Please show work for partial credit. I can only grade what I can read. Please write legibly. (28 pts)

For the formula $Ca(NO_3)_2$ (formula mass or molecular weight = 164.12 grams / mole)

a. How many moles of $Ca(NO_3)_2$ is in 937.4 grams of the compound ? (14pts)

$937.4\text{g } Ca(NO_3)_2 \times \frac{\text{mol } Ca(NO_3)_2}{164.12\text{g } Ca(NO_3)_2} = 5.712 \text{ mol } Ca(NO_3)_2$

6 pts — 6 pts — 2 pts math — upside down -3 — extra wrong step -3 — serious attempt -8

b. How many atoms of N is in 937.4 grams of the compound $Ca(NO_3)_2$? (14 pts)

$937.4\text{g } Ca(NO_3)_2 \times \frac{\text{mol } Ca(NO_3)_2}{164.12\text{g } Ca(NO_3)_2} \times \frac{2 \text{ mol N}}{1 \text{ mol } Ca(NO_3)_2} \times \frac{6.02 \times 10^{23} \text{ atoms}}{1 \text{ mol N}} = 6.877 \times 10^{24} \text{ atoms N}$

3pt — 3pt — 3pt — 3pt — 1 pt math — 1pt sig fig

used wrong # from 19a — no pts off

serious attempt -8 — has Avogadro's # in answer

Exam I General Chemistry I (CHEM 101) Fall 2012 9:55 am T,R Dr. Hahn ~~9:55 B~~ ~~Exam #~~ _____

Name Key (print) Name _____ (sign)

NO partial credit
Multiple Choice

Please show work for partial credit on the Long Answers and in some of the ~~Short Answer Questions.~~ Multiple choice questions have no partial credit. Please write anything ~~you want graded legibly. If I cannot~~ read your work, I obviously cannot grade it. (2 pts print and sign exam)

NA = not attempted

Part I MULTIPLE CHOICE. Choose the one ~~alternative that best completes the statement or~~ answers the question. (2 pts per question, 28 pts total)

2 pts each MC

1) In a chemical reaction, matter is ~~neither created or destroyed~~. Which law does this refer to? 1) A

A) Law of the Conservation of Mass
B) Law of Multiple Proportions
C) Law of Modern Atomic Theory
D) First Law of Thermodynamics
E) Law of Definite Proportions

2) Choose the element from the list below. 2) A

A) helium ——— He
B) carbon dioxide CO_2
C) water H_2O
D) rust iron oxide
E) sodium chloride NaCl

3) The outside temperature is 35°C, what is the temperature in K? 3) C

A) -238 K B) 63 K C) 31 K D) 95 K E) 308 K

$K = 35 + 273.15$

4) How many Li atoms are contained in 97.9 g of Li? 4) D

A) 4.27×10^{22} Li atoms
B) 5.90×10^{25} Li atoms
C) 4.18×10^{24} Li atoms
D) 8.49×10^{24} Li atoms
E) 7.09×10^{21} Li atoms

$97.9\,g\,Li \times \frac{mol\,Li}{6.941\,g\,Li} \times \frac{6.02 \times 10^{23}\ atoms}{1\,mol\,Li} =$

5) Which of the following elements is an alkali metal? 5) C

A) Xe B) Zn C) Li D) Ca E) F

group IA

6) How many mg does a 433 kg sample contain? 6) B

A) 4.33×10^{-4} mg
B) 4.33×10^{8} mg
C) 4.33×10^{7} mg
D) 4.33×10^{-3} mg
E) 4.33×10^{6} mg

$433\,kg \times \frac{1000\,g}{1\,kg} \times \frac{1000\,mg}{1\,g} = 4.33 \times 10^{8}\,mg$

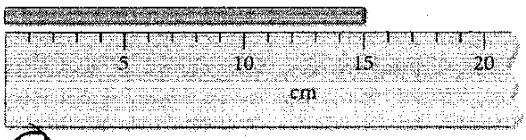
7) Give the name for H_2SO_4. 7) E

A) sulfurous acid
B) persulfurous acid
C) persulfuric acid
D) hyposulfurous acid
E) sulfuric acid

8) Identify a cation. 8) B

A) An atom that has lost a proton.
B) An atom that has lost an electron.
C) An atom that has gained a proton.
D) An atom that has gained an electron.

9) Read the length of the metal bar with the correct number of significant figures. 9) A



A) 15.0 cm B) 15.00 cm C) 15.000 cm D) 20 cm E) 15 cm

10) How many moles of N_2O_4 are in 76.3 g N_2O_4? The molar mass of N_2O_4 is 92.02 g/mol. 10) C

A) 7.02×10^3 moles
B) 1.42×10^{-4} moles
C) 0.829 moles
D) 1.21 moles
E) 1.00 mole

$76.3\ g\ N_2O_4 \times \frac{1\ mol\ N_2O_4}{92.02\ g\ N_2O_4} = 0.829\ mol\ N_2O_4$

11) Which of the following are examples of intensive properties? 11) A

A) density
B) mass
C) volume
D) None of the above are examples of intensive properties.
E) All of the above are examples of intensive properties.

which is independent of amount

12) Write the name for $Ca_3(PO_4)_2$. Remember that Ca only forms one charged ion. 12) E

A) calcium phosphite
B) tricalcium phosphorustetraoxide
C) calcium (II) phosphite
D) calcium (III) phosphite
E) calcium phosphate

$88.6\ mL \times \frac{9.77\ g}{mL} = 0.866\ g$

13) Determine the mass of an object that has a volume of 88.6 mL and a density of 9.77 g/mL. 13) A

A) 866 g B) 1100 g C) 568 g D) 298 g E) 907 g

14) Which of the following is an ionic compound? 14) A

A) $MgCl_2$ B) Cl_2O C) CH_2O D) PF_5 E) SCl_2

→ all the rest between elements close together in periodic table

Part II Short Answer: Write the word or phrase or circle the choice that best completes each statement or answer the question. (42 pts)

15)

For the following, given the metric prefix, fill in the blank with the number which matches (6 pts)

centi 0.01 (10^{-2}) kilo 1000 (10^{3}) milli 0.001 (10^{-3})

16)

For the symbol given below fill in the blanks (6 pts)

$^{50}_{23}V$ # protons 23 # electrons (for a neutral atom) 23 # neutrons $50-23=27$

reversed −2

17)

Fill in the blank or circle the correct choice (2 pts per blank , 24 pts)

a. The element symbol for the element iodine I

b. The name of the element with the symbol Ar Argon

c. one mole of the element Cs weighs 132.9 grams and contains 6.02×10^{23} atoms of cesium

d. An example of a (period) or (group) [circle one] is the row going from Cs to Rn

e. An example of one of the elements which is a Transition ~~Metal is the element~~ Mo (fill in with the symbol for an element)

reversed −2

f. For the element Se the atomic mass is 78.96 and the atomic number is 34

g. The charge for the ionic form of the element K is $+1$.

This number is the same as the {(group) or (period) [circle one] number}

sign $-\frac{1}{2}$

h. The charge for the ionic form of the element Br is -1

This number is derived from the equation {(group) or (period) number minus 8}

$54.0 + 96.21 + 192.0 = 342.2$

18) The formula weight (molecular weight) of $Al_2(SO_4)_3$ is (show work) (6 pts)

$2(27.0) + 3(32.07) + 12(16.0) =$

math $-\frac{1}{2}$

Al S O — 2 pts each

19) Part III: Long Answers: Please answer the following question Please show work for partial credit. I can only grade what I can read. Please write legibly. (28 pts)

For the formula H_2SO_4 (formula mass or molecular weight = 98.12 grams / mole)

a. How many moles of H_2SO_4 is in 937.4 grams of the compound ? (14pts)

$937.4\ g\ H_2SO_4 \times \frac{1\ mol\ H_2SO_4}{98.12\ g\ H_2SO_4} = 9.554\ mol\ H_2SO_4$

6 pts

extra wrong step −3

6 pts

2 pts math

upside down −3

serious attempt −8

b. How many atoms of H (hydrogen atoms) is in 937.4 grams of the compound H_2SO_4 ? 14 pts)

3 pt 3 pt 3 pt

$937.4\ g\ H_2SO_4 \times \frac{1\ mol\ H_2SO_4}{98.12\ g\ H_2SO_4} \times \frac{2\ mol\ H}{1\ mol\ H_2SO_4} \times \frac{6.022 \times 10^{23}\ H\ atoms}{1\ mol\ H}$

$= 1.150 \times 10^{25}\ atoms\ H$

1 pt math

1 pt sig. fig

used wrong # from (199) no pts off

serious attempt has Avogadro's # in answer

Exam I General Chemistry I (CHEM 101) Fall 2012 8:30 am T,R Dr. Hahn 8:30 A Exam # 3-11

Name_____ (print) Name _____(sign)

Please show work for partial credit on the Long Answers and in some of the Short Answer Questions. Multiple choice questions have no partial credit. Please write anything you want graded legibly. If I cannot read your work, I obviously cannot grade it. (2 pts print and sign exam)

Part I MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. (2 pts per question, 28 pts total)

1) Determine the volume of an object that has a mass of 455.6 g and a density of 19.3 g/cm^3. 1) _____
A) 42 .4 mL B) 23.6 mL C) 31.2 mL D) 87.9 mL E) 18.5 mL

2) The statement, "In a chemical reaction, matter is neither created nor destroyed" is called 2) _____
A) Dalton's Atomic Theory.
B) the Scientific Method.
C) the Law of Definite Proportions.
D) the Law of Conservation of Mass.
E) the Law of Multiple Proportions.

3) Which of the following are examples of a chemical change? 3) _____
A) copper building materials develop a green patina over time
B) a match burns
C) ethanol evaporates
D) Both A and B are examples of chemical change.
E) All of the above are examples of chemical change.

4) Write the name for $Sn(SO_4)_2$. Remember that Sn forms several different charged ions. 4) _____
A) tin (II) sulfite
B) tin (I) sulfite
C) tin sulfide
D) tin (I) sulfate
E) tin (IV) sulfate

5) Identify the charges of the protons, neutrons, and electrons. 5) _____
A) protons +1, neutrons 0, electrons –1
B) protons 0, neutrons –1, electrons +1
C) protons +1, neutrons –1, electrons 0
D) protons 0, neutrons +1, electrons –1
E) protons –1, neutrons 0, electrons +1

6) Which of the following is a molecular (covalent) compound? 6) _____
A) RbBr B) CH_3Cl C) KCl D) $CuCl_2$ E) $NaNO_3$

7) The outside temperature is 35°C, what is the temperature in K? 7) _____
A) 95 K B) –238 K C) 63 K D) 308 K E) 31 K

8) How many molecules of N_2O_4 are in 76.3 g N_2O_4? The molar mass of N_2O_4 is 92.02 g/mol. 8) _____

A) 7.26×10^{23} N_2O_4 molecules

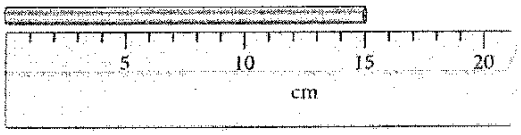
B) 4.99×10^{23} N_2O_4 molecules

C) 4.59×10^{25} N_2O_4 molecules

D) 1.38×10^{24} N_2O_4 molecules

E) 5.54×10^{25} N_2O_4 molecules

9) Read the length of the metal bar with the correct number of significant figures. 9) _____



A) 20 cm B) 15.0 cm C) 15.000 cm D) 15 cm E) 15.00 cm

10) Choose the pure substance from the list below. 10) _____

A) lemonade B) sea water C) milk D) sugar E) air

11) How many silver atoms are contained in 3.75 moles of silver? 11) _____

A) 6.23×10^{24} silver atoms

B) 2.26×10^{24} silver atoms

C) 6.50×10^{25} silver atoms

D) 2.44×10^{26} silver atoms

E) 1.61×10^{23} silver atoms

12) Which of the following elements is a noble gas? 12) _____

A) Ar B) N C) Br D) O E) K

13) Determine the name for H_2CO_3. 13) _____

A) carbonic acid

B) dihydrogen carbonate

C) hydrocarbide acid

D) carbonous acid

E) hydrocarbonic acid

14) How many mg does a 433 kg sample contain? 14) _____

A) 4.33×10^{7} mg

B) 4.33×10^{8} mg

C) 4.33×10^{6} mg

D) 4.33×10^{-4} mg

E) 4.33×10^{-3} mg

Part II Short Answer: Write the word or phrase or circle the choice that best completes each statement or answer the question. (42 pts)

15)

For the following, given the metric prefix, fill in the blank with the number which matches (6 pts)

kilo _____ centi _____ milli _____

16)

For the symbol given below fill in the blanks (6 pts)

$^{20}_{10}$Ne # protons _____ # electrons (for a neutral atom) ____ # neutrons _____

17)

Fill in the blank or circle the correct choice (2 pts per blank , 24 pts)

a. The element symbol for the element hydrogen _____

b. The name of the element with the symbol Li _____

c. one mole of the element Mg weighs _____ grams and contains

_____ atoms of magnesium

d. An example of a (period) or (group) [circle one] is the column going from H to Fr

e. An example of one of the elements which is an Actinide/Lanthanide

is the element _____ (fill in with the symbol for an element)

f. For the element S the atomic mass is _____ and the atomic number is _____

g. The charge for the ionic form of the element Na is _____.

This number is the same as the { (group) or (period) [circle one] number}

h. The charge for the ionic form of the element Se is _____

This number is derived from the equation {(group) or (period) number minus 8}

18) The formula weight (molecular weight) of $Ba_3(PO_4)_2$ is (show work) (6 pts)

19) Part III: Long Answers: Please answer the following question Please show work for partial credit. I can only grade what I can read. Please write legibly. (28 pts)

For the formula Na_2SO_4 (formula mass or molecular weight = 142.1 grams / mole)

a. How many moles of Na_2SO_4 is in 937.4 grams of the compound ? (14pts)

b. How many atoms of Na is in 937.4 grams of the compound Na_2SO_4 ? (14 pts)

Exam I General Chemistry I (CHEM 101) Fall 2012 8:30 am T,R Dr. Hahn 8:30 B Exam # 3-2

Name_____ (print) Name _____(sign)

Please show work for partial credit on the Long Answers and in some of the Short Answer Questions. Multiple choice questions have no partial credit. Please write anything you want graded legibly. If I cannot read your work, I obviously cannot grade it. (2 pts print and sign exam)

Part I MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. (2 pts per question, 28 pts total)

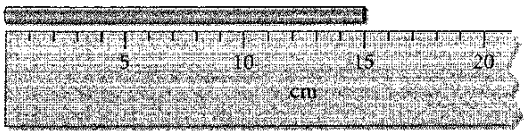
1) Which of the following is a molecular (covalent) compound? 1) _____
A) P_4O_{10} B) SrI_2 C) LiOH D) NaCN E) ZnS

2) Determine the volume of an object that has a mass of 455.6 g and a density of 19.3 g/cm^3. 2) _____
A) 42 .4 mL B) 87.9 mL C) 31.2 mL D) 18.5 mL E) 23.6 mL

3) Identify the charges of the protons, neutrons, and electrons. 3) _____
A) protons 0, neutrons +1, electrons −1
B) protons +1, neutrons 0, electrons −1
C) protons +1, neutrons −1, electrons 0
D) protons 0, neutrons −1, electrons +1
E) protons −1, neutrons 0, electrons +1

4) How many mg does a 433 kg sample contain? 4) _____
A) 4.33×10^8 mg
B) 4.33×10^{-3} mg
C) 4.33×10^{-4} mg
D) 4.33×10^7 mg
E) 4.33×10^6 mg

5) Read the length of the metal bar with the correct number of significant figures. 5) _____



A) 20 cm B) 15.000 cm C) 15 cm D) 15.00 cm E) 15.0 cm

6) Which of the following elements is a noble gas? 6) _____
A) N B) Ar C) K D) Br E) O

7) How many silver atoms are contained in 3.75 moles of silver? 7) _____
A) 6.50×10^{25} silver atoms
B) 1.61×10^{23} silver atoms
C) 2.26×10^{24} silver atoms
D) 2.44×10^{26} silver atoms
E) 6.23×10^{24} silver atoms

8) Determine the name for H_2CO_3. 8) _____

A) hydrocarbide acid
B) carbonic acid
C) hydrocarbonic acid
D) carbonous acid
E) dihydrogen carbonate

9) Write the name for $Sn(SO_4)_2$. Remember that Sn forms several different charged ions. 9) _____

A) tin (II) sulfite
B) tin (I) sulfate
C) tin sulfide
D) tin (I) sulfite
E) tin (IV) sulfate

10) How many molecules of N_2O_4 are in 76.3 g N_2O_4? The molar mass of N_2O_4 is 92.02 g/mol. 10) _____

A) 5.54×10^{25} N_2O_4 molecules
B) 4.59×10^{25} N_2O_4 molecules
C) 1.38×10^{24} N_2O_4 molecules
D) 4.99×10^{23} N_2O_4 molecules
E) 7.26×10^{23} N_2O_4 molecules

11) Choose the pure substance from the list below. 11) _____

A) sugar B) lemonade C) milk D) air E) sea water

12) The outside temperature is 35°C, what is the temperature in K? 12) _____

A) 308 K B) 31 K C) 63 K D) 95 K E) -238 K

13) Which of the following are examples of a chemical change? 13) _____

A) a match burns
B) copper building materials develop a green patina over time
C) ethanol evaporates
D) Both A and B are examples of chemical change.
E) All of the above are examples of chemical change.

14) The statement, "In a chemical reaction, matter is neither created nor destroyed" is called 14) _____

A) the Law of Definite Proportions.
B) the Scientific Method.
C) the Law of Multiple Proportions.
D) Dalton's Atomic Theory.
E) the Law of Conservation of Mass.

Part II Short Answer: Write the word or phrase or circle the choice that best completes each statement or answer the question. (42 pts)

15)

For the following, given the metric prefix, fill in the blank with the number which matches (6 pts)

milli _____ centi _____ kilo _____

16)

For the symbol given below fill in the blanks (6 pts)

$^{75}_{33}$As # protons _____ # electrons (for a neutral atom) _____ # neutrons _____

17)

Fill in the blank or circle the correct choice (2 pts per blank , 24 pts)

a. The element symbol for the element sulfur, _____

b. The name of the element with the symbol Na _____

c. one mole of the element Sr weighs _____ grams and contains

_____ atoms of strontium

d. An example of a (period) or (group) [circle one] is the row going from K to Kr

e. An example of one of the elements which is a Nonmetal is the element _____ (fill in with the symbol for an element)

f. For the element N the atomic mass is _____ and the atomic number is _____

g. The charge for the ionic form of the element Mg is _____.

This number is the same as the { (group) or (period) }[circle one] number

h. The charge for the ionic form of the element F is _____

This number is derived from the equation {(group) or (period) number minus 8}

18) The formula weight (molecular weight) of $(NH_4)_2O$ is (show work) (6 pts)

19) Part III: Long Answers: Please answer the following question Please show work for partial credit. I can only grade what I can read. Please write legibly. (28 pts)

For the formula $Ba_3(PO_4)_2$ (formula mass or molecular weight = 601.9 grams / mole)

a. How many moles of $Ba_3(PO_4)_2$ is in 937.4 grams of the compound ? (14pts)

b. How many atoms of Ba is in 937.4 grams of the compound $Ba_3(PO_4)_2$? (14 pts)

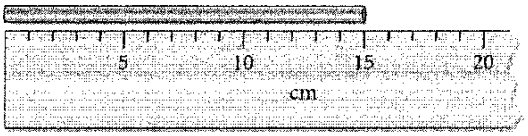
Exam I General Chemistry I (CHEM 101) Fall 2012 9:55 am T,R Dr. Hahn 9:55 A Exam # 4-10

Name_____ (print) Name _____(sign)

Please show work for partial credit on the Long Answers and in some of the Short Answer Questions. Multiple choice questions have no partial credit. Please write anything you want graded legibly. If I cannot read your work, I obviously cannot grade it. (2 pts print and sign exam)

Part I MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. (2 pts per question, 28 pts total)

1) Read the length of the metal bar with the correct number of significant figures. 1) _____



A) 15 cm B) 15.000 cm C) 15.0 cm D) 15.00 cm E) 20 cm

2) Which of the following is an ionic compound? 2) _____

A) NO_2 B) $SeBr_2$ C) CF_4 D) PCl_3 E) LiCl

3) Which of the following elements is an alkali metal? 3) _____

A) Zn B) Xe C) Li D) F E) Ca

4) How many moles of N_2O_4 are in 76.3 g N_2O_4? The molar mass of N_2O_4 is 92.02 g/mol. 4) _____

A) 1.21 moles
B) 0.829 moles
C) 1.42×10^{-4} moles
D) 1.00 mole
E) 7.02×10^{3} moles

5) In a chemical reaction, matter is neither created or destroyed. Which law does this refer to? 5) _____

A) Law of Modern Atomic Theory
B) First Law of Thermodynamics
C) Law of Definite Proportions
D) Law of Multiple Proportions
E) Law of the Conservation of Mass

6) How many mg does a 433 kg sample contain? 6) _____

A) 4.33×10^{-4} mg
B) 4.33×10^{-3} mg
C) 4.33×10^{7} mg
D) 4.33×10^{6} mg
E) 4.33×10^{8} mg

7) Identify a cation. 7) _____

A) An atom that has gained a proton.
B) An atom that has lost a proton.
C) An atom that has lost an electron.
D) An atom that has gained an electron.

8) Which of the following are examples of intensive properties? 8) _____

A) mass
B) volume
C) density
D) None of the above are examples of intensive properties.
E) All of the above are examples of intensive properties.

9) Write the name for $Ca_3(PO_4)_2$. Remember that Ca only forms one charged ion. 9) _____

A) calcium phosphate
B) calcium (III) phosphite
C) tricalcium phosphorustetraoxide
D) calcium phosphite
E) calcium (II) phosphite

10) How many iron atoms are contained in 354 g of iron? 10) _____

A) 2.62×10^{25} Fe atoms
B) 4.69×10^{24} Fe atoms
C) 3.82×10^{24} Fe atoms
D) 9.50×10^{22} Fe atoms
E) 2.13×10^{26} Fe atoms

11) Determine the mass of an object that has a volume of 88.6 mL and a density of 9.77 g/mL. 11) _____

A) 568 g B) 1100 g C) 298 g D) 907 g E) 866 g

12) Give the name for H_2SO_4. 12) _____

A) persulfuric acid
B) sulfuric acid
C) hyposulfurous acid
D) sulfurous acid
E) persulfurous acid

13) The outside temperature is 35°C, what is the temperature in K? 13) _____

A) 308 K B) 95 K C) -238 K D) 63 K E) 31 K

14) Choose the element from the list below. 14) _____

A) rust
B) carbon dioxide
C) water
D) sodium chloride
E) helium

Part II Short Answer: Write the word or phrase or circle the choice that best completes each statement or answer the question. (42 pts)

15)

For the following, given the metric prefix, fill in the blank with the number which matches (6 pts)

kilo _____ centi _____ milli _____

16)

For the symbol given below fill in the blanks (6 pts)

$^{127}_{52}$Te # protons _____ # electrons (for a neutral atom) _____ # neutrons _____

17)

Fill in the blank or circle the correct choice (2 pts per blank , 24 pts)

a. The element symbol for the element phosphorus _____

b. The name of the element with the symbol Br _____

c. one mole of the element Rb weighs _____ grams and contains

_____ atoms of rubidium

d. An example of a (period) or (group) [circle one] is the c olumn going from C to Pb

e. An example of one of the elements which is a Metal is the element _____ (fill in with the symbol for an element)

f. For the element Cl the atomic mass is _____ and the atomic number is _____

g. The charge for the ionic form of the element Sr is _____.

This number is the same as the { (group) or (period) [circle one] number}

h. The charge for the ionic form of the element O (oxygen) is _____

This number is derived from the equation {(group) or (period) number minus 8}

18) The formula weight (molecular weight) of $Be(NO_3)_2$ is (show work) (6 pts)

19) Part III: Long Answers: Please answer the following question Please show work for partial credit. I can only grade what I can read. Please write legibly. (28 pts)

For the formula $Ca(NO_3)_2$ (formula mass or molecular weight = 164.12 grams / mole)

a. How many moles of $Ca(NO_3)_2$ is in 937.4 grams of the compound ? (14pts)

b. How many atoms of N is in 937.4 grams of the compound $Ca(NO_3)_2$? (14 pts)

Exam I General Chemistry I (CHEM 101) Fall 2012 9:55 am T,R Dr. Hahn 9:55 B Exam # 4-9

Name_____ (print) Name _____(sign)

Please show work for partial credit on the Long Answers and in some of the Short Answer Questions. Multiple choice questions have no partial credit. Please write anything you want graded legibly. If I cannot read your work, I obviously cannot grade it. (2 pts print and sign exam)

Part I MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. (2 pts per question, 28 pts total)

1) In a chemical reaction, matter is neither created or destroyed. Which law does this refer to? 1) _____
A) Law of the Conservation of Mass
B) Law of Multiple Proportions
C) Law of Modern Atomic Theory
D) First Law of Thermodynamics
E) Law of Definite Proportions

2) Choose the element from the list below. 2) _____
A) helium
B) carbon dioxide
C) water
D) rust
E) sodium chloride

3) The outside temperature is 35°C, what is the temperature in K? 3) _____
A) –238 K B) 63 K C) 31 K D) 95 K E) 308 K

4) How many Li atoms are contained in 97.9 g of Li? 4) _____
A) 4.27×10^{22} Li atoms
B) 5.90×10^{25} Li atoms
C) 4.18×10^{24} Li atoms
D) 8.49×10^{24} Li atoms
E) 7.09×10^{21} Li atoms

5) Which of the following elements is an alkali metal? 5) _____
A) Xe B) Zn C) Li D) Ca E) F

6) How many mg does a 433 kg sample contain? 6) _____
A) 4.33×10^{-4} mg
B) 4.33×10^{8} mg
C) 4.33×10^{7} mg
D) 4.33×10^{-3} mg
E) 4.33×10^{6} mg

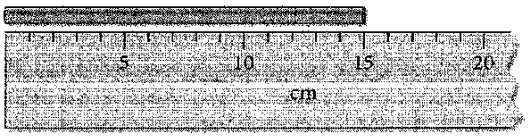
7) Give the name for H_2SO_4. 7) _____

A) sulfurous acid
B) persulfurous acid
C) persulfuric acid
D) hyposulfurous acid
E) sulfuric acid

8) Identify a cation. 8) _____

A) An atom that has lost a proton.
B) An atom that has lost an electron.
C) An atom that has gained a proton.
D) An atom that has gained an electron.

9) Read the length of the metal bar with the correct number of significant figures. 9) _____



A) 15.0 cm B) 15.00 cm C) 15.000 cm D) 20 cm E) 15 cm

10) How many moles of N_2O_4 are in 76.3 g N_2O_4? The molar mass of N_2O_4 is 92.02 g/mol. 10) _____

A) 7.02×10^3 moles
B) 1.42×10^{-4} moles
C) 0.829 moles
D) 1.21 moles
E) 1.00 mole

11) Which of the following are examples of intensive properties? 11) _____

A) density
B) mass
C) volume
D) None of the above are examples of intensive properties.
E) All of the above are examples of intensive properties.

12) Write the name for $Ca_3(PO_4)_2$. Remember that Ca only forms one charged ion. 12) _____

A) calcium phosphite
B) tricalcium phosphorustetraoxide
C) calcium (II) phosphite
D) calcium (III) phosphite
E) calcium phosphate

13) Determine the mass of an object that has a volume of 88.6 mL and a density of 9.77 g/mL. 13) _____

A) 866 g B) 1100 g C) 568 g D) 298 g E) 907 g

14) Which of the following is an ionic compound? 14) _____

A) $MgCl_2$ B) Cl_2O C) CH_2O D) PF_5 E) SCl_2

Part II Short Answer: Write the word or phrase or circle the choice that best completes each statement or answer the question. (42 pts)

15)

For the following, given the metric prefix, fill in the blank with the number which matches (6 pts)

centi _____ kilo _____ milli _____

16)

For the symbol given below fill in the blanks (6 pts)

$^{50}_{23}V$ # protons _____ # electrons (for a neutral atom) _____ # neutrons _____

17)

Fill in the blank or circle the correct choice (2 pts per blank , 24 pts)

a. The element symbol for the element iodine _____

b. The name of the element with the symbol Ar _____

c. one mole of the element Cs weighs _____ grams and contains

_____ atoms of cesium

d. An example of a (period) or (group) [circle one] is the row going from Cs to Rn

e. An example of one of the elements which is a Transition Metal is the element _____ (fill in with the symbol for an element)

f. For the element Se the atomic mass is _____ and the atomic number is _____

g. The charge for the ionic form of the element K is _____.

This number is the same as the { (group) or (period) [circle one] number}

h. The charge for the ionic form of the element Br is _____

This number is derived from the equation {(group) or (period) number minus 8}

18) The formula weight (molecular weight) of $Al_2(SO_4)_3$ is (show work) (6 pts)

19) Part III: Long Answers: Please answer the following question Please show work for partial credit. I can only grade what I can read. Please write legibly. (28 pts)

For the formula H_2SO_4 (formula mass or molecular weight = 98.12 grams / mole)

a. How many moles of H_2SO_4 is in 937.4 grams of the compound ? (14pts)

b. How many atoms of H (hydrogen atoms) is in 937.4 grams of the compound H_2SO_4 ? 14 pts)