**Exam 1: Chem 1114 Spring 2018**

**Version B 100 points**

**Your name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 1 pt**

1. What is the magnitude associated with a T ? \_\_\_\_\_\_1012\_\_\_\_\_\_\_\_\_\_\_\_

2. Convert 0.001 g to its equivalent, prefixed form: \_\_\_\_\_\_1 mg\_\_\_\_\_\_\_\_\_\_\_\_

3. The magnitude 10+6 has what prefix name (not symbol) associated with ? \_\_\_\_mega\_\_\_\_\_\_

4. What is the symbol connected to 10-3 ?\_\_\_\_m\_\_\_\_\_\_\_\_\_

5. Convert 10,000,000 m to its correct prefixed form:\_\_\_\_\_10 Mm\_\_\_\_\_\_\_\_\_\_

6. Write 0.000000004 g in its best prefixed form\_\_\_\_\_\_\_\_\_\_4 ng\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

7. 0.1 ms = \_\_\_\_\_100\_\_\_\_μs (2 pts each)

8. 3 nm = \_\_\_3000\_\_\_\_ pm

9. 2 cg = \_\_\_\_\_20\_\_\_\_\_ mg

10. 0.008 Ts = \_\_\_8\_\_\_ Gs

11. 5,000,000 mg = \_\_\_\_5\_\_\_\_ kg

12. How many significant figures are in each of the numbers below ?

a) 0.01\_\_\_\_\_\_1\_\_\_\_ b) 10010000\_\_4\_\_\_\_\_

c) 0.301\_\_\_\_\_3\_\_\_\_ d) 3.0\*10600 \_\_\_2\_\_\_\_\_\_\_\_\_

e) 1.0600000\_\_8\_\_\_\_ f) 1000\_\_1\_\_\_\_

13. Compute to the correct significant figure count: ( 2 pts each)

 0.000001 - 0.10 + 6.1 + 0.0015 = \_\_\_\_\_6.0\_\_\_\_\_\_\_\_\_\_\_\_

 1.0001 -0.01 +23999.0 = \_\_\_\_\_\_24,000.0\_\_\_\_\_\_\_\_\_\_\_\_\_\_

14. Compute to correct sig fig count: 2.00\*10.0000 = \_\_20.0\_\_\_\_ 3 pts each

 15. Compute to correct sig fig count: 100.000= \_\_\_1.00\_\_\_\_\_

 2.00\*25.00

 16. Compute to the correct sig fig count:

 2 + 20.00\*6.00 = \_\_\_62\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 1.999

 \_\_\_/31 (includes name pt)

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17. Provide names or symbols for the elements below: (spelling counts)

Fe\_\_\_\_\_iron\_\_\_\_\_\_\_\_\_\_ sodium \_Na\_\_\_ K\_\_potassium\_\_\_\_\_\_\_\_\_\_\_

He\_\_\_\_\_helium\_\_\_\_\_\_\_\_ nitrogen\_\_N\_\_\_\_\_ Cu\_\_\_\_\_copper\_\_\_\_\_\_\_\_\_

Mn\_\_\_manganese\_\_\_\_\_\_\_ iron\_\_Fe\_ Zinc\_\_\_Zn\_\_\_\_\_

18. The ratio of the electron orbit’s radius to the nuclear radius is ~ \_\_\_100,000\_\_\_\_ ( a number)

19.The ratio of the proton mass to the electron mass is about \_\_\_2000\_\_\_\_\_\_\_\_\_( another number)

20. An element with a specific count of neutrons is a(n) \_\_isotope\_\_\_\_\_\_\_\_\_\_\_\_ of the element.

21. neutrons are: ***heavier lighter***  *the same mass* as protons. (Circle your choice)

22. How many neutrons in 19O. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 8

23. Fill in the missing information (4 points per line)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Atomic # | Mass # | symbol | #p | #n | #e | Atom charge |
| 10 | 21 | Ne | 10 | 11 | 10 | 0 |
| 35 | 81 | Br | 35 | 46 | 36 | -1 |

24. Compute the average atomic mass of the hypothetic element Fu given the data below:

Fu mass # fractional abundance=fk

210.0 0.10 **0.1\*210 + 0.40\*220 + 0.5\*230=224**

220.0 0.40 average mass of Fu= \_\_\_224\_\_\_\_\_\_\_\_\_\_\_\_\_ ( to nearest 0.1 )

230.0 0.50 (4 pts)

**25. Provide the name or formula for the compounds below. (You may use your Periodic Table as an aid.)**

Note: ClO4-2 = perchlorate CO3-2 = carbonate spelling counts ! (2 pts each)

SO2 \_\_\_\_\_\_\_\_\_\_\_sulfur dioxide\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ iron(II) oxide = \_\_\_\_\_\_FeO\_\_\_\_\_\_\_\_\_\_\_

MgClO4= \_\_\_\_\_magnesium perchlorate\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ copper(II) carbonate= \_\_copper carbonate\_

Ca(CO3) = \_\_\_\_\_\_\_\_calcium carbonate\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ sodium nitride = \_\_\_\_Na3N\_\_\_\_\_\_\_

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SHOW WORK FOR PROBLEMS BELOW OR NO CREDIT

26. Compute the molecular weight (MW) for: CaCO3 . (Ca=40 g/mol C=12 g/mol O=16 g/mol)

(3 pts)

40 + 12 +3\*16=100

 \_\_100\_\_\_\_g CaCO3 /mol

27. The MW of sulfuric acid is 98 g/mol How many moles of are in 686 grams of it? (5 pts)

Divide up 686 g/98 g mol\_1=7 mol

 \_\_**\_\_\_\_7**\_\_\_\_\_mol sulfuric acid

28. What does 0.2449 moles of sulfuric acid weigh in grams ? ( 5 pts)

Multiply down 0.2449 mol\*98 g/mol=24 g

 \_\_\_\_**24**\_\_\_\_\_\_ g sulfuric acid

29. How many grams are in 2.449\*1022 molecules of sulfuric acid? Assume 1 mole count=6.0\*1023

 (round answer to nearest gram) ( 5 pts)

Divide up 2.449\*1022 molecules/6\*1023 molecules mol\_1 =0.0-408166 mol

Multiply down 0.0408166 mol\*98 g/mol=4 g \_\_**\_4\_**\_\_\_\_ g H2SO4

30 Given that octane (C8H18) has a molecular mass of 114 g/mol and 1 mole count=6\*1023:

 How many molecules of octane are in 380 g of octane ? (5 pts)

Divide up 380 g/114 g mol\_1=3.333 mol octane

Multiply down 3.333 mol\*6\*1023 molecules/mol =20\*1023=2\*1024 molecules

 \_\_\_\_2\*1024\_\_\_\_\_\_ molecules octane

31. The formula for calcium oxalate is CaC2O4. (Molecular wt=128 g/mol)

1. How many moles of CaC2O4 are formed from 128 g of O (at wt of O=16 ? (2 pts)

Step 1: mol O = 128/16=8 Step 2 mol CaC2O4/O=1/4= x/8=> x= 8/4=2

\_\_\_\_2\_\_\_ mol CaC2O4

1. If 3.2 g of O (at. wt.=16 g/mol) are present in CaC2O4, how many g of Ca (at mass=40) are present?

(4 pts)

Step 1: mol O =3.2 g/16 g mol-1 = 0.2 mol O Step 2: set up ratio

mol Ca/Mol O= ¼= x/0.2=> mol Ca=0.2/4=0.05 Step 3: g Ca=40 g/mol\*0.05 mol=2 g \_\_2\_\_\_\_\_\_ g Ca

32. Glucose has the formula C6H12O6 and a molecular weight of 180. How many atoms of C are in 1.0 g of

 glucose ? (5 pts)

divide up: 1 g/180 g mol-1=0.00555 mol glucose

set up ratio:Mol C/mol glucose =6/1=x/0.00555=> x= 6\*0.00555=0.033 mol C=>

multiply down: 0.033 mol \*6\*1023 molecules/mol=2\*1022 molecules C

\_2\*1022\_\_\_\_\_\_\_atoms of C

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