**Exam 1: Chem 1114 Spring 2018**

**Version A 100 points**

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

1. What is the magnitude associated with a n? \_\_\_\_10‑9\_\_\_\_\_\_\_\_\_\_\_

2. Convert 2000 g to its equivalent, prefixed form: \_\_\_2 kg\_\_\_\_\_\_\_\_\_\_\_\_

3. The magnitude 10+9 has what prefix name (not symbol) associated with ? \_\_\_giga\_\_\_\_\_\_\_\_

4. What is the symbol connected to 10-12 ?\_\_\_\_\_\_\_\_p\_\_\_\_\_

5. Convert 0.000000001 s to its correct prefixed form:\_\_\_\_\_1 ns\_\_\_\_\_\_\_\_\_\_

6. Write 100,000,000 m in its best prefixed form\_\_\_\_\_\_\_\_100 Mm\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

7. 1 ns = \_\_\_\_1000\_\_\_\_\_\_\_ps (2 pts each)

8. 2000 km = \_\_\_\_2\_\_\_\_\_ Mm

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

10. 0.003 Ts = \_\_\_\_3\_\_ Gs

11. 10,000 g = \_\_\_\_\_10\_\_\_ kg

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

a) 500\_\_\_\_1\_\_\_\_\_\_ b) 110000\_\_\_\_2\_\_\_

c) 0.300\_\_\_\_3\_\_\_\_\_ d) 6.000\*10600 \_\_\_\_\_4\_\_\_\_\_\_\_

e) 1.0100\_\_\_5\_\_\_ f) 800011\_\_6\_\_\_\_

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

 0.00005 + 0.050 + 30 + 0.04 = \_\_\_\_\_30\_\_\_\_\_\_\_\_\_\_\_\_

 1.0001 -0.03 +99.0 = \_\_\_\_\_\_\_\_\_\_100.0\_\_\_\_\_\_\_\_

14. Compute to correct sig fig count: 1.00\*10.0000 = 10.0\_\_\_\_\_\_\_ 3 pts each

 15. Compute to correct sig fig count: 100.000= \_\_2.0\_\_\_\_\_\_\_

 4.0\*12.500

 16. Compute to the correct sig fig count:

 3 + 10.00\*6.00 = \_\_\_\_\_\_\_\_\_33\_\_\_\_\_\_\_\_\_\_

 1.999

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

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

K\_\_potassium\_\_\_\_\_\_\_ sodium\_\_Na H\_\_\_\_hydrogen\_\_\_\_\_\_\_\_\_\_\_\_\_

C\_\_\_\_carbon\_\_\_\_\_\_\_\_\_ copper\_\_Cu\_\_ N\_\_nitrogen\_\_\_\_\_\_\_\_\_\_\_\_\_

S\_\_\_\_sulfur\_\_\_\_\_\_\_\_\_\_\_\_\_ Fluorine\_\_F\_\_\_\_ Fe \_\_iron\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

22. How many neutrons in 15N ? \_\_\_\_\_8\_\_\_\_\_\_\_\_\_\_

 7

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

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Atomic # | Mass # | symbol | #p | #n | #e | Atom charge |
| 26 | 59 | Fe | 26 | 33 | 26 | 0 |
| 17 | 36 | Cl | 17 | 19 | 17 | 0 |

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

Du mass # fractional abundance=fk

100.0 0.10 0.1\*100 + 0.4\*110 + 0.5\*120=114

110.0 0.40 average mass of Du= \_\_\_\_\_114\_\_\_\_\_\_\_\_\_\_\_ ( to nearest 0.1 )

120.0 0.50 (4 pts)

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

Note: ClO3-2 = chlorate HCO3-1 = bicarbonate spelling counts ! (2 pts each)

N2S \_\_\_\_\_\_\_\_dinitrogen monosulfide\_\_\_\_\_\_\_\_\_\_\_\_\_\_ iron(II) bromide = \_\_FeBr2\_\_\_\_\_\_\_\_\_\_\_\_

KClO3= \_\_\_\_potassium chlorate\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ copper(I) bicarbonate= \_CuHCO3\_\_\_\_\_\_\_

Fe(CO3) = \_\_iron(II) carbonate\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ sodium oxide = \_\_Na2O\_\_\_\_\_\_\_\_\_\_\_\_

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SHOW WORK FOR PROBLEMS BELOW OR NO CREDIT

26. Compute the molecular weight (MW) for: H2SO4 . (S=32 g/mol O=16 g/mol H=1 g/mol)

(3 pts)

2\*1 + 1\*32 + 4\*16 =98

H S O \_\_\_98\_\_\_g H2SO4 /mol

27. The MW of CaCO3 is 100 g/mol How many moles of are in 200 grams of it? (4 pts)

Divide up 200 g/100 g mol-1=2 mol

 \_\_\_\_2\_\_\_\_\_\_\_mol CaCO3

28. What does 0.2 moles of CaCO3 weigh in grams ? ( 4 pts)

Multiply down: 0.2 mol\*100 g/mol=20 mol

 \_\_20\_\_\_\_\_\_ g CaCO3

29. How many grams are in 2.4\*1022 molecules of CaCO3? Assume 1 mole count=6.0\*1023

 (round answer to nearest gram) ( 5 pts)

Divide up: 2.4\*1024/6\*1023=0.04 mol CaCO3 Multiply down to mass: 0.04 mol\*100 g/mol=4 g

 \_\_\_4\_\_\_\_\_ g CaCO3

30. Given that butane (C4H10) has a molecular mass of 58 g/mol and 1 mole count=6\*1023:

 How many molecules of butane are in 29 g of butane ? (5 pts)

Divide up to mol 29/58=0.5 mol

Multiply down to molecules 0.5 mol\*6\*1023 molecules/mol =3\*1023

 \_\_\_\_\_3\*1023\_\_\_\_\_\_\_\_ molecules butane

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

1. How many moles of CaC2O4 are formed from 256 g of O ? (2 pts)

Step 1: mol O =256/16= 16 mol O step 2 mol CaC2O4/mol O=1/4=x/16 => x= 16/4=4 mol CaC2O4

\_\_\_4\_\_\_\_ mol CaC2O4

1. If 24 g of C (at. wt.=12 g/mol) are present in CaC2O4, how many grams of O ( at wt=16) are present? (3 pts)

Step 1: 24 g C/12 g mol\_1 =2 mol C step 2: mol O/mol C=4/2 = x/2 => x= 4 mol O

Step 3: 4 mol O\*16 g O /mol O=64 g \_\_\_\_64\_\_\_\_ g O

32. Glucose has the formula C6H12O6 and a molecular weight of 180. How many atoms of H are in 0.25 g of

 glucose ? (5 pts)

1)divide up to moles glucose: 0.25 g/180 g mol‑1=0.0013888 3) multiply down to H atom count

2) ratio of H mol /glucose mol=12/1=x/0.0013888=>x=0.01666 mol H 0.01666 mol\*6\*1023=1\*1022  atom H

 1\*1022\_\_\_ atoms of H

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