Exam 1: Chem 1114 Fall 2014
Version A 100 points

Your name: Answers

1.1 What is the universal obsession of chemists ? Molecules

1.2 What is Doc Fong's boy cat named ? Bosco

1.3. How old was Doc when he got his first chemistry set ? 13

1.4. How many cats does Doc Fong have at home ? 2

1.5. Where did Doc get his undergraduate B. SC. In Chemistry ? Univ. California @ Berkeley

2.1. What is the magnitude associated with a G ? 10^9

2.2. Convert 0.000001 s to its equivalent, prefixed form: 1 μs

2.3. The magnitude 10^{-12} has what prefix name (not symbol) associated with ? pico

2.4. What is the symbol connected to 10^{-9} ? n

2.5. Convert 3,000,000 g to its correct prefixed form: 3 Mg

2.6 Write 10 μs in scientific notation: 1×10^{-5} s

3.1. 10 ms = $10 \cdot 10^3 = 10^4$ μs (2 pts each)

3.2. 0.005 nm = 5 pm

3.3. 65 cg = $6.5 \cdot 10^{-4}$ kg

3.4. 0.003 Ts = 3 Gs

3.5. 250,000 mg = 0.25 kg

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

a) 0.00400200 6

b) 100110000 5

c) 0.3010 4

d) $3.00*10^{60000}$ 3

e) 10.01000 7

f) 2000 1

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

1.00112 + 0.10 + 2 + 201 = 204

37 -0.01 +3000 = 3000

5.1 Compute to correct sig fig count: $\frac{3.00*1.000}{2.0*0.50000}$ = 3.0 3 pts each

5.2. Compute to correct sig fig count: $\frac{(1+0.00014)}{1.000*0.5}$ = 2

5.3. Compute to the correct sig fig count:

3.0-0.102000 + $\frac{12.00*6.0}{9.02*1.999}$ = 6.9 (I accepted 7.0 also)

2.9 4.0

6.1. An element with a specific count of neutrons is a(n) isotope of the element.

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

6.3. How many neutrons in ^{15}N(N has 7 protons). 8 15-7

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

Mn manganese lead Pb K potassium

Hg mercury gold Au Ag silver

Sn tin beryllium Be Co cobalt

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

Atomic #	Mass #	symbol	#p	#n	#e	Atom charge
23	49	V	23	26	23	0
38	88	Sr	38	50	38	0

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7.2. Compute the average atomic mass of the hypothetic element Fu given the information below:

Fu mass #		% abundance=P_k	
200.0	x	10	= 2000
210.0	x	40	8400
230.0	x	50	11500
		100	21900 ÷ 100

average mass of Fu= 219 (to nearest 0.1) (4 pts)

8.1. Provide the name or formula for the compounds below. (You may use your Periodic Table as an aid.)
Note: ClO_3^{2-} = chlorate HCO_3^- = bicarbonate spelling counts ! (2 pts each)

N_2S_7 dinitrogen heptasulfide cobalt(III) chloride = $CoCl_3$

$BaClO_3$= Barium chlorate copper(I) nitride= Cu_3N

$Mn(HCO_3)_2$ = manganese (II) bicarbonate sodium phosphide = Na_3P

9.1. Compute the molecular weight (MW) for: $CaCO_3$. (Use your Periodic Tables and round to nearest 1 g/mol) (2 pts)

40 + 12 + 3x16 → 100 g $CaCO_3$ /mol
Ca + C + 3xO

9.2. The MW of phosphoric acid is 98 g/mol How many moles of are in 4900 grams of it? (4 pts)

Divide up: $4900\ g \times \frac{1\ mol}{98} = 50$

50 mol phosphoric acid

98 g/mol

9.3. How many grams are in $1.228*10^{23}$ molecules of phosphoric acid? Assume 1 mole count=$6.02*10^{23}$ (round answer to nearest gram) (4 pts)

Divide up / Multiply down $\frac{1.228 \cdot 10^{23}}{6.02 \cdot 10^{23}} \times \frac{98\ g}{mol} = 20$

20 g H_2SO_4

mol ↖ ↙ g # ↗

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Show work below or no credit will be given !

10.1 Given that octane (C_8H_{18}) has a molecular mass of 114 g/mol and 1 mole count=$6*10^{23}$: How many grams of octane are in $3.158*10^{22}$ molecules of octane ? (5 pts)

divide up / multiply down

$$\frac{3.158 \cdot 10^{22}}{6.02 \cdot 10^{23}} \times 114\ g/mol = 6$$

_____6_____ g octane

10.2. The molecular mass of SO_2 is 64 g/mol. Given that 1 mole count =$6*10^{23}$, how many molecules of SO_2 are in 42.666 g SO_2 ? (5 pts)

divide up / multiply down

$$\frac{42.666}{64} \times 6 \times 10^{23} = 4 \cdot 10^{23}$$

_____$4 \cdot 10^{23}$_____ molecules SO_2

11.1. The formula for calcium oxalate is CaC_2O_4. A chemist determines that a sample of this compound contains 512 grams of O (atomic weight 16 g/mol) . How many moles of calcium oxalate are present ? (5 pts)

$$\text{mol O} = \frac{512}{16} = 32$$

$$\frac{\text{mol } CaC_2O_4}{\text{mol O}} = \frac{1}{4} = \frac{X}{32}$$

$$\frac{32}{4} = X = 8$$

_____8_____ mol calcium oxalate

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