

Name: KEY

Chem 121 Test 1A
Fall 2009

PART A: Naming, Fill-in the blank, Significant Figures, Essay – clearly indicate your answer in the spaces provided.

1. (26 pts) Naming and Formulas: Write the correct name/formula.

$\text{Ca}(\text{C}_2\text{H}_3\text{O}_2)_2$	calcium acetate
tetraphosphorus pentasulfide	P_4S_5
FeO	iron(II) oxide
cobalt(II) hydroxide	$\text{Co}(\text{OH})_2$
AsBr_4	arsenic tetrabromide
zinc(I) sulfite tetrahydrate	$\text{Zn}_2\text{SO}_3 \cdot 4\text{H}_2\text{O}$
N_3O_6	trinitrogen hexa oxide
$\text{PbSO}_4 \cdot 2\text{H}_2\text{O}$	lead(II) sulfate dihydrate
magnesium dichromate	MgCr_2O_7
trinitrogen pentafluoride	N_3F_5
MnS_2	manganese(IV) sulfide
barium nitride	Ba_3N_2
SeI_2	selenium diiodide

2. (6 pts) Indicate the number of significant figures in each measurement and write the number in correct scientific notation.

Measurement	# of Sig Figs	In Scientific Notation
12500 mi	3	$1.25 \times 10^4 \text{ mi}$
0.08900 g	4	$8.900 \times 10^{-2} \text{ g}$
560.0 cm	4	$5.600 \times 10^2 \text{ cm}$

3. (6 pts) Fill in the blank with the best correct response.
- Atoms with the same number of protons but different numbers of neutrons are called isotopes.
 - An atom that has lost an electron becomes a(n) cation and an atom that has gained an electron is called a(n) anion. (be specific)
 - In a balanced equation, reactants appear on the left and products appear on the right.
 - The numbers used to balance a chemical equation are called coefficients.

4. (12 pts) Atomic Notation: Fill in the blanks

Element name	Symbol	# of Protons	# of Neutrons	Mass Number
sulfur	S	16	20	36
gallium	Ga	31	38	79
rubidium	Rb	37	51	88
silver	Ag	47	61	108

5. (10 pts) ESSAY: Answer **ONE** of the following in **4 – 6** grammatically correct sentences
- Describe the experiment that discovered the presence of the nucleus.
 - Describe Millikan's oil drop experiment and what it was used to determine.

Read Facets of Chemistry

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1 H 1.008												5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18																												
3 Li 6.94	4 Be 9.01											13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.06	17 Cl 35.45	18 Ar 39.95																												
11 Na 22.99	12 Mg 24.31																																												
19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.90	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.71	29 Cu 63.55	30 Zn 65.37	31 Ga 69.72	32 Ge 72.59	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.80																												
37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.94	43 Tc [98]	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.40	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.60	53 I 126.90	54 Xe 131.30																												
55 Cs 132.9	56 Ba 137.3	71 Lu 175	72 Hf 178.5	73 Ta 181	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197	80 Hg 200.59	81 Tl 204.4	82 Pb 207.2	83 Bi 209	84 Po [209]	85 At [210]	86 Rn [222]																												
87 Fr [223]	88 Ra [226]	103 Lr [262]	104 Rf [267]	105 Db [268]	106 Sg [271]	107 Bh [272]	108 Hs [270]	109 Mt [276]	110 Ds [281]	111 Rg [280]	112 Uub [285]	113 Uut [284]	114 Uuq [289]	115 Uup [288]	116 Uuh [293]		118 Uuo [294]																												
<table border="1"> <tbody> <tr> <td>57 La 138.9</td> <td>58 Ce 140.1</td> <td>59 Pr 140.9</td> <td>60 Nd 144.2</td> <td>61 Pm [145]</td> <td>62 Sm 150.4</td> <td>63 Eu 152</td> <td>64 Gd 157.3</td> <td>65 Tb 158.9</td> <td>66 Dy 162.5</td> <td>67 Ho 164.93</td> <td>68 Er 167.3</td> <td>69 Tm 168.9</td> <td>70 Yb 173</td> </tr> <tr> <td>89 Ac [227]</td> <td>90 Th 232</td> <td>91 Pa [231]</td> <td>92 U 238</td> <td>93 Np [237]</td> <td>94 Pu [244]</td> <td>95 Am [243]</td> <td>96 Cm [247]</td> <td>97 Bk [247]</td> <td>98 Cf [251]</td> <td>99 Es [252]</td> <td>100 Fm [257]</td> <td>101 Md [258]</td> <td>102 No [259]</td> </tr> </tbody> </table>																		57 La 138.9	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm [145]	62 Sm 150.4	63 Eu 152	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.93	68 Er 167.3	69 Tm 168.9	70 Yb 173	89 Ac [227]	90 Th 232	91 Pa [231]	92 U 238	93 Np [237]	94 Pu [244]	95 Am [243]	96 Cm [247]	97 Bk [247]	98 Cf [251]	99 Es [252]	100 Fm [257]	101 Md [258]	102 No [259]
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PART B: Calculations – show all work for calculations (do nothing in your head, even moving decimal places) to receive full credit.

1. (10 pts) Neon has three naturally occurring isotopes ^{20}Ne , ^{21}Ne and ^{22}Ne . Calculate the average atomic mass.

Isotopic Mass	Percent Abundance
19.9924 u	90.48%
20.9938 u	0.27%
21.9914 u	9.25%

$$\begin{aligned}(19.9924 \text{ u})(0.9048) &= 18.09 \text{ u} \\ (20.9938 \text{ u})(0.0027) &= 0.057 \text{ u} \\ (21.9914 \text{ u})(0.0925) &= 2.03 \text{ u} \\ \hline &20.18 \text{ u}\end{aligned}$$

2. (10 pts) Rutherford's experiment determined that the atomic nucleus is very dense. In fact, it has a density of $2.3 \times 10^{17} \text{ kg/m}^3$. A single hydrogen nucleus contains only one proton. The mass of a proton is $1.6726 \times 10^{-24} \text{ g}$. What is volume (in L) of a hydrogen nucleus? ($1000 \text{ L} = 1 \text{ m}^3$)

$$\begin{aligned}1.6726 \times 10^{-24} \text{ g} &\times \frac{1 \text{ kg}}{1000 \text{ g}} \times \frac{1 \text{ m}^3}{2.3 \times 10^{17} \text{ kg}} \times \frac{1000 \text{ L}}{1 \text{ m}^3} \\ &= 7.2722 \times 10^{-42} \text{ L}\end{aligned}$$

3. (10 pts) The baby penguin that was recently hatched at the Tennessee Aquarium had a birth weight of 0.485 kg. What is this weight in ounces? (16 oz = 1lb, 1 lb = 453.6g)

$$0.485 \text{ kg} \times \frac{1000 \text{ g}}{1 \text{ kg}} \times \frac{1 \text{ lb}}{453.6 \text{ g}} \times \frac{16 \text{ oz}}{1 \text{ lb}} \\ = 17.1 \text{ oz}$$

4. (10 pts) The average speed of a garden snail is 0.0468 km/hr. What is this in m/s?

$$\frac{0.0468 \text{ km}}{\text{hr}} \times \frac{1000 \text{ m}}{1 \text{ km}} \times \frac{1 \text{ hr}}{60 \text{ min}} \times \frac{1 \text{ min}}{60 \text{ s}} \\ = 0.0130 \text{ m/s}$$