

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

IA												VIIIA																			
1	2											3	4																		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18														
H	He	B	C	N	O	F	Ne	Al	Si	P	S	Cl	Ar	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
1.008	4.00	10.81	12.01	14.01	16.00	19.00	20.18	26.98	28.09	30.97	32.06	35.45	39.95	39.10	40.08	44.96	47.90	50.94	52.00	54.94	55.85	58.93	58.71	63.55	65.37	69.72	72.59	74.92	78.96	79.90	83.80
11	12											13	14	15	16	17	18														
Na	Mg											Al	Si	P	S	Cl	Ar														
22.99	24.31											26.98	28.09	30.97	32.06	35.45	39.95														
		III	IV	V	VI	VII	VIII					IX	X																		
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36														
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr														
39.10	40.08	44.96	47.90	50.94	52.00	54.94	55.85	58.93	58.71	63.55	65.37	69.72	72.59	74.92	78.96	79.90	83.80														
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54														
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe														
85.47	87.62	88.91	91.22	92.91	95.94	[98]	101.1	102.9	106.4	107.9	112.40	114.8	118.7	121.8	127.60	126.90	131.30														
55	56	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86														
Cs	Ba	Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn														
132.9	137.3	175	178.5	181	183.9	186.2	190.2	192.2	195.1	197	200.59	204.4	207.2	209	[209]	[210]	[222]														
87	88	103	104	105	106	107	108	109	110	111	112	113	114	115	116		118														
Fr	Ra	Lr	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Uub	Uut	Uuq	Uup	Uuh		Uuo														
[223]	[226]	[262]	[267]	[268]	[271]	[272]	[270]	[276]	[281]	[280]	[285]	[284]	[289]	[288]	[293]		[294]														
57	58	59	60	61	62	63	64	65	66	67	68	69	70																		
La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb																		
138.9	140.1	140.9	144.2	[145]	150.4	152	157.3	158.9	162.5	164.93	167.3	168.9	173																		
89	90	91	92	93	94	95	96	97	98	99	100	101	102																		
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No																		
[227]	232	[231]	238	[237]	[244]	[243]	[247]	[247]	[251]	[252]	[257]	[258]	[259]																		

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?

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