

Name: _____

Chemistry 121
Test 1
Spring 2007

You have 75 minutes to complete this 100 point test. Please mark each answer clearly and show all work. You may use a simple scientific calculator. NO GAPHING CALCULATORS.

I. (10 pts) Multiple Choice: Circle the best answer

1. In chemistry, the numbers in front of formulas in a balanced equation are referred to as:
 - a. Isotopes
 - b. Coefficients
 - c. Products
 - d. Reactants

2. What are the total number of protons and electrons in a chromium(VI) cation?
 - a. 27 protons, 27 electrons
 - b. 24 protons, 24 electrons
 - c. 27 protons, 21 electrons
 - d. 24 protons, 18 electrons

3. Which one of the following ionic compounds has the correct formula?
 - a. NaO
 - b. Mg₂O
 - c. CaO
 - d. K₂O₃

4. Which one of the following numbers has 4 significant figures?
 - a. 1.000
 - b. 0.0001
 - c. 1000
 - d. None of the above

5. Which of the following choices is the correct answer to this math problem: $14.509 - 2.39651 + 13.0$
 - a. 25.11249
 - b. 25.11
 - c. 25.1
 - d. 25

II. (30 pts) Calculations and Explanations: Clearly show all work for full credit.

- | | | |
|---|------------------------------|------------------|
| 1. (8 pts) An element has three naturally occurring isotopes with the following masses and percent abundances. (a) Calculate the average atomic weight of this element and (b) give the chemical name of the element. | Isotopic Mass
(u) | Abundance |
| | 38.964 | 93.26% |
| | 39.964 | 0.01000% |
| | 40.962 | 6.730% |

Element Name: _____

2. (8 pts) Acetic acid is an ingredient in vinegar. Pure acetic acid has a strong vinegar smell but is corrosive to the skin. What volume (in L) of pure acetic acid has a mass of 3.500×10^5 mg if the density of acetic acid is 1.053 g/mL?
3. (8 pts) The Insurance Institute for Highway Safety (IIHS) rates the structural integrity of automobiles using a frontal crash test during which the cars are accelerated to 40.0 mi/hr. What is this speed in m/s? (1 mi = 1.609 km)
4. (6 pts) Explain the difference between precision and accuracy as it applies to chemical measurements.

III. (52 pts) Atomic Notation and Naming

1. (12 pts) Complete the blanks in the following table:

Name	Symbol	Number of Protons	Number of Neutrons	Mass Number
	Ca			42
Arsenic			45	
		22	25	
			45	80

2. (20 pts) Name the following compounds:

- a. $\text{Ca}_3(\text{PO}_4)_2$ _____
- b. Al_2O_3 _____
- c. S_2Cl_4 _____
- d. $\text{Mn}(\text{OH})_2$ _____
- e. $\text{Ti}(\text{HPO}_4)_2$ _____
- f. NS_3 _____
- g. KrCl_5 _____
- h. $\text{FeSO}_4 \cdot 6 \text{H}_2\text{O}$ _____
- i. Na_2Se _____
- j. OBr_2 _____

3. (20 pts) Give the chemical formula for each of the following compounds

- a. Sodium sulfate
- b. Copper(II) chromate
- c. Strontium hydroxide
- d. Diphosphorous pentoxide
- e. Nitrogen trichloride
- f. Calcium hydrogen sulfite
- g. Selenium difluoride
- h. Carbon tetrabromide
- i. Ammonium carbonate
- j. Nickel(II) phosphide

IV. (8 pts) Periodic Table: Indicate the following regions on the periodic table below: (a) Halogens (b) Noble Gases (c) Alkali Metals (d) Alkaline Earth Metals

	IA																VIIIA																													
1	1 H 1.008																2 He 4.00																													
2	3 Li 6.94	4 Be 9.01										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	11 Na 22.99	12 Mg 24.31										13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.06	17 Cl 35.45	18 Ar 39.95																													
4	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																												
5	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																												
6	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]																												
7	87 Fr [223]	88 Ra [226]	103 Lr [262]	104 [261]	105 [262]	106 [263]																																								
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V. (10 pts) Essay: In 4 – 6 grammatically correct sentences, answer ONE of the following questions.

- Describe the experiment that Rutherford performed when he discovered the nucleus.
- Explain how a mass spectrometer distinguishes between heavy and light ions.