

Test 1
Chem 121
Fall 2008
Form A

You must complete **PART I** of this test without your calculator. When you are ready to start **PART II** (calculations), put the first page on the floor by your feet. You may not return to **PART I**. Staple and turn in both sections when finished.

PART I: You may **NOT** use a calculator for this section.

1. (12 pts, 3 pts each) Fill-in the blanks

| Element Name | Symbol | Number of Protons | Number of Neutrons | Mass Number |
|--------------|--------|-------------------|--------------------|-------------|
| germanium | Ge | 32 | 43 | 75 |
| phosphorus | P | 15 | 17 | 32 |
| scandium | Sc | 21 | 23 | 44 |
| barium | Ba | 56 | 82 | 138 |

2. (18 pts, 3 pts each) Name the following compounds

- a. CaSO_3 calcium sulfite
 b. SF_5 sulfur pentafluoride
 c. NS_2 nitrogen disulfide
 d. $\text{Cu}_3(\text{PO}_4)_2$ copper (II) phosphate
 e. $\text{Cr}(\text{C}_2\text{H}_3\text{O}_2)_3$ chromium (III) acetate
 f. NCl_3 nitrogen trichloride

3. (18 pts, 3 pts each) Give the chemical formula of the following compounds

- a. sodium iodide NaI
 b. selenium dibromide SeBr₂
 c. calcium hydroxide Ca(OH)₂
 d. nickel(II) hydrogen sulfate Ni(HSO₄)₂
 e. carbon tetrachloride CCl₄
 f. iron(III) oxide Fe₂O₃

4. (6 pts) Give the chemical symbol and element name of:

- | | Symbol | → | Element Name |
|----------------------------|------------------|---|------------------|
| a. A noble gas | 8A <u>He</u> | | <u>helium</u> |
| b. A transition metal | middle <u>Cu</u> | | <u>copper</u> |
| c. An alkaline earth metal | 2A <u>Mg</u> | | <u>magnesium</u> |

5. (10 pts) In 4 – 5 grammatically correct sentences, answer one of the following essay questions.
- Describe the experiment that was used to determine the charge of the electron.
 - Describe the suggestion by Rutherford that led to the discovery of the neutron.

See Facts of Chemistry 2.1 & 2.2
in Chapter 2.

When you are done with Part I, please put it on the floor until you have finished with Part II. You may not return to Part I.

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|-------|-------|-------|--------|--------|--------|-------|-------|-------|-------|-------|-------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| | IA | | | | | | | | | | | | | | | | VIII A | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | | | | | | | | | | | | | | | | | 2 | | | | | | | | | | | | | | | | | | | | | | |
| | H | | | | | | | | | | | | | | | | | He | | | | | | | | | | | | | | | | | | | | | | |
| | 1.008 | | | | | | | | | | | | | | | | | 4.00 | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 3 | 4 | | | | | | | | | | | | | | | | | 5 | 6 | 7 | 8 | 9 | 10 | | | | | | | | | | | | | | | | |
| | Li | Be | | | | | | | | | | | | | | | | | B | C | N | O | F | Ne | | | | | | | | | | | | | | | | |
| | 6.94 | 9.01 | | | | | | | | | | | | | | | | | 10.81 | 12.01 | 14.01 | 16.00 | 19.00 | 20.18 | | | | | | | | | | | | | | | | |
| 3 | 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 | | | | | | | | | | | | | | | | |
| 4 | 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 | | | | | | | | | | | | | | | | | | | | | | |
| 5 | 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 | | | | | | | | | | | | | | | | | | | | | | |
| 6 | 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] | | | | | | | | | | | | | | | | | | | | | | |
| 7 | 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 II: Once you start this section, you may not return to PART I. You may now use your calculator to complete the rest of the exam. Show all work for full credit.

1. (10 pts) Indicate the number of significant figures (SF) and write the number in scientific notation

| | number of SF | scientific notation |
|--------------|--------------|---|
| a. 21.530 | <u>5</u> | <u>2.1530×10^1</u> |
| b. 56000.200 | <u>8</u> | <u>5.6000200×10^4</u> |
| c. 1200 | <u>2</u> | <u>1.2×10^3</u> |
| d. 0.000397 | <u>3</u> | <u>3.97×10^{-4}</u> |
| e. 0.0027850 | <u>5</u> | <u>2.7850×10^{-3}</u> |

2. (9 pts) An unknown element has three isotopes of mass and percent abundance listed below. What is the average atomic weight of this element?

isotope #1: 147.9554 u, 16.563%

isotope #2: 150.9496 u, 70.811%

isotope #3: 152.9461 u, 12.626%

$$\begin{aligned}(147.9554 \text{ u})(0.16563) &= 24.506 \text{ u} \\(150.9496 \text{ u})(0.70811) &= 106.89 \text{ u} \\(152.9461 \text{ u})(0.12626) &= 19.311 \text{ u} \\ \hline &= 150.71 \text{ u}\end{aligned}$$

3. (9 pts) Gatorade has a density of 1.020 g/mL. What is the volume (in L) of a sample of Gatorade that weighs 3.56×10^5 mg?

$$\begin{aligned} & \text{?? L} \\ 3.56 \times 10^5 \text{ mg} & \times \frac{1 \text{ g}}{1000 \text{ mg}} \times \frac{1 \text{ mL}}{1.020 \text{ g}} \times \frac{\text{L}}{1000 \text{ mL}} \\ & = 0.349 \text{ L} \end{aligned}$$

4. (9 pts) On Saturday, the UTC football team will play Florida State University (GO MOCS!). The distance from Finley Stadium in Chattanooga, TN to Bobby Bowden Field in Tallahassee, FL is 363 mi. How many centimeters will the team need to travel to make it to the game? Put your answer in scientific notation. (1 mi = 1.609 km)

?? cm

$$363 \text{ mi} \times \frac{1.609 \text{ km}}{1 \text{ mi}} \times \frac{1000 \text{ m}}{1 \text{ km}} \times \frac{100 \text{ cm}}{1 \text{ m}} = 5.84 \times 10^7 \text{ cm}$$

5. (9 pts) On average, a soccer player will lose 1.5 L of sweat during a game. How many gallons is this? (1 qt = 946.35 mL, 1 gal = 4 qt).

?? gal

$$1.5 \text{ L} \times \frac{1000 \text{ mL}}{1 \text{ L}} \times \frac{1 \text{ qt}}{946.35 \text{ mL}} \times \frac{1 \text{ gal}}{4 \text{ qt}} = 0.40 \text{ gal}$$