

Department of Chemistry
University of Missouri-St. Louis

Name _____
Chem 5

September 17, 1999
Exam I

1. (15 pts)

- a. Express the width of a human hair, 0.000008 m in scientific notation

- b. How many significant figures are there in the following number? 11.005

- c. Multiply the following and express the product with the appropriate number of significant figures. Be sure to round off if necessary.

$$25.0 \times 10.5 =$$

2. (16 pts) The following nutrition information is listed on a box of crackers:

Serving size: 0.5 oz (6 crackers)

Fat: 4 g per serving; sodium: 0.14 g per serving

- a. If the box has a net weight (contents only) of 8.0 oz, about how many crackers are in the box?

- b. If you ate 10 crackers, how many grams of fat are you consuming?

- c. How many grams of sodium are used to prepare 50 boxes of crackers?

- d. Do you think that the element sodium is directly used to make crackers? Why?

3a. (20pts) Using the periodic table given as the last page on this examination, complete the following table for neutral atoms.

Name of Element	Symbol	Atomic Number	Mass Number	Number of Protons	Number of Neutrons	Number of Electrons
	C		12			
		10				10
sodium						11
	Br		79			
		20			20	

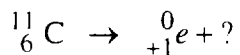
- b. How many valence electrons do each of the following elements have?

1. Na
2. N
3. C
4. F

4. (8pts) If the atomic weight of an element is the sum of the number of neutrons and protons in the nucleus, explain why the atomic weight of B is listed as 10.8 ?

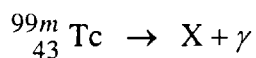
5. (12pts) Balance the following nuclear reactions:

a.



used in positron emission tomography

- b. Determine what X is when Tc-99 emits a gamma ray



- c. When Al-27 is bombarded by an alpha particle, it forms Si-30. What is the other particle produced?
6. (8pts) If the half life of a radioactive element is 5 years, how much of an original 4.0 g sample would remain after 20 yrs?
7. (15 pts) Draw electron dot diagrams for each of the following compounds and describe their shape:
- H₂S
 - CCl₄
 - PH₃
8. (6 pts) Using the octet rule and the periodic table as a guide, what would be the formula expected for the ionic substances: calcium (Ca) chloride (Cl), lithium (Li) fluoride (F), and potassium (K) oxide (O)?
- calcium chloride
- lithium fluoride
- potassium oxide

Periodic Table of the Elements

IA	1 H 1.008	IIA	3 Li 6.941	4 Be 9.012	11 Na 22.990	12 Mg 24.305	19 K 39.10	20 Ca 40.08	37 Rb 85.47	55 Cs 132.91	87 Fr (223)	88 Ra 226.03	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 65.38	31 Ga 69.72	32 Ge 72.59	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.80	39.10	40.08	44.96	47.90	50.94	52.00	54.94	55.85	58.93	58.71	63.55	65.38	69.72	72.59	74.92	78.96	79.90	83.80	85.43	89.90	93.94	98.91	103.90	108.91	113.90	118.91	123.90	128.91	133.90	138.91	143.91	148.91	153.91	158.91	163.91	168.93	173.04	177.04	181.04	185.04	189.04	193.04	197.04	201.04	205.04	209.04	213.04	217.04	221.04	225.04	229.04	233.04	237.04	241.04	245.04	249.04	253.04	257.04	261.04	265.04	269.04	273.04	277.04	281.04	285.04	289.04	293.04	297.04	301.04	305.04	309.04	313.04	317.04	321.04	325.04	329.04	333.04	337.04	341.04	345.04	349.04	353.04	357.04	361.04	365.04	369.04	373.04	377.04	381.04	385.04	389.04	393.04	397.04	401.04	405.04	409.04	413.04	417.04	421.04	425.04	429.04	433.04	437.04	441.04	445.04	449.04	453.04	457.04	461.04	465.04	469.04	473.04	477.04	481.04	485.04	489.04	493.04	497.04	501.04	505.04	509.04	513.04	517.04	521.04	525.04	529.04	533.04	537.04	541.04	545.04	549.04	553.04	557.04	561.04	565.04	569.04	573.04	577.04	581.04	585.04	589.04	593.04	597.04	601.04	605.04	609.04	613.04	617.04	621.04	625.04	629.04	633.04	637.04	641.04	645.04	649.04	653.04	657.04	661.04	665.04	669.04	673.04	677.04	681.04	685.04	689.04	693.04	697.04	701.04	705.04	709.04	713.04	717.04	721.04	725.04	729.04	733.04	737.04	741.04	745.04	749.04	753.04	757.04	761.04	765.04	769.04	773.04	777.04	781.04	785.04	789.04	793.04	797.04	801.04	805.04	809.04	813.04	817.04	821.04	825.04	829.04	833.04	837.04	841.04	845.04	849.04	853.04	857.04	861.04	865.04	869.04	873.04	877.04	881.04	885.04	889.04	893.04	897.04	901.04	905.04	909.04	913.04	917.04	921.04	925.04	929.04	933.04	937.04	941.04	945.04	949.04	953.04	957.04	961.04	965.04	969.04	973.04	977.04	981.04	985.04	989.04	993.04	997.04	1001.04	1005.04	1009.04	1013.04	1017.04	1021.04	1025.04	1029.04	1033.04	1037.04	1041.04	1045.04	1049.04	1053.04	1057.04	1061.04	1065.04	1069.04	1073.04	1077.04	1081.04	1085.04	1089.04	1093.04	1097.04	1101.04	1105.04	1109.04	1113.04	1117.04	1121.04	1125.04	1129.04	1133.04	1137.04	1141.04	1145.04	1149.04	1153.04	1157.04	1161.04	1165.04	1169.04	1173.04	1177.04	1181.04	1185.04	1189.04	1193.04	1197.04	1201.04	1205.04	1209.04	1213.04	1217.04	1221.04	1225.04	1229.04	1233.04	1237.04	1241.04	1245.04	1249.04	1253.04	1257.04	1261.04	1265.04	1269.04	1273.04	1277.04	1281.04	1285.04	1289.04	1293.04	1297.04	1301.04	1305.04	1309.04	1313.04	1317.04	1321.04	1325.04	1329.04	1333.04	1337.04	1341.04	1345.04	1349.04	1353.04	1357.04	1361.04	1365.04	1369.04	1373.04	1377.04	1381.04	1385.04	1389.04	1393.04	1397.04	1401.04	1405.04	1409.04	1413.04	1417.04	1421.04	1425.04	1429.04	1433.04	1437.04	1441.04	1445.04	1449.04	1453.04	1457.04	1461.04	1465.04	1469.04	1473.04	1477.04	1481.04	1485.04	1489.04	1493.04	1497.04	1501.04	1505.04	1509.04	1513.04	1517.04	1521.04	1525.04	1529.04	1533.04	1537.04	1541.04	1545.04	1549.04	1553.04	1557.04	1561.04	1565.04	1569.04	1573.04	1577.04	1581.04	1585.04	1589.04	1593.04	1597.04	1601.04	1605.04	1609.04	1613.04	1617.04	1621.04	1625.04	1629.04	1633.04	1637.04	1641.04	1645.04	1649.04	1653.04	1657.04	1661.04	1665.04	1669.04	1673.04	1677.04	1681.04	1685.04	1689.04	1693.04	1697.04	1701.04	1705.04	1709.04	1713.04	1717.04	1721.04	1725.04	1729.04	1733.04	1737.04	1741.04	1745.04	1749.04	1753.04	1757.04	1761.04	1765.04	1769.04	1773.04	1777.04	1781.04	1785.04	1789.04	1793.04	1797.04	1801.04	1805.04	1809.04	1813.04	1817.04	1821.04	1825.04	1829.04	1833.04	1837.04	1841.04	1845.04	1849.04	1853.04	1857.04	1861.04	1865.04	1869.04	1873.04	1877.04	1881.04	1885.04	1889.04	1893.04	1897.04	1901.04	1905.04	1909.04	1913.04	1917.04	1921.04	1925.04	1929.04	1933.04	1937.04	1941.04	1945.04	1949.04	1953.04	1957.04	1961.04	1965.04	1969.04	1973.04	1977.04	1981.04	1985.04	1989.04	1993.04	1997.04	2001.04	2005.04	2009.04	2013.04	2017.04	2021.04	2025.04	2029.04	2033.04	2037.04	2041.04	2045.04	2049.04	2053.04	2057.04	2061.04	2065.04	2069.04	2073.04	2077.04	2081.04	2085.04	2089.04	2093.04	2097.04	2101.04	2105.04	2109.04	2113.04	2117.04	2121.04	2125.04	2129.04	2133.04	2137.04	2141.04	2145.04	2149.04	2153.04	2157.04	2161.04	2165.04	2169.04	2173.04	2177.04	2181.04	2185.04	2189.04	2193.04	2197.04	2201.04	2205.04	2209.04	2213.04	2217.04	2221.04	2225.04	2229.04	2233.04	2237.04	2241.04	2245.04	2249.04	2253.04	2257.04	2261.04	2265.04	2269.04	2273.04	2277.04	2281.04	2285.04	2289.04	2293.04	2297.04	2301.04	2305.04	2309.04	2313.04	2317.04	2321.04	2325.04	2329.04	2333.04	2337.04	2341.04	2345.04	2349.04	2353.04	2357.04	2361.04	2365.04	2369.04	2373.04	2377.04	2381.04	2385.04	2389.04	2393.04	2397.04	2401.04	2405.04	2409.04	2413.04	2417.04	2421.04	2425.04	2429.04	2433.04	2437.04	2441.04	2445.04	2449.04	2453.04	2457.04	2461.04	2465.04	2469.04	2473.04	2477.04	2481.04	2485.04	2489.04	2493.04	2497.04	2501.04	2505.04	2509.04	2513.04	2517.04	2521.04
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