

Complete each of the following problems. For numerical problems, you must show your work in order to possibly earn full credit.

1. Write the electron configurations for the following atoms. (2 pts. ea.)

- a. Oxygen (O)  $1s^2 2s^2 2p^4$  (8 electrons)
- b. Bromine (Br)  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^5$  (35 electrons)
- c. Magnesium (Mg)  $1s^2 2s^2 2p^6 3s^2$  (12 electrons)

2. In the periodic table, atoms within a group (vertical column) tend to have similar properties and reactivity. Why is this the case? (6 pts.)

Reactivity is controlled primarily by valence electron configuration. For elements within a group, the number of valence electrons and their configuration is the same as you proceed down the group. Valence electron configurations change as you move across a period (row).

3. When 18.02 grams of water is decomposed, 16.00 g of oxygen and 2.02 g of hydrogen are formed. How many grams of oxygen would be formed from the electrolysis of 154 g of water? (6 pts.)

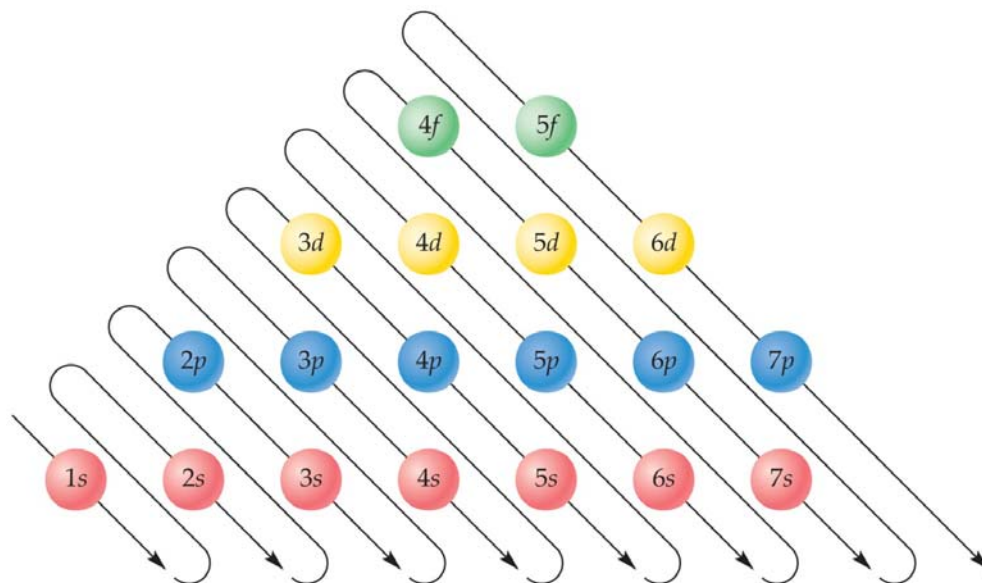
The law of definite proportions allows us to trust that the ratio of oxygen to water will be constant, regardless of the quantity of water we have. Therefore: we can use the ratio 16.00 g oxygen per 18.02 grams water to solve the problem.

$$154 \text{ g-water} \times \frac{16.00 \text{ g oxygen}}{18.02 \text{ g-water}} = 137 \text{ g oxygen}$$

4. Complete the following table (6 pts.)

Element	Mass Number	Number of Protons	Number of Neutrons
Cu	63	29	34
P	31	15	16
U	238	92	146

## Possibly Useful Information



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## PERIODIC CHART OF THE ELEMENTS

PERIODIC CHART OF THE ELEMENTS															INERT GASES		
IA	IIA	IIIB	IVB	VB	VIB	VII B	VIII			IB	IIB	IIIA	IVA	VA	VIA	VIIA	
1 H 1.00797																1 H 1.00797	2 He 4.0026
3 Li 6.939	4 Be 9.0122											5 B 10.811	6 C 12.0112	7 N 14.0067	8 O 15.9994	9 F 18.9984	10 Ne 20.183
11 Na 22.9898	12 Mg 24.312											13 Al 26.9815	14 Si 28.086	15 P 30.9738	16 S 32.064	17 Cl 35.453	18 Ar 39.948
19 K 39.102	20 Ca 40.08	21 Sc 44.956	22 Ti 47.90	23 V 50.942	24 Cr 51.996	25 Mn 54.9380	26 Fe 55.847	27 Co 58.9332	28 Ni 58.71	29 Cu 63.54	30 Zn 65.37	31 Ga 69.72	32 Ge 72.59	33 As 74.9216	34 Se 78.96	35 Br 79.909	36 Kr 83.80
37 Rb 85.47	38 Sr 87.62	39 Y 88.905	40 Zr 91.22	41 Nb 92.906	42 Mo 95.94	43 Tc [99]	44 Ru 101.07	45 Rh 102.905	46 Pd 106.4	47 Ag 107.870	48 Cd 112.40	49 In 114.82	50 Sn 118.69	51 Sb 121.75	52 Te 127.60	53 I 126.904	54 Xe 131.30
55 Cs 132.905	56 Ba 137.34	*57 La 138.91	72 Hf 178.49	73 Ta 180.948	74 W 183.85	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.09	79 Au 196.967	80 Hg 200.59	81 Tl 204.37	82 Pb 207.19	83 Bi 208.980	84 Po (210)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra (226)	+89 Ac (227)	104 Rf (261)	105 Db (262)	106 Sg (266)	107 Bh (262)	108 Hs (265)	109 Mt (266)	110 ? (271)	111 ? (272)	112 ? (277)						

Numbers in parenthesis are mass numbers of most stable or most common isotope.

Atomic weights corrected to conform to the 1963 values of the Commission on Atomic Weights.

The group designations used here are the former Chemical Abstract Service numbers.

### \* Lanthanide Series

58 Ce 140.12	59 Pr 140.907	60 Nd 144.24	61 Pm (147)	62 Sm 150.35	63 Eu 151.96	64 Gd 157.25	65 Tb 158.924	66 Dy 162.50	67 Ho 164.930	68 Er 167.26	69 Tm 168.934	70 Yb 173.04	71 Lu 174.97
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### † Actinide Series

90 Th 232.038	91 Pa (231)	92 U 238.03	93 Np (237)	94 Pu (242)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (249)	99 Es (254)	100 Fm (253)	101 Md (256)	102 No (256)	103 Lr (257)
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