

CHM 1020
Elements and Isotopes
Homework Part 2

Using a Periodic Table of the Elements, answer the following practice questions:

1. Carbon-14 is a radioactive isotope of carbon. How many protons, neutrons and electrons are in an atom of this radioactive isotope? $p=6, n=8, e=6$
2. Uranium-235 is a radioactive isotope of uranium. How many protons, neutrons and electrons are in an atom of this radioactive isotope? $p=92, n=143, e=92$
3. Phosphorus-32 is a radioactive isotope of phosphorus. How many protons, neutrons and electrons are in an atom of this radioactive isotope? $p=15, n=17, e=15$
4. Be sure that you can name the elements and symbols for elements 1-18 ✓
5. An atom has 45 protons, 60 neutrons and 43 electrons. Describe this atom using the format described in class.

assume it is neutral

$^{14}_6\text{C}$
from periodic table

$^{235}_{92}\text{U}$

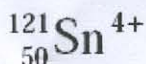
$^{32}_{15}\text{P}$

F is fluorine!



I know from the periodic table that Rh is atomic #45

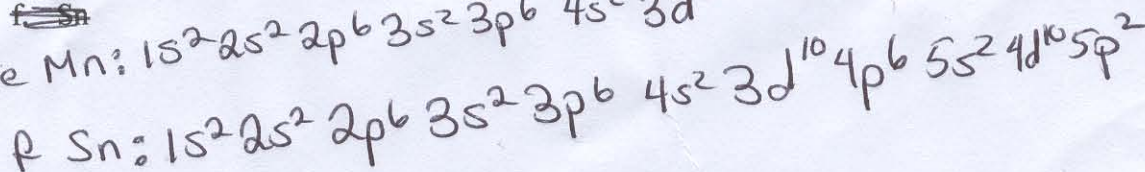
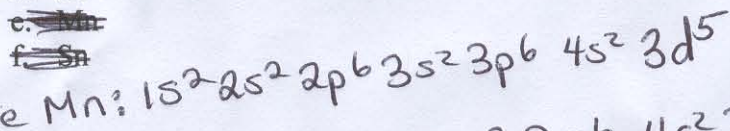
6. How many protons neutrons and electrons are in the following molecule?



$p=50, n=71, e=46$

7. Please describe the physical significances of the quantum numbers n (principle quantum number), l (angular momentum quantum number), (Please use complete sentences.)
8. How many electrons are permitted in a d subshell? 10
9. How many electrons are permitted in a d orbital? 2
10. The maximum number of electrons that may occupy the second electron shell is? 8
11. Please write the ground electron configuration for the following elements. Please use shell-subshell notation.

- a. H: $1s^1$
- b. C: $1s^2 2s^2 2p^2$
- c. O: $1s^2 2s^2 2p^4$
- d. Al: $1s^2 2s^2 2p^6 3s^2 3p^1$



12. A molecule has 26 electrons, 28 protons and 30 neutrons. What is the element? How would you write it? (Use the form described in class with the chemical symbol, atomic number, charge and mass number.)

58
~~58~~
28 Ni²⁺

13. Assume I have discovered a new element (Mi) and there are two naturally occurring isotopes. My element has 196 protons. One of the isotopes (isotope 1) has 200 neutrons and the other (isotope 2) has 220 neutrons. They exist in 60: 40 ratio. (Isotope 1 is more abundant.) What is the average atomic mass of my element? (Report your answer to 3 significant figures.)

196+200=396
196+220=416

14. Calculate the atomic mass of silver from the following data. Report your answer in 5 significant figures.

| Isotope | Natural Abundance (%) | Relative Mass (amu) |
|-------------------|-----------------------|---------------------|
| ¹⁰⁷ Ag | 51.820 | 106.90509 |
| ¹⁰⁹ Ag | 48.180 | 108.9047 |

#7 ~~As shell of Bo~~

The principle quantum number n generally corresponds to the shell of the Bohr model or the distance from the nucleus.

The angular momentum quantum number l corresponds to the type of orbital.

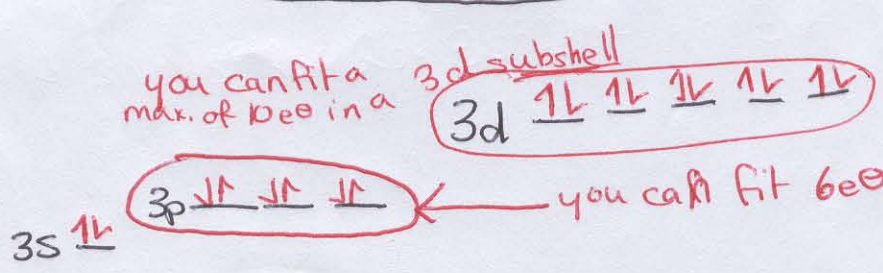
#3 Ave Mass = $\chi_1 M_1 + \chi_2 M_2$
 $= (.60)(396) + (.40)(416)$
 $= 404 \text{ amu}$

| | % | Mass |
|---|----|------|
| 1 | 60 | 396 |
| 2 | 40 | 416 |

#4 Ave Mass = $\chi_1 M_1 + \chi_2 M_2$
 $= (.51820)(106.90509) + (.48180)(108.9047)$
 $= 107.87 \text{ amu}$

You can get 18e⁻ max into the entire 3rd shell

#8, 9 & 10 explained



• You can fit a maximum of 2e⁻ in any orbital