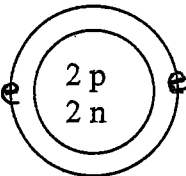


1. Complete the following table.

Symbol	Atomic Number	Atomic Mass	Number of Protons	Number of Neutrons	Number of Electrons
${}^{12}_6\text{C}$					
${}^{40}_{18}\text{Ar}$					
${}^{127}_{53}\text{I}^-$					
${}^{40}_{20}\text{Ca}^{+2}$					

2. Atoms are made up of subatomic particles, such as protons, neutrons, and electrons. The nucleus of atoms that make up isotopes of an element differ. There are three known isotopes of the element hydrogen. Make a drawing representing each of these three isotopes. A drawing of a helium isotope is shown as an example. A drawing of a helium isotope is shown as an example.

Helium, ${}^4_2\text{He}$	Protium, ${}^1_1\text{H}$	Deuterium, ${}^2_1\text{H}$	Tritium, ${}^3_1\text{H}$
			

Why is the mass for hydrogen 1.0079 and not a whole number?

Do the numbers of electrons for neutral isotopes of the same element differ? Yes or No

Do the numbers of protons for neutral isotopes of the same element differ? Yes or No

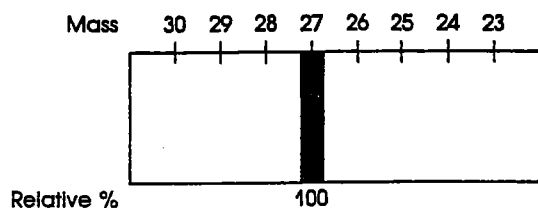
Do the numbers of neutrons for neutral isotopes of the same element differ? Yes or No

Do the atomic numbers for neutral isotopes of the same element differ? Yes or No

Do the mass numbers for neutral isotopes of the same element differ? Yes or No

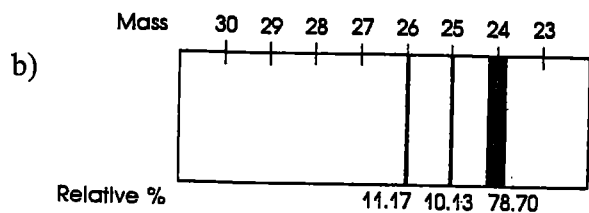
3. A mass spectrograph is an instrument used to separate an element's isotopes and to measure their relative abundances.

a)



What is the atomic mass of the isotope of the element? \_\_\_\_\_

What is this element's name? \_\_\_\_\_



What are the atomic masses of the isotopes of the element? \_\_\_\_\_

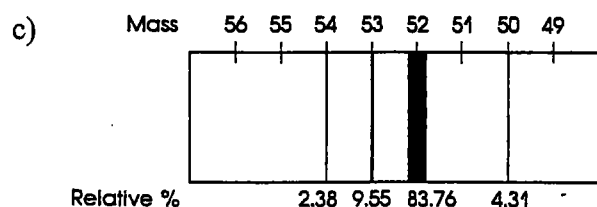
Based on the experimentally obtained values of atomic mass and percent, calculate the average atomic mass of this element. Show your work below the spectrograph.

What is this element's name? \_\_\_\_\_

What are the atomic masses of the isotopes of the element? \_\_\_\_\_

Calculate the average atomic mass of this element, showing your work under the spectrograph.

What is this element's name? \_\_\_\_\_



4. a) By what other name are elements in Group 1 known? \_\_\_\_\_
- b) By what other name are elements in Group 2 known? \_\_\_\_\_
- c) By what other name are the elements in Group 3-12 known? \_\_\_\_\_
- d) By what other name are the elements in Group 17 known? \_\_\_\_\_
- e) By what other name are the elements in Group 18 known? \_\_\_\_\_

5. What is true of elements within any group?

6. The electron configuration of an atom reveals the placement of electrons within the orbitals of the atom and is the key to chemical behavior.

Write the electron configurations for atoms that have the following atomic numbers

3: \_\_\_\_\_

11: \_\_\_\_\_

19: \_\_\_\_\_

What if anything do these electron configurations have in common?

What would you expect about the relative properties of these elements?

Where are there atoms located on the periodic table?

7. Write the electron configurations for the atoms that have the following atomic numbers.

9: \_\_\_\_\_

17: \_\_\_\_\_

35: \_\_\_\_\_

What if anything do these electron configurations have in common?

What would you expect about the relative properties of these elements?

Where are these atoms located on the periodic table?

8. Calcium tends to form a 2+ ion. Write the electron configuration of a neutral Ca atom and the  $\text{Ca}^{2+}$  ion.

Ca: \_\_\_\_\_

$\text{Ca}^{2+}$ : \_\_\_\_\_

Explain why the 2+ ion is the one that tends to typically form.

What family on the periodic table does Ca belong to?

What ions would other elements in that family form? Why?

9. Sulfur tends to form a 2- ion. Write the electron configuration of a neutral S atom and the  $\text{S}^{2-}$  ion.

S: \_\_\_\_\_

$\text{S}^{2-}$ : \_\_\_\_\_

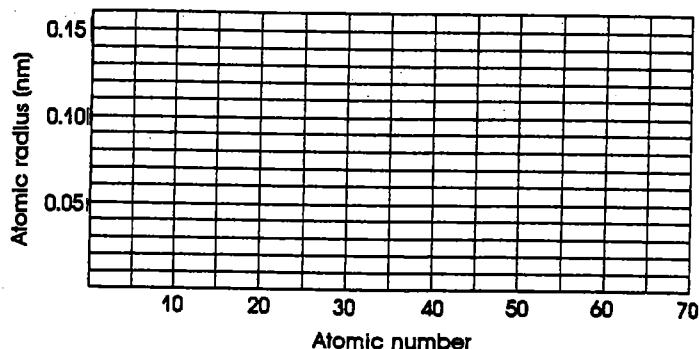
Explain why the 2- ion is the one that tends to typically form.

What family on the periodic table does S belong to?

What ions would other elements in that family form? Why?

10. The atomic radius of the first few atoms in Group 17 have been estimated to have the following values:

F	0.064 nm
Cl	0.099 nm
Br	0.114 nm
I	0.133 nm



Graph these values versus atomic number on the grid.

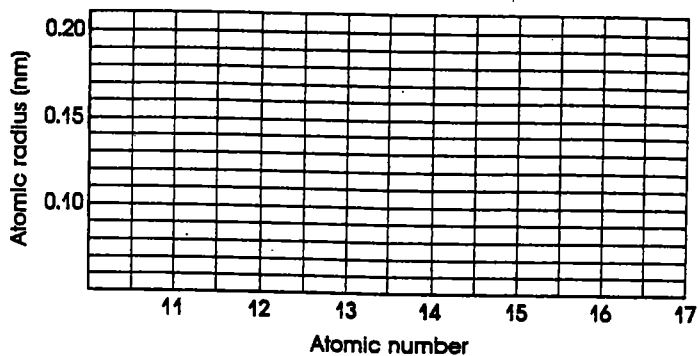
What do you notice about the relationship?

Account for this relationship in terms of atomic forces and structure.

11. The radii of the first seven elements in period 3 have been estimated to have the following values:

Na	0.186 nm
Al	0.143 nm
Si	0.117 nm
P	0.110 nm
S	0.104 nm
Cl	0.099 nm

Graph these values versus atomic number on the grid.



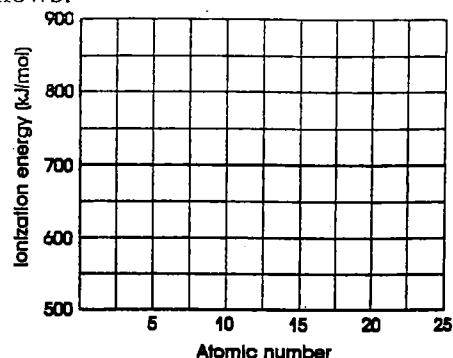
What do you notice about the relationship?

Account for this relationship in terms of atomic forces and structure.

12. The ionization energies of the first three atoms in group 2 are as follows:

Be	900 kJ
Mg	736 kJ
Ca	590 kJ

Graph these values versus atomic number on the grid.



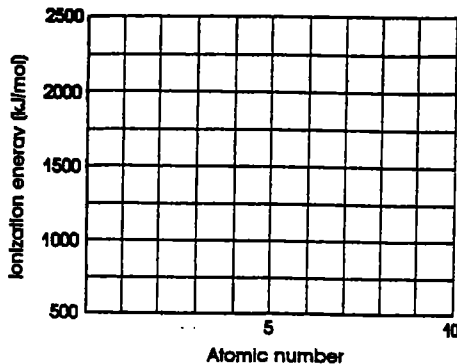
What do you notice about the relationship?

Account for this relationship in terms of atomic forces, structure, and radius.

13. The ionization energies of the elements in period 2 are as follows:

Li	519 kJ
Be	900 kJ
B	799 kJ
C	1088 kJ
N	1406 kJ
O	1314 kJ
F	1682 kJ
Ne	2080 kJ

Graph these values versus atomic number on the grid.



What general trend do you notice?

Account for this general trend in terms of atomic forces, structure, and radius.