

WORKSHOP 2

Ions, Isotopes, Subatomic Particles

Name: _____

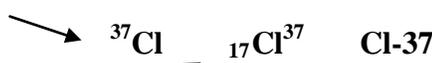
Section _____

Isotopes are characterized by individual “mass numbers” shown as superscripts.

For example, the mass number 37 in this isotope of Cl is shown as follows. (Our text uses the first format, the CRC handbook uses the second, and the third is commonly used in body of texts and articles.)

Sometimes the atomic number, 17 in this case, is shown

as a subscript. This is easily typed using the second format but not in the format used by our text. Ionic charges are always given as superscripts to the right, and thus are more compatible with the first of the three formats.



The chloride ion with a mass number of 37: $^{37}\text{Cl}^-$ Ionic charge can be shown in this manner. Usually we don't find ions of individual isotopes expressed with mass numbers, but for the purposes of this exercise it can be instructive.

1. List the number of subatomic particles in each of the following isotopes (and ions). or give a symbol, when the number of protons, electrons & neutrons are given

symbol	protons	neutrons	electrons	symbol	protons	neutrons	electrons
^{79}Br				$^{51}\text{V}^{2+}$			
^{82}Se				$^{127}\text{I}^-$			
$^{80}\text{Se}^{2-}$				$^3\text{H}^+$			
	30	36	28		1	1	2

2. Briefly describe the contributions made to atomic theory by the following scientists: Some of these may not be in your textbook

a) R. Millikan

b) J. Thomson

c) J. Berzelius

d) E. Rutherford

3. "Isobars" are isotopes of different elements having the same mass number. The isobars ^{40}K and ^{40}Ar have the same mass number (to 4 sig figs anyway). What is different about them?
4. A hypothetical element, which we'll call "X" on the planet Krypton has 24 protons and either 26 or 29 neutrons. The lighter isotope is present as 40.0 % of the element, and the heavier isotope constitutes 60.0 % of the element. Calculate the atomic mass of the element to 3 significant figures. (Mass numbers are good to 3 sig figs.)
5. In fact, isotope ratios of elements are different on different planets. Do you think the isotope ratio given for the element above is reasonable for element # 24 on Earth? Why or why not? (Look at the periodic table for guidance.)

Look up the correct isotopes for element #24 present on planet Earth (use the CRC Handbook table of isotopes and their abundances (% composition))