SNC2D CHEMISTRY

CHEMICAL REACTIONS

☞ Standard Atomic Notation (P.~)

Electric Charges

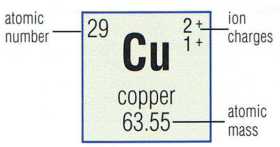
Since the number of protons and electrons in an atom is the same, the positive charges of the protons cancel the negative charges of the electron. As such, an atom itself has no electric charge.

element	# protons	total +ve charge	# electrons	total –ve charge	net charge of atom
hydrogen	1	1+	1	1-	0
oxygen	8	8+	8	8-	0
magnesium	12	12+	12	12-	0
copper	29	29+	29	29-	0
uranium	92	92+	92	92-	0

Elemental Information

Recall that each element is represented by a square on the periodic table. The information given in the square may vary between different periodic tables, but it usually includes the:

- *name*
- *symbol*
- *atomic number (# protons)*
- *atomic mass (an average)*
- *ion charge (+ if it loses electrons and – if it gains electrons)*



Standard Atomic Notation

*We can represent the numbers of subatomic particles by using **standard atomic notation**, an internationally recognized system used to communicate information about an atom. Using this notation, we write the chemical symbol of the atom and place the atomic number to the lower left and the mass number to the upper left. For example, carbon which has an atomic mass of 12 and an atomic number of 6, would be expressed as:*

$$^{12}_{6}C$$

Standard Atomic Notation

STANDARD ATOMIC NOTATION

$^{A}_{Z}X$

A = atomic mass = # p's + # n's
Z = atomic number = # p's
X = chemical symbol

NOTE! # e's = # p's = Z (since atoms are electrically neutral)
n's = A – Z

Standard Atomic Notation

PRACTICE

1. Express each of the following using standard atomic notation:
   - lithium (Li)
   - nitrogen (N)
   - aluminum (Al)
   - potassium (K)

Standard Atomic Notation

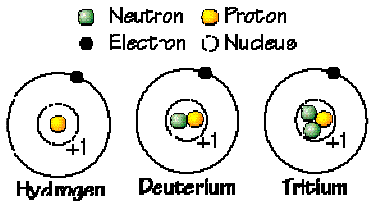
PRACTICE

2. How many electrons, protons, and neutrons are there in the following atoms?

	$^{4}_{2}He$	$^{16}_{8}O$	$^{28}_{14}Si$	$^{31}_{15}P$	$^{40}_{20}Ca$	$^{70}_{31}Ga$	$^{75}_{33}As$
#p	2	8	14	15	20	31	33
#e	2	8	14	15	20	31	33
#n	2	8	14	16	20	39	42

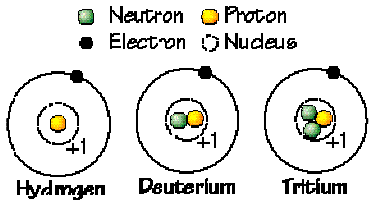
Isotopes

An isotope is any of two or more forms of an element, each having the same number of protons but having a different mass due to a different number of neutrons. For example, the isotopes of hydrogen are shown below.



Isotopes

While isotopes of the same element have the same physical properties and the same chemical properties, some isotopes are unstable, or radioactive, which means that the nucleus has a tendency to break apart and eject very-high-energy particles into its surroundings.



Isotopes

ISOTOPES

- two or more forms of an element (same # p's but different # of n's)
- have the same physical and chemical properties