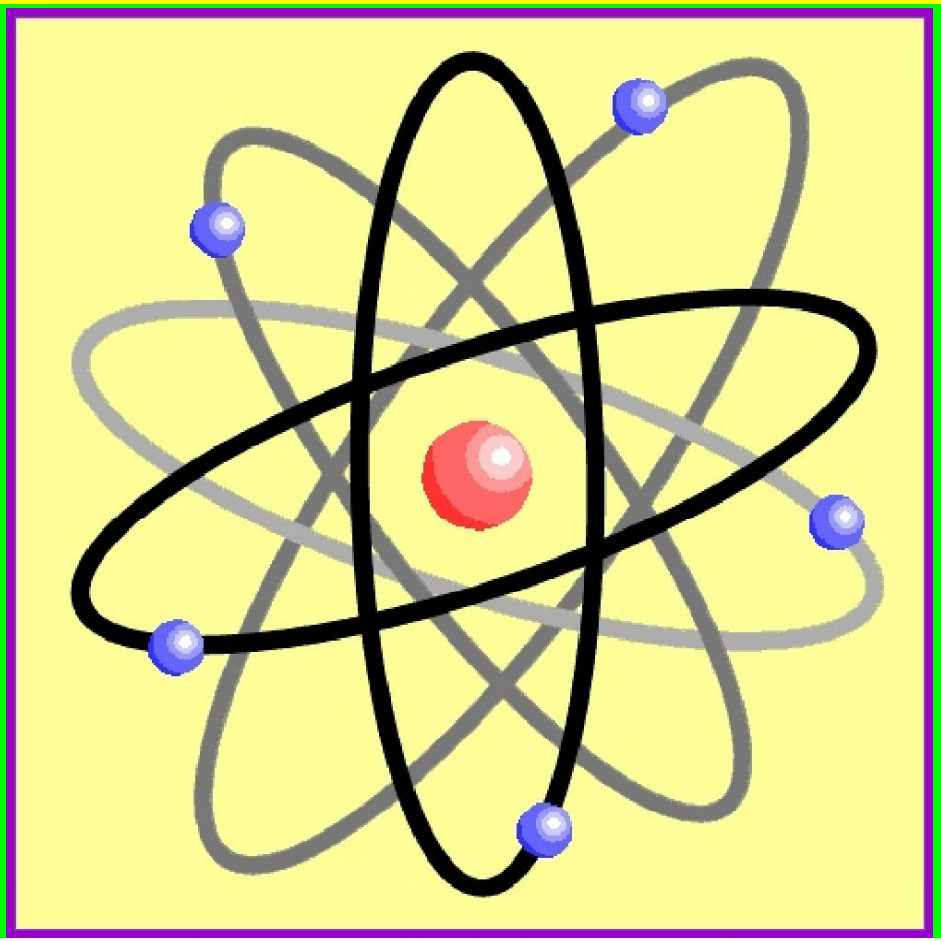
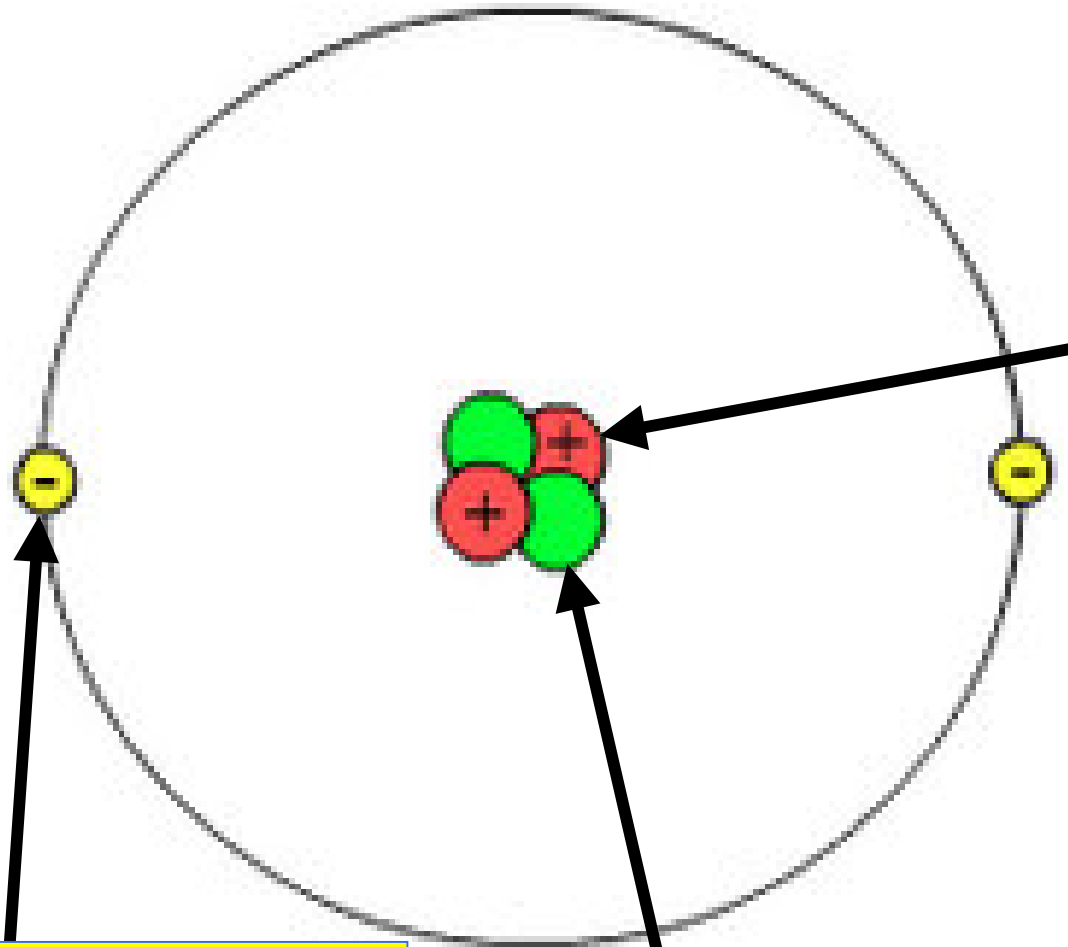
Chemistry 11 – Atomic Stucture

Particles which make up the atom are called subatomic particles.





Protons

Positively charged particles in the nucleus

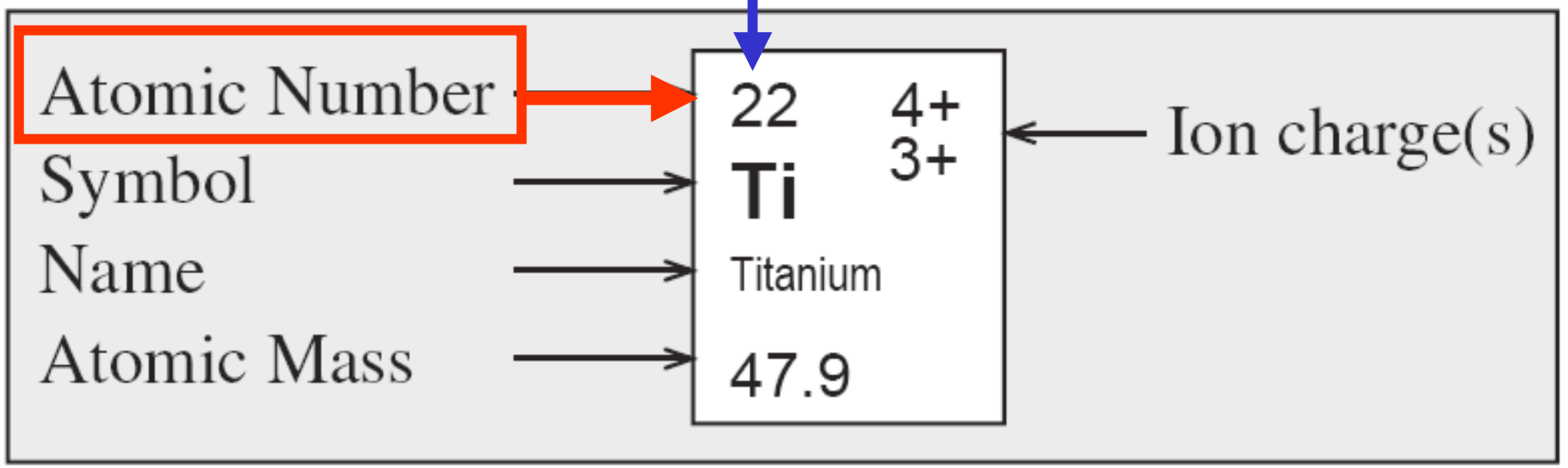
Electrons –
Small negative particles outside the nucleus

Neutrons - Neutral particles in the nucleus

Particle	Mass (P = 1)	Charge	Location
Proton	1	+	nucleus
Neutron	1	0	nucleus
Electron	$\frac{1}{1837}$	-	outside

Atomic Number = The # of Protons in the Nucleus

Found on top of element symbol

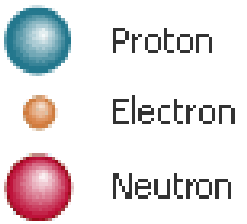


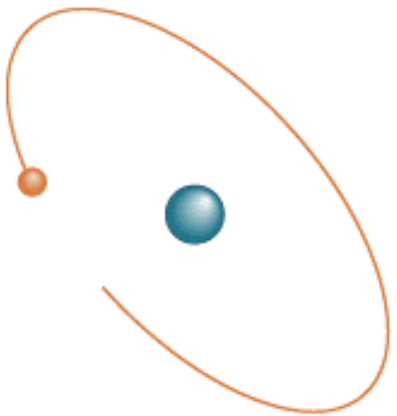
Try these:

Element	Symbol	Atomic Number	Number of Protons
Hydrogen		**1**	
Beryllium		**4**	
Carbon			
Cobalt			
Krypton		**36**	

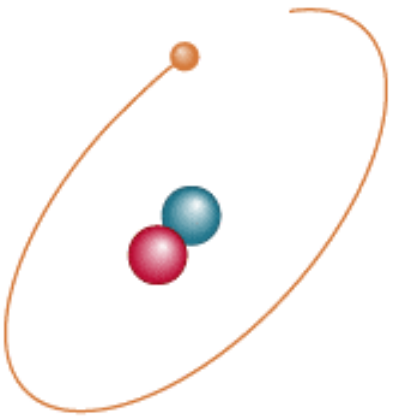
Element	Symbol	Atomic Number	Number of Protons
Hydrogen	H	1	1
Beryllium	Be	4	4
Carbon	C	6	6
Cobalt	Co	27	27
Krypton	Kr	36	36

Isotopes of Hydrogen

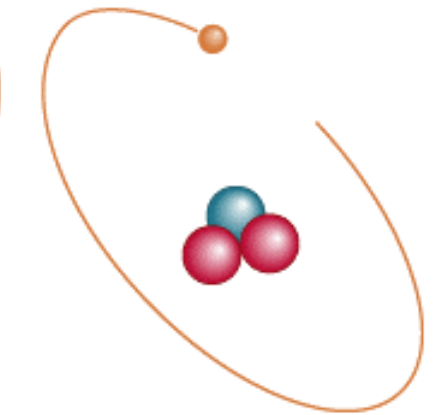




Hydrogen-1



Hydrogen-2

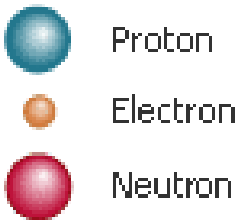


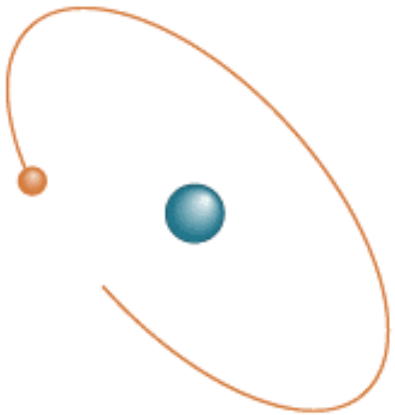
Hydrogen-3

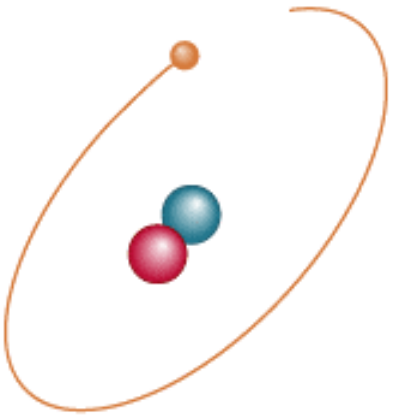
Isotopes are:

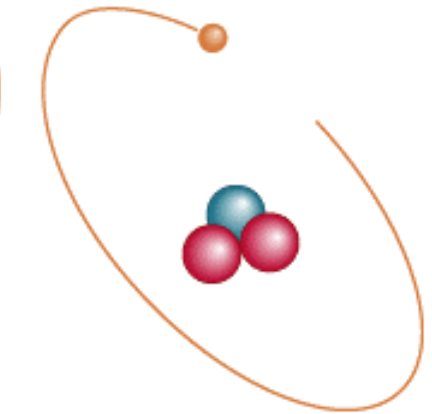
Different forms of the same element with the SAME # of Protons but with DIFFERENT #'s of Neutrons

Isotopes of Hydrogen









Hydrogen-1

^{1}H

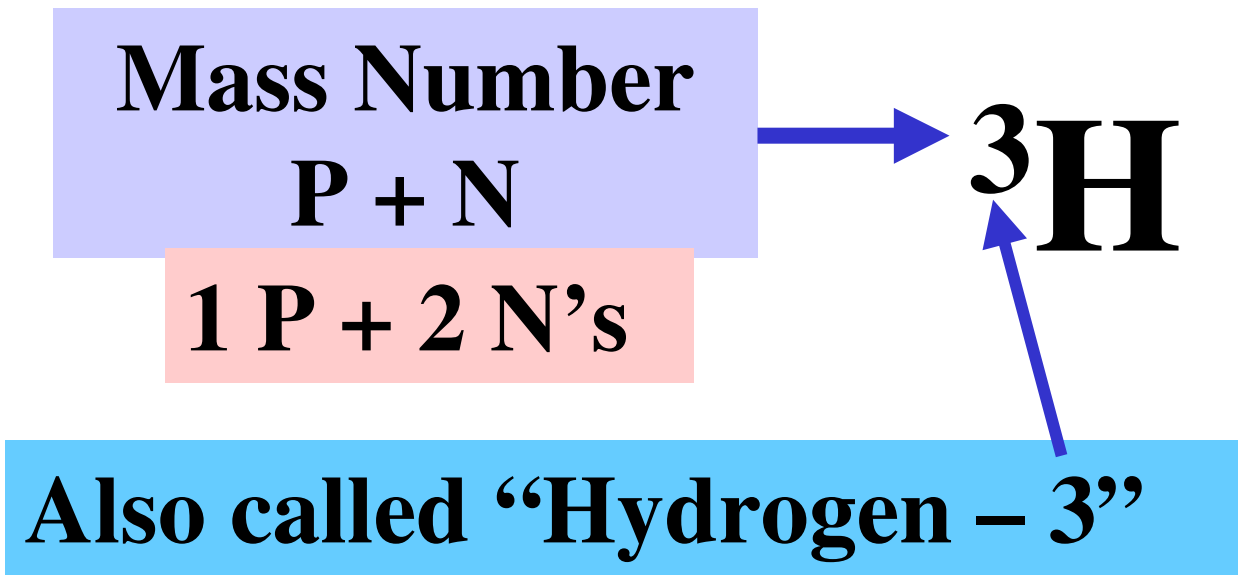
Hydrogen-2

^{2}H

Hydrogen-3

^{3}H

Mass Number = Total Protons + Neutrons in an isotope of an element



^{3}H

Called the "Nuclear Notation"

To find P's and N's from Nuclear Notation

^{41}Ca

To find P's and N's from Nuclear Notation

To find # of Neutrons, put Atomic Number Here: →

$$^{41}_{20}Ca$$

Calcium's atomic Number = 20

So it has 20 Protons

To find P's and N's from Nuclear Notation

Mass # = P + N

To find # of Neutrons, put Atomic Number Here:

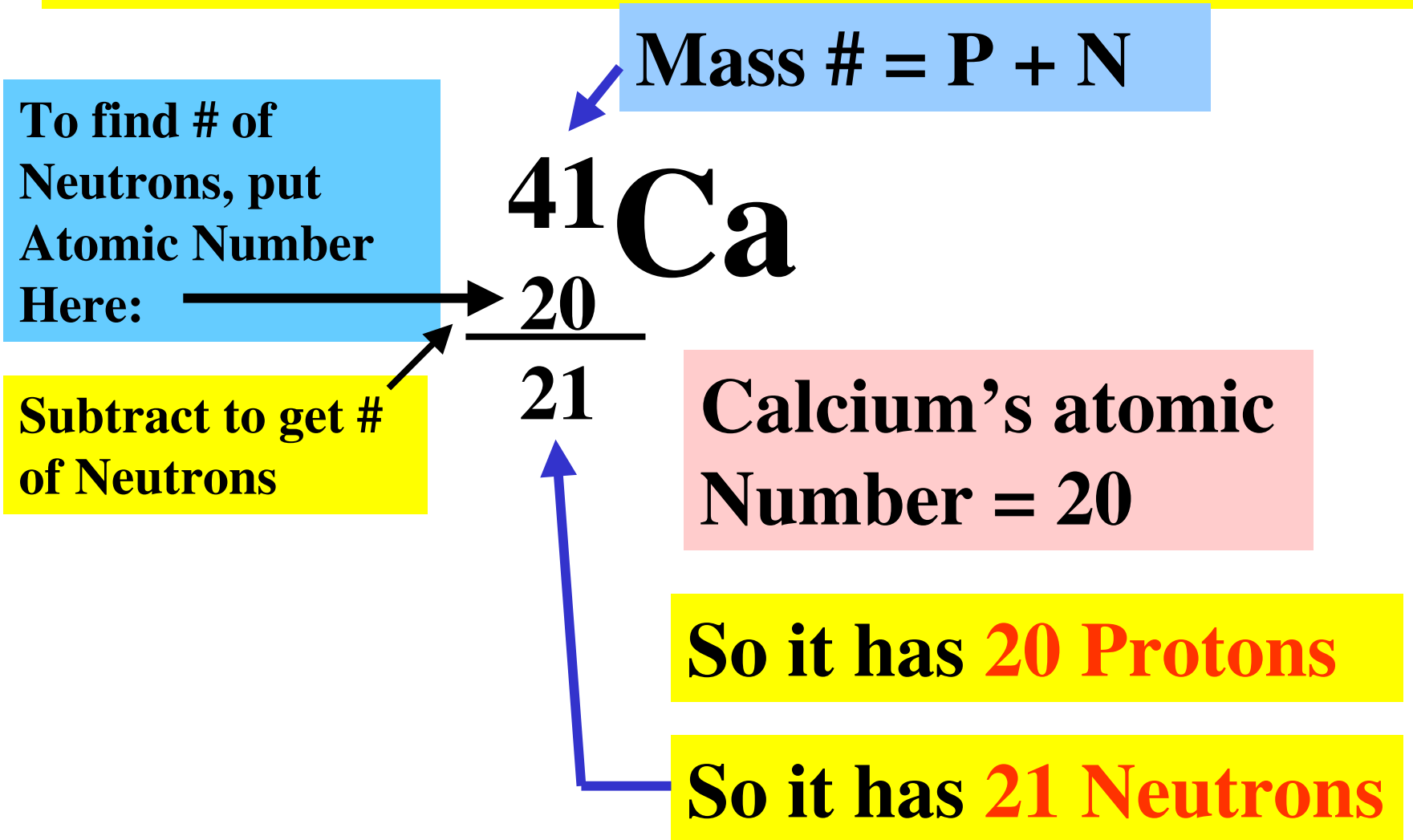
$$^{41}_{20}Ca$$

Subtract to get # of Neutrons

Calcium's atomic Number = 20

So it has 20 Protons

To find P's and N's from Nuclear Notation



Find the # of Protons and # of Neutrons in Each of the Following Isotopes:

Isotope	Mass #	Atomic #	# of Protons	# of Neutrons
^{54}Fe				
^{56}Mn				
^{237}Np				
^{12}C				

Find the # of Protons and # of Neutrons in Each of the Following Isotopes:

Isotope	Mass #	Atomic #	# of Protons	# of Neutrons
^{54}Fe	54	26	26	54 – 26 = 28
^{56}Mn	56	25	25	31
^{237}Np	237	93	93	144
^{12}C	12	6	6	6

Now try the other way!

Isotope	Mass #	Atomic #	# of Protons	# of Neutrons
		55		78

Now try the other way!

Isotope	Mass #	Atomic #	# of Protons	# of Neutrons
	55 + 78 = 133	55	55	78

Now try the other way!

Isotope	Mass #	Atomic #	# of Protons	# of Neutrons
^{133}Cs	55 + 78 = 133	55	55	78

Now try the other way!

Isotope	Mass #	Atomic #	# of Protons	# of Neutrons
^{133}Cs	55 + 78 = 133	55	55	78
			82	128
	130	54		
		17		20

Now try the other way!

Isotope	Mass #	Atomic #	# of Protons	# of Neutrons
^{133}Cs	55 + 78 = 133	55	55	78
^{210}Pb	210	82	82	128
^{130}Xe	130	54	54	130 – 54 = 76
^{37}Cl	37	17	17	20

In a Neutral Atom of an Element:

The # of Electrons(-) = The # of Protons(+)

Ions

An ion is an atom where:

of e^-'s ≠ # of p's

In a + ion (cation)

of e^-'s < # of p's

In a - ion (anion)

of e^-'s > # of p's

The ion Ca^{2+} has 20 protons (atomic #) and it has 18 e^-'s (2 less –'s than +'s, hence a 2+ charge)

The ion Se^{2-}
has 34 protons (atomic #)
and it has 36 e^-'s (2 more $-$'s than $+$'s, hence a 2- charge)

An atom of Bi
has 83 protons (atomic #)
and it has 83 e^-'s (e^-'s are equal to protons, hence, no charge (neutral))

The isotope:

$^{56}Fe^{3+}$

has 26 protons

30 neutrons (56-26)

23 electrons (26-3)

The isotope:

$^{76}As^{3-}$

has 33 protons

43 neutrons (76-33)

36 electrons (33 +3)

The isotope:

$^{201}Au^{+}$

has 79 protons

122 neutrons (201-79)

78 electrons (79 - 1)

The isotope:

$^{82}Br^-$

has 35 protons

47 neutrons (82-35)

36 electrons (35 + 1)

An isotope has 46 protons, 58 neutrons and 42 electrons. Write the nuclear notation:

An isotope has 46 protons, 58 neutrons and 42 electrons. Write the nuclear notation:

Answer: $^{104}Pd^{4+}$

An isotope has 52 protons,
79 neutrons and 54 electrons.
Write the nuclear notation:

An isotope has 52 protons, 79 neutrons and 54 electrons. Write the nuclear notation:

Answer: $^{131}Te^{2-}$

Read p. 144-149 in SW. Do Ex. 22 a-j on page 149. (Change "atomic mass" to "mass #"