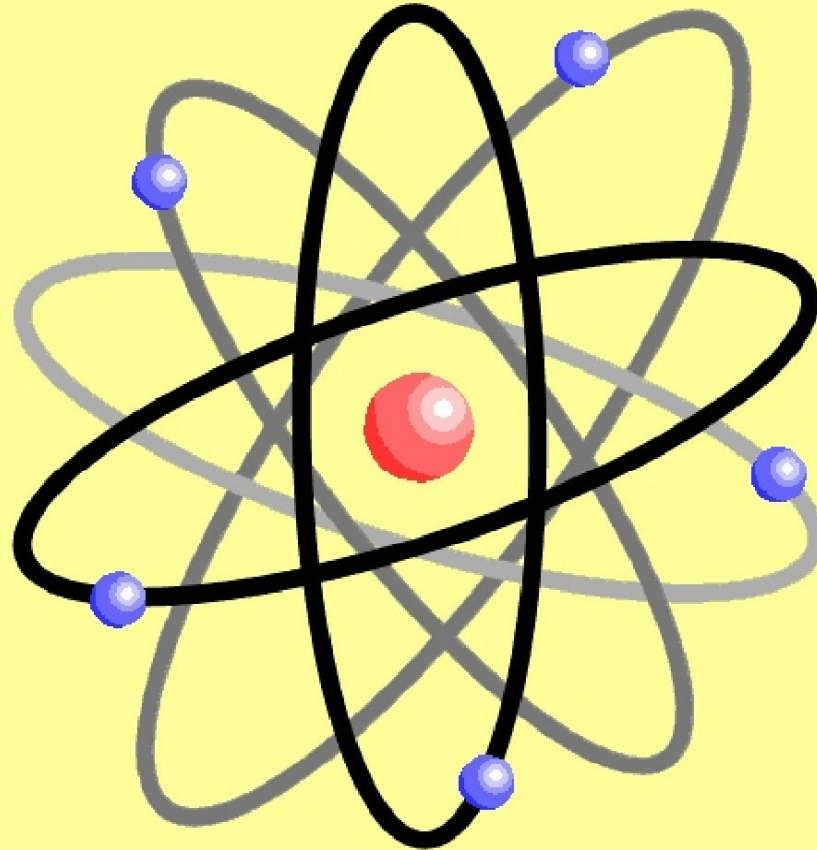
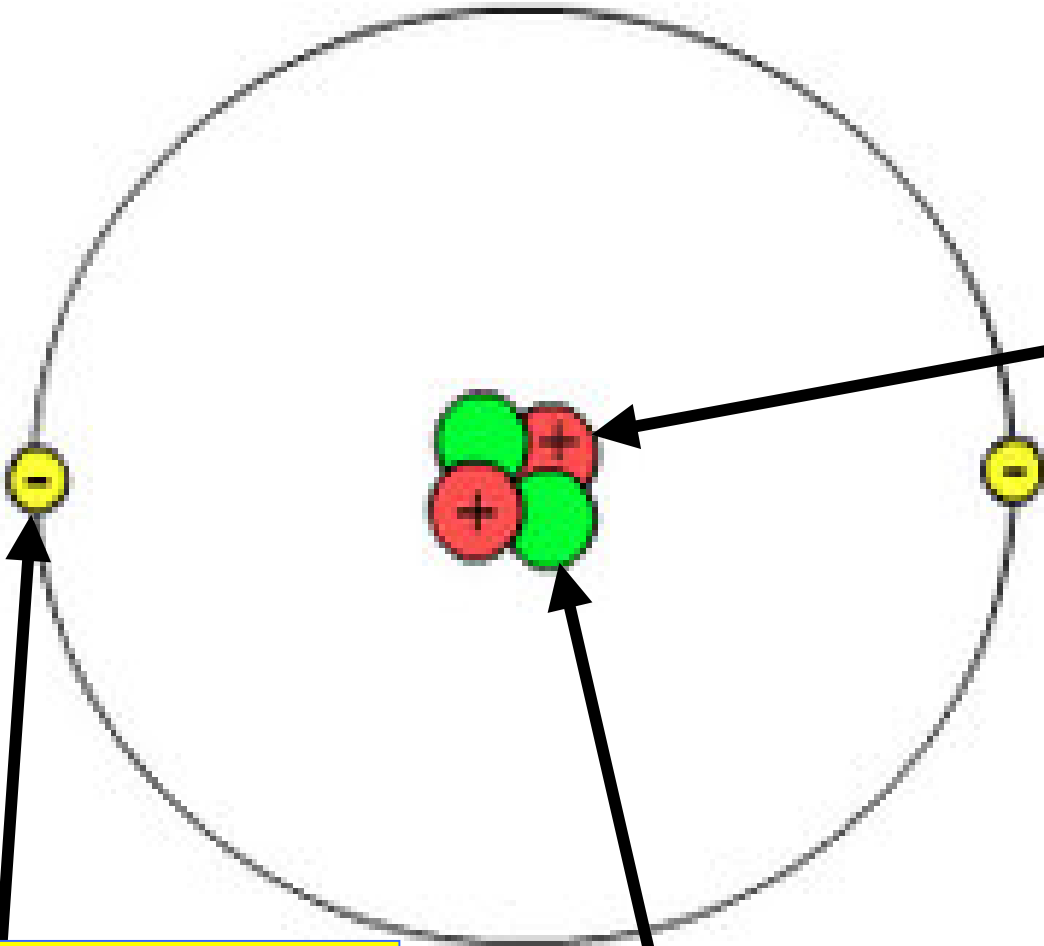


Chemistry 11 - Atomic Structure

Particles which make up the atom are called **subatomic particles**.





Protons
Positively charged particles in the nucleus

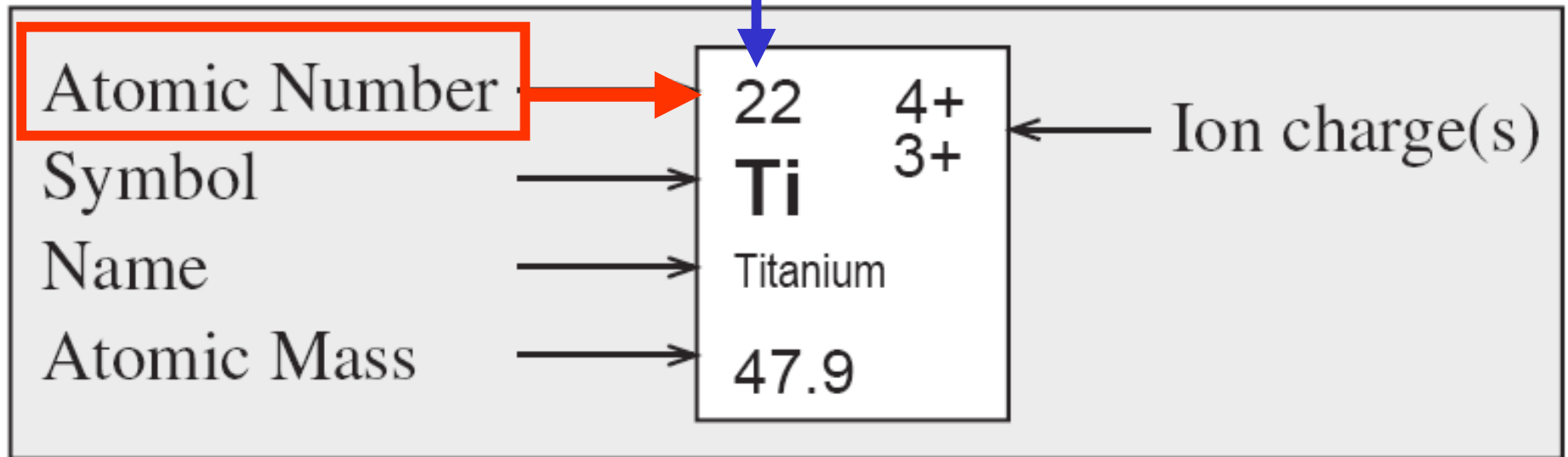
Neutrons - Neutral particles in the nucleus

Electrons – Small negative particles outside 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

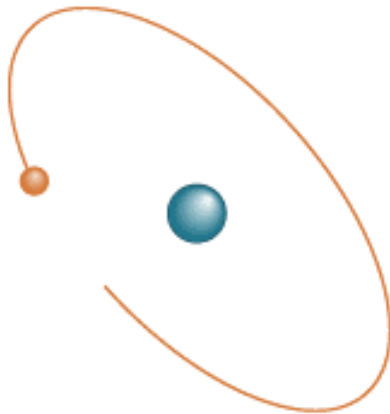
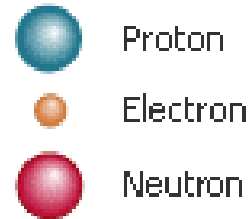


Try these:

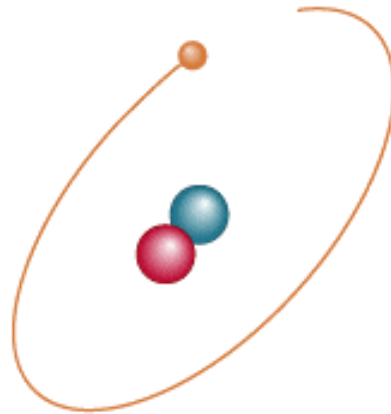
Element	Symbol	Atomic Number	Number of Protons
Hydrogen		1	
Beryllium		4	
Carbon			
Cobalt			
Krypton		36	

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

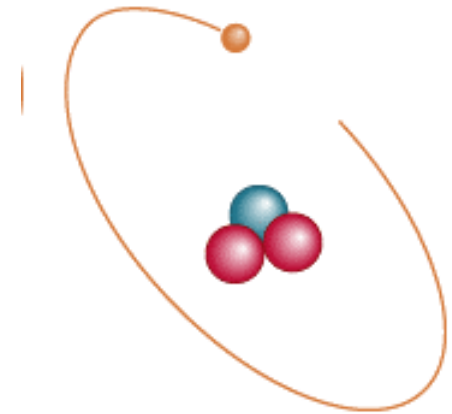
Isotopes of Hydrogen



Hydrogen-1



Hydrogen-2

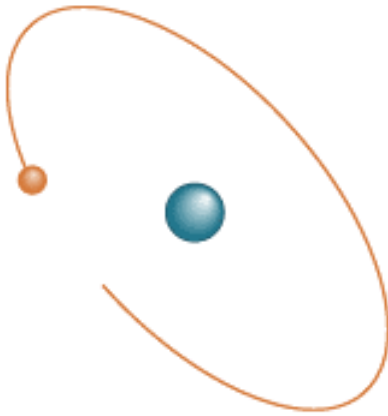


Hydrogen-3

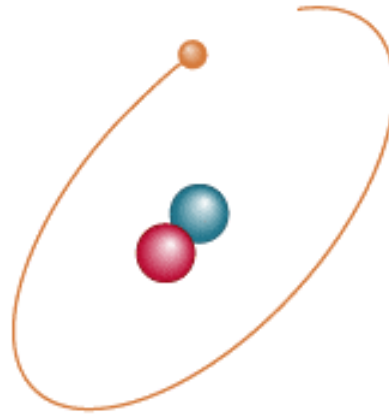
Isotopes are:

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

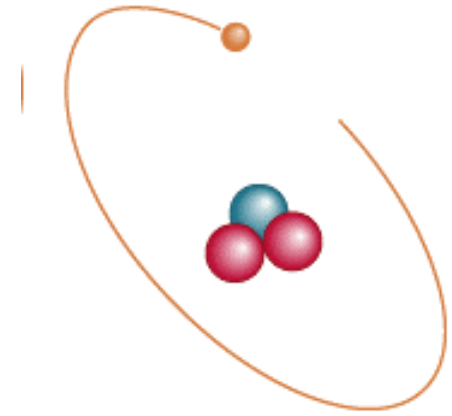
Isotopes of Hydrogen



Hydrogen-1



Hydrogen-2



Hydrogen-3



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

Mass Number

P + N

1 P + 2 N's



3H



Also called “Hydrogen – 3”




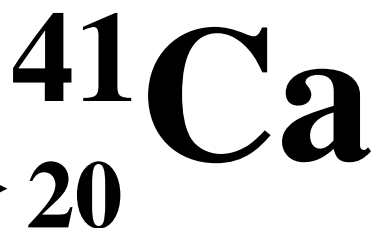
Called the “Nuclear Notation”

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



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

To find # of
Neutrons, put
Atomic Number
Here: 



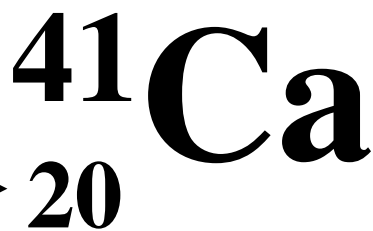
Calcium's atomic
Number = 20

So it has **20 Protons**

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

$$\text{Mass \#} = P + N$$

To find # of
Neutrons, put
Atomic Number
Here: \longrightarrow



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

$$\text{Mass \#} = P + N$$

To find # of Neutrons, put Atomic Number Here: \longrightarrow



20

21

Subtract to get # of Neutrons

Calcium's atomic Number = 20

So it has **20 Protons**

So it has **21 Neutrons**

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:
 $\# \text{ of } e^{-}'s \neq \# \text{ of } p's$

In a + ion (cation)
 $\# \text{ of } e^{-}'s < \# \text{ of } p's$

In a - ion (anion)
 $\# \text{ of } e^{-}'s > \# \text{ of } p's$

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:



has 26 protons

30 neutrons ($56-26$)

23 electrons ($26-3$)

The isotope:

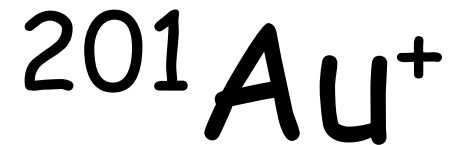


has 33 protons

43 neutrons ($76-33$)

36 electrons ($33+3$)

The isotope:



has 79 protons

122 neutrons (201-79)

78 electrons (79 - 1)

The isotope:



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: $^{104}\text{Pd}^{4+}$

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: $^{131}\text{Te}^{2-}$

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