

# Atoms, Ions, & Istopes

• **Atomic number** = # of protons ( $p^+$ ) = identity of the element

(metal/nonmetal)

19
K
39.098

○ Potassium has 19 protons

• Atom's Mass = #  $p^+$  + #  $n^0$  = mass number

• **Isotope:**

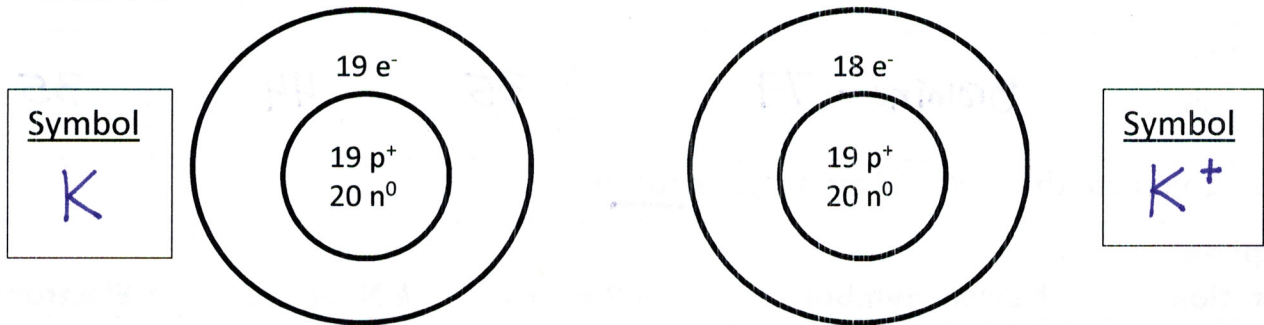
○ Same element                      ○ Different mass numbers

○ Same #  $p^+$                               ○ Different #  $n^0$

• **Average Atomic Mass** is a weighted average of each isotope's mass for an element.

• Potassium's average mass of all isotopes is 39.10 amu.

• **Atom versus Ion**



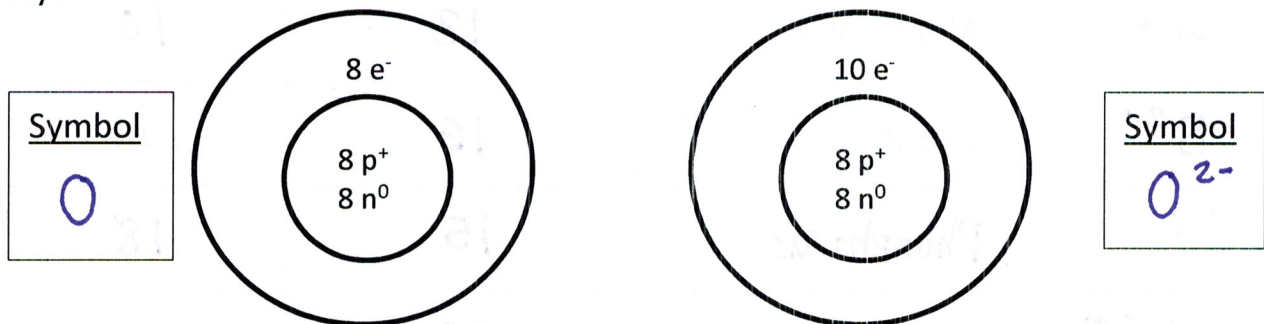
19  $p^+$  = 19  $e^-$  therefore #  $p^+$  = #  $e^-$

neutral atom

#  $p^+$  > #  $e^-$

positive ion  
(cation)

• You Try:



#  $p^+$  = #  $e^-$

neutral atom

#  $p^+$  < #  $e^-$

negative ion  
(anion)

## Atomic Structure Practice

1. Complete the table. All atoms are neutral.  $\#p^+ = \#e^-$

	Nuclear symbol	Hyphen Notation Name	Atomic #	$p^+ + n^0$ Mass #	# Protons	# Neutrons	# Electrons
a	$^{72}_{32}\text{Ge}$	Germanium-72	32	72	32	40	32
b	$^{37}_{17}\text{Cl}$	Chlorine -37	17	37	17	20	17

2. Complete the table. All atoms are neutral.

	Nuclear Symbol	Hyphen Notation	# Protons	# Neutrons	# Electrons
a	$^{27}_{13}\text{Al}$	Aluminum - 27	13	14	13
b	$^{79}_{35}\text{Br}$	Bromine - 79	35	44	35

3. Complete the table. All atoms are neutral.

Hyphen notation	Nuclear Symbol	# Protons	# Neutrons	# Electrons
Carbon-14	$^{14}_6\text{C}$	6	8	6

4. Complete the table. All atoms (ions) have a charge.  $\#p^+ \neq \#e^-$

	Symbol	Element	# Protons	# Electrons
a	$\text{Al}^{3+}$	Aluminum	13	10
b	$\text{S}^{2-}$	Sulfur	16	18
c	$\text{P}^{3-}$	Phosphorus	15	18
d	$\text{Mg}^{2+}$	Magnesium	12	10