Cornell Notes Name:_____Date:_____Block:___

Topic: Atomic Structure

Essential Question: How do we determine the number of protons, neutrons and electrons in an atom?

Questions:

Notes:

Atoms - building blocks of matter; atoms make up everything

3 parts of the atom (subatomic particles)

Subatomic particle	Symbol	Charge	location	relative mass	Importance
Proton	p^+	+1	inside nucleus	1 amu	element identity
neutron	n^0	0	inside nucleus	1 amu	holds together nucleus
electron	e^-	-1	outside nucleus	0	chemical reactivity

★ element identity = atomic # = # p^+

ex) All hydrogen atoms contain 1 p^+

Questions:

Notes:

only p^+ and n^0 have mass, thus all of an atom's mass is in the nucleus.

Mass number = # p^+ + # n^0

ex) Hydrogen atom w/ 1 n^0

mass number = 1 p^+ + 1 n^0 = 2 amu

ex) Hydrogen atom w/ 2 n^0

mass number = 1 p^+ + 2 n^0 = 3 amu

Isotopes - atoms of the same element, but different # of n^0, thus different masses.

Questions:

Notes:

2 ways to indicate an atom's mass number

① Hyphen notation

element name — (hyphen) mass #

ex) Hydrogen — 2

Hydrogen — 3

② Nuclear Symbol

Mass #
Atomic # Element Symbol

ex) $^{2}_{1}H$ $^{3}_{1}H$

Questions:

Notes:

Average Atomic Mass - **weighted** average of an element's naturally occurring isotopes (it is the mass on the periodic table)

★ must take into account % abundance of isotopes

∴ those isotopes present in higher quantities count more toward element's average at. mass.

Ex)

Hydrogen Isotopes	$^{1}_{1}H$	$^{2}_{1}H$	$^{3}_{1}H$
Percent Abundance	99.98%	0.0026 - 0.0189%	Very rare

X Unweighted average = 2 amu

Weighted average = 1.01 amu = average atomic mass

Questions:

Notes:

Neutral atom - no charge; $\#p^+ = \#e^-$

Ion - atom w/ a charge; occurs when an atom gains or loses e^-

∴ $\#p^+ \neq \#e^-$

Ex) atom gains e^- - $\#e^- > \#p^+$

∴ negative ion (a.k.a. anion)

N w/ 7 e^- vs. N w/ 10 e^-

N has 7 p^+ N has 7 p^+

Neutral N atom N^{3-} nitrogen ion

Questions:

Notes:

Ex) Atom loses e^-: $\#e^- < \#p^+$

$\therefore$ positive ion (a.k.a. cation)

Li w/ 3 e- has 3 p+ — Li neutral atom

vs.

Li w/ 2 e- has 3 p+ — Li^{1+} or Li^+ positive ion