NAME: KEY PERIOD:

Unit 3 Test Review

State the contribution of each of the following people in a *quick and brief* sentence:

Mendeleev: *The creator or "grandfather" of the periodic table. First person to organize to periodic table based on increasing ATOMIC MASS and similar characteristics.*

Moseley: *The "father" of the modern periodic table. Moseley was actually the scientist that organized the periodic table correctly. The modern periodic table we know today is organized based on increasing ATOMIC NUMBER.*

Democritus: *Greek philosopher who first brought up the idea that everything is made up of small, indivisible particles in which he called "atomos."*

Dalton: *British school teacher/ scientist who came up with the Atomic Theory.*

Thomson: *English physicist who used the cathode ray tube experiment to discover the electron and its negative charge. His model was the plum pudding model.*

Rutherford: *Physicist who is credited with discovering that the atom has a DENSED, POSITIVELY CHARGED NUCLEUS with electrons around it along with mostly empty space. He did this by using the Gold Foil Experiment.*

Bohr: *Danish scientist that came up with the 2D Bohr Model of the atom aka "the planetary model." He stated in the center of the atom is the nucleus which contains protons and neutrons, and orbiting the nucleus are electrons. These electrons are orbiting in energy levels or electron cloud.*

Chadwick: *Credited with discovering the neutron.*

Schrodinger: *Used quantum mechanics to describe that the atom is a 3D model with orbitals. His "Quantum Mechanical Model" of the atom is the CURRENT model of the atom that we used today.*

Definitions:

Atomic number: *Identity of the element. Represented by letter (Z), the atomic number tells us the number of protons (p^+).*

Mass number: *Tells us the mass of that particular isotope. Represented by letter (A).*
Mass # = # protons + # neutrons

Atom: *Smallest particle of an element that still retains that element's properties. Atoms are electrically neutral meaning # protons = # electrons*

Isotope: *Atoms of the SAME ELEMENT but DIFFERENT MASS due to differences in NEUTRONS.*

Ion: *A charged atom. # protons ≠ # electrons. Cations are positively charged due to LOSS of electrons (Mg^{+2}). Anions are negatively charged due to GAIN of electrons (Cl^{-1})*

Atomic mass unit (amu): *Relative unit to compare masses of atoms, based on carbon- 12.*

Average atomic mass: *The weighted average of all naturally occurring isotopes of that particular element.*

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Complete the table:

Subatomic Particle	Location in the Atom	Relative Charge	Relative Mass (integer)	How can you find the number in an atom of a given element?
Proton (p^+)	*Nucleus*	+	*1 amu*	*Atomic # from periodic table*
Neutron (n^0)	*Nucleus*	*0*	*1 amu*	*Mass # - # protons*
Electron (e^-)	*Electron cloud*	-	*0 amu*	*If neutral atom, $e^- = p^+$* *If ion, use charge to determine # e^-*

In isotope notation, what do A, X, and Z represent?

mass # = $p^+ + n^0$ → A

atomic # = p^+ → Z

X ← element symbol

In an isotope name like uranium-235, what does 235 tell you?

Mass # (p + n)

Solve average atomic mass problems:

Rubidium has two common isotopes, ^{85}Rb and ^{87}Rb. If the abundance of ^{85}Rb is 72.2% and the abundance of ^{87}Rb is 27.8%, what is the average atomic mass of rubidium?

Avg. atomic mass = $\frac{(85)(72.2\%) + (87)(27.8\%)}{100}$ = 85.56 amu

Calculate the average atomic mass for the following false element Unobtainium with the given information:

Isotope name	Isotope mass (amu)	Relative abundance
Unobtainium - 43	42.67	54.00%
Unobtainium - 44	44.01	46.00%

Avg. atomic mass = $\frac{(42.67)(54.00\%) + (44.01)(46.00\%)}{100}$ = 43.29 amu

Element	**Atomic Number Z**	**Mass Number A**	**# Protons**	**# Neutrons**	**# Electrons**	**Isotope Name**	**Isotope Symbol**
Hydrogen	1	2	1	1	1	hydrogen-2	$^{2}_{1}H$
Helium	2	4	2	2	2	Helium-4	$^{4}_{2}He$
Beryllium ion	4	7	4	3	2	Beryllium-7 ion	$^{7}_{4}Be^{+2}$
Chloride ion	17	36	17	19	18	chloride-36 ion	$^{36}_{17}Cl^{-1}$
Aluminum	13	27	13	14	13	Aluminum-27	$^{27}_{13}Al$
Argon	18	40	18	22	18	Argon-40	$^{40}_{18}Ar$
Beryllium	4	9	4	5	4	Beryllium-9	$^{9}_{4}Be$
Sodium Ion	11	22	11	11	10	Sodium-22 ion	$^{22}_{11}Na^{+1}$