Name_____ Period____

Skill 1: Interpreting Models of the Atom

1. In the late 1800s, experiments using cathode ray tubes led to the discovery of the which sub atomic particle? electron

2. Which of the following was originally a part of Dalton's atomic theory, but had to be revised about a century ago? (No longer true!)

   1) Atoms are tiny, indivisible particles
   2) All matter is composed of atoms
   3) Compounds are made by combining atoms
   4) Atoms of different elements can combine with one another in simple whole number ratios.

3. In the wave-mechanical model, an orbital is a region of space in an atom where there is a high probability/chance! of finding an electron.

4. The gold foil experiment told us what about the nucleus had a + charge, high density and that the atom is mostly empty space

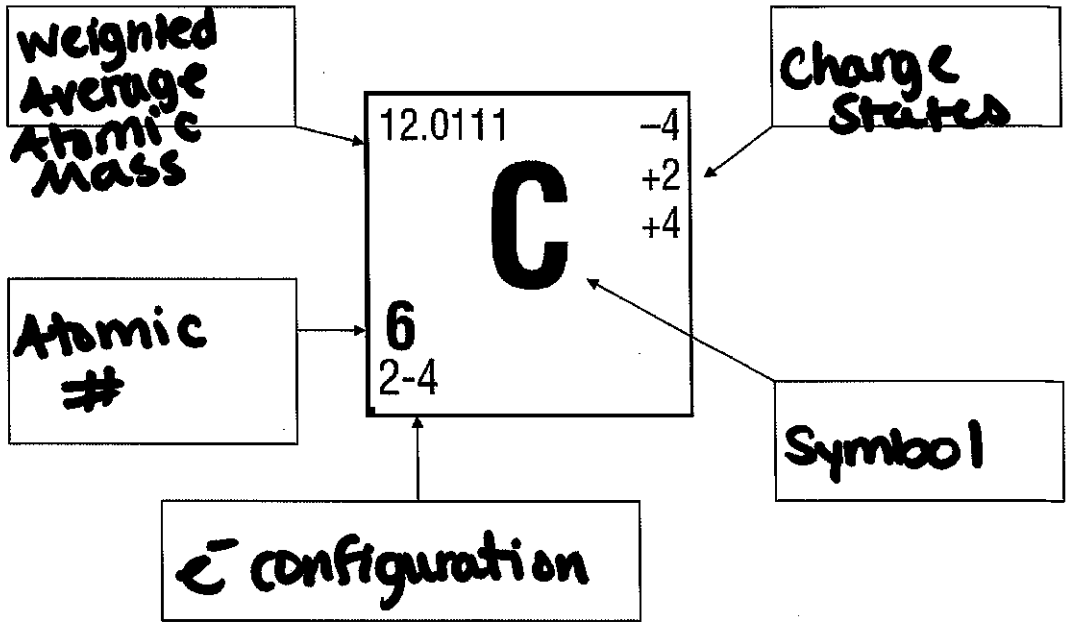
Use your notes to fill in the chart:

Researcher	Instrument	Name of Model	Sketch	Major Discovery/Idea
Dalton	----	Cannon ball		Spherical Uniform Density
JJ Thomson	Cathode Ray	plum pudding		ELECTRON!!
Rutherford	Gold Foil	Nuclear Model		nucleus + empty space
Bohr	----	planetary		Electrons travel in orbits (Bohr-bits) around the nucleus
Many Scientists	-----	Wave Mechanical or Cloud		orbitals!

Skill 2: Determine the number of subatomic particles

Particle	Mass	Charge	Location
Proton	1 Amu	+	Nucleus
Neutron	1 Amu	0	Nucleus
Electron	~0	−	outside nucleus

The P and N are NUCLEONS because they are located in the nucleus.



Element	P	N	E	Atomic Number	Atomic Mass
F-19	9	10	9	9	19
N-14	7	7	7	7	14
Cu-64	29	35	29	29	64

Skill 3: Id Isotopes and Calculate Avg Atomic Mass

Define Isotope: Elements w/ same protons but a different # of neutrons + Atomic Mass

Solve:

	atomic mass	abundance
107Ag	106.90509 amu	51.86%
109Ag	108.90470 amu	48.14%

Calculate average atomic mass for silver using the chart above!

Remember: We must use the decimal form of our percent abundance!

Show Your Work Here!

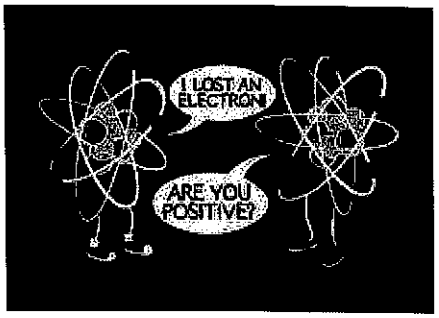
$$\frac{M(\%)+M(\%)}{100} = \text{WAM}$$

$$\frac{(51.86)(106.90509) + 48.14(108.90470)}{100}$$

107.9 AMU

Skill 4: IDENTIFY P, N + e- for Ions

Define Ion: charged atom (+/-) due to the gain or loss of e^-



Circle the correct choice:

An ANION is **(positive/negative)** and electrons are **(gained/lost).**

A CATION is **(positive/negative)** and electrons are **(gained/lost)**

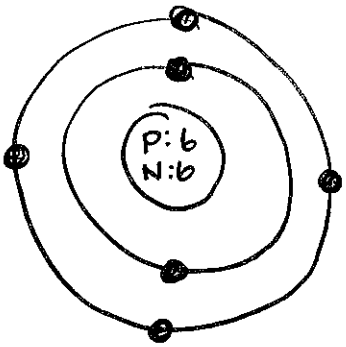
Element	Atom or Ion?	P	N	E	Atomic Number	Atomic Mass
Fe^{+2}	I cation	26	30	24	26	56
O^{2-}	ion anion	8	8	10	8	16
^{65}Cu	atom	29	36	29	29	65
Mg^{2+}	ion cation	12	12	10	12	24

Skill 5: Draw Bohr Diagrams

PRACTICE: Complete the following electron configurations and Bohr diagrams.

Carbon (C)

e⁻ config: 2-4

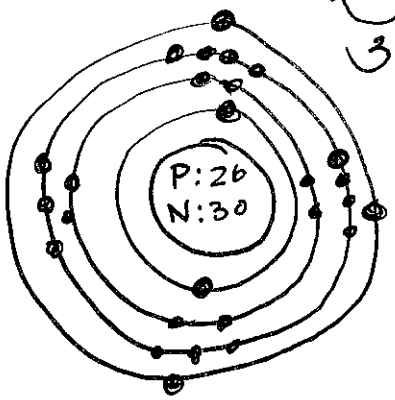


Iron (Anion) Fe^{-1}

e⁻ config: 2-8-14-2

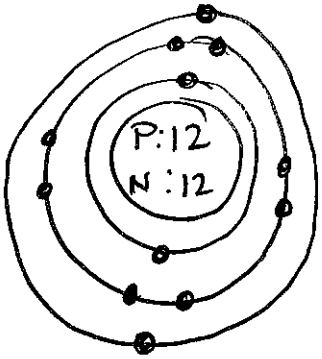
gains 1

3



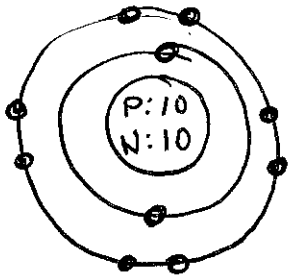
~~Magnesium (Mg)~~

e⁻ config: 2-8-2



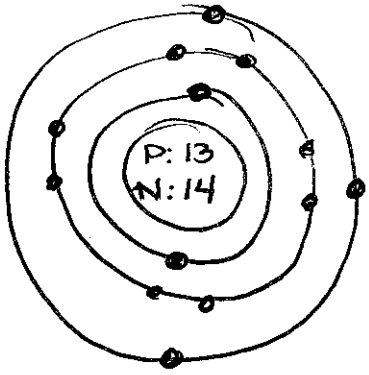
Neon

e⁻ config: 2-8



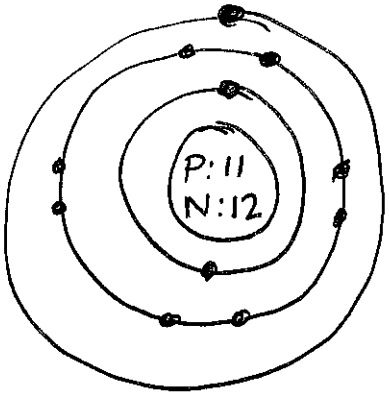
Aluminum (Al)

e⁻ config: 2-8-3



Sodium (Cation) Na^{+}

e⁻ config: 2-8-1



Skill 6: Excited States and Spectra

Configuration	Element	Ground or Excited?
2-8-3	Al	G
2-8-2	Mg	G
2-8-8-18-7-3	Pd	E

Fill in the Blank:

Movement of Electron	Energy Transfer	What is seen?
Ground → Excited	Absorb	—
Excited →Ground	Release	Bright Line Spectra

Answer:

1. Does the spectrum you see depend on the identity of the element?

   Yes all are unique!

2. Electron X can change to a higher energy level or a lower energy level. Which statement is true of electron X?

   1) Electron X emits energy when it changes to a higher energy level.
   2) Electron X absorbs energy when it changes to a higher energy level.
   3) Electron X absorbs energy when it changes to a lower energy level.
   4) Electron X neither emits nor absorbs energy when it changes energy level.

3. A composition of a crushed rock sample was investigated using atomic emission spectroscopy. Shown below is this emission spectrum, along with those of five metals. Based on this spectral analysis it can be concluded that the rock sample contains

   A. all five of the metals.
   B. none of the five metals.
   C. strontium and beryllium, but none of the other three metals.
   D. strontium, but none of the other four metals.