



ATOMS AND THE PERIODIC TABLE

Intro to Chemistry

ATOMIC TERMS

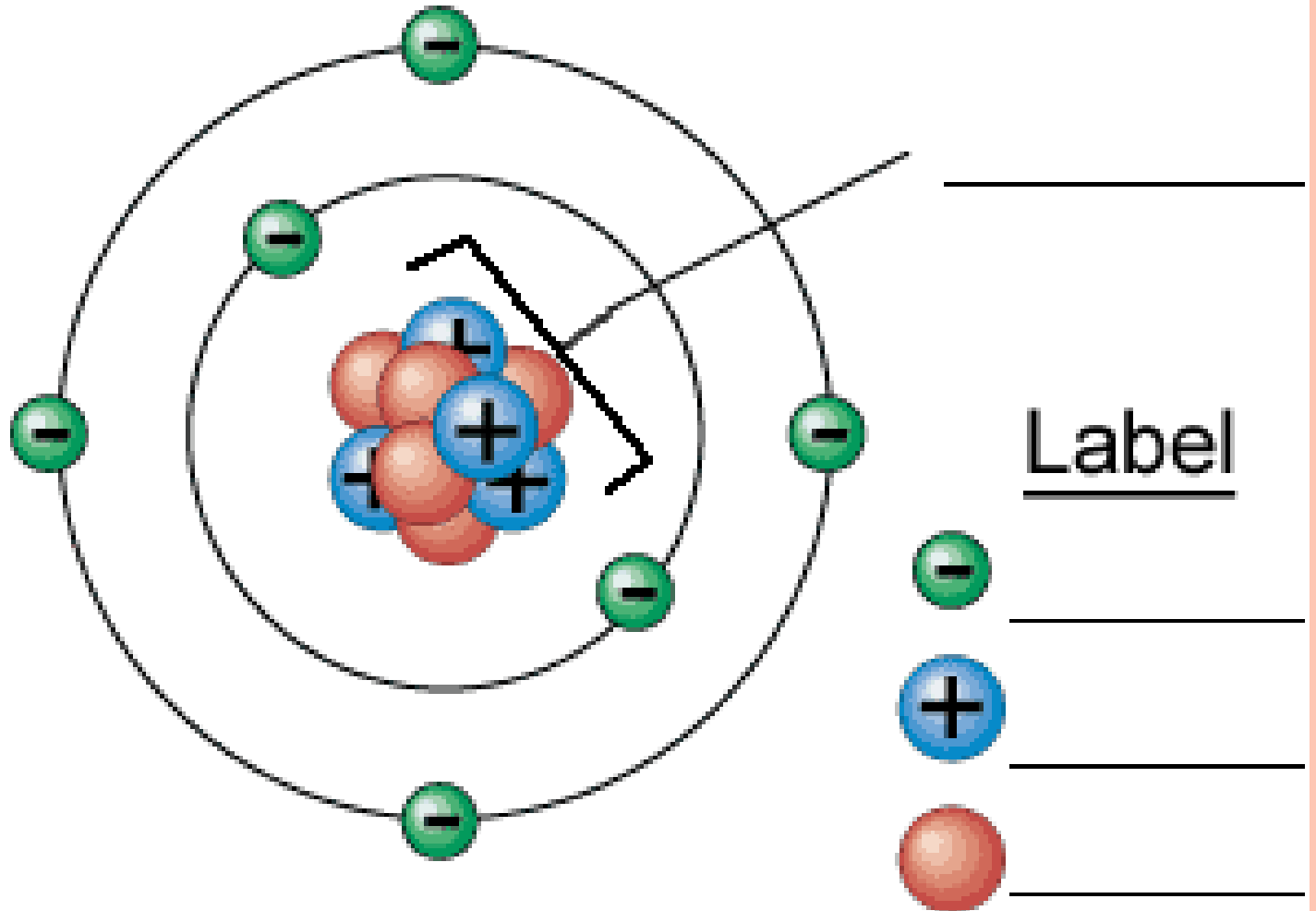
○ Atoms

- Building blocks of all matter
 - Consists of ...
 1. Nucleus
 1. Protons
 2. Neutrons
 2. Energy Levels
 1. Electrons

○ Elements



USING YOUR TERMS LABEL THE
FOLLOWING PARTS OF THE ATOM



WHY WOULD YOU WANT TO ADD THE PROTON AND NEUTRONS TOGETHER?

- Where do you find the Protons and Neutrons?
 - Nucleus
- The mass of the Protons (p^+) and the neutrons (n^0) = atomic mass (or the mass of the nucleus)
$$p^+ + n^0 = \text{atomic mass}$$
- What units do you use for Atomic Mass? (amus)



LET'S CALCULATE

$$p^+ + n^0 = \text{atomic mass}$$

p^+	n^0	Atomic mass
17 amus		36 amus
	10 amus	19 amus
33 amus	42 amus	
35 amus		80 amus
12 amus	12 amus	



WHAT DOES AMUS MEAN?

- Atomic Mass Unit
- $1 \text{ p}^+ = 1 \text{ amu}$
- $1 \text{ n}^0 = 1 \text{ amu}$
- $1 \text{ e}^- = \text{approximately } 1/1836 \text{ that of the proton}$
- Thus we do not count e^- in the calculation of the atomic mass.



WHAT IS THE PERIODIC TABLE OF ELEMENTS?

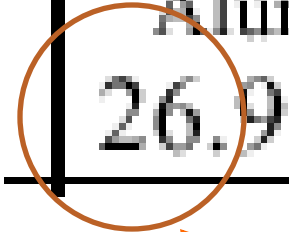
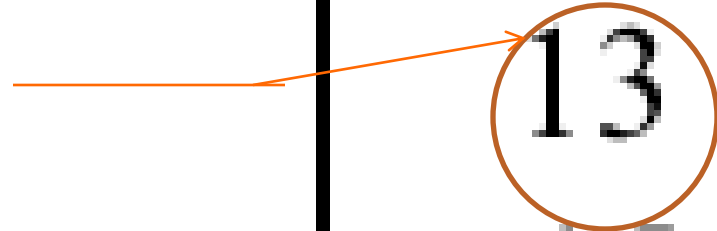
The Periodic Table of the Elements

1 H Hydrogen 1.00794																	2 He Helium 4.003
3 Li Lithium 6.941	4 Be Beryllium 9.012182											5 B Boron 10.811	6 C Carbon 12.0107	7 N Nitrogen 14.00674	8 O Oxygen 15.9994	9 F Fluorine 18.9984032	10 Ne Neon 20.1797
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19 K Potassium 39.0983	20 Ca Calcium 40.078	21 Sc Scandium 44.955910	22 Ti Titanium 47.867	23 V Vanadium 50.9415	24 Cr Chromium 51.9961	25 Mn Manganese 54.938049	26 Fe Iron 55.845	27 Co Cobalt 58.933200	28 Ni Nickel 58.6934	29 Cu Copper 63.546	30 Zn Zinc 65.39	31 Ga Gallium 69.723	32 Ge Germanium 72.61	33 As Arsenic 74.92160	34 Se Selenium 78.96	35 Br Bromine 79.904	36 Kr Krypton 83.80
37 Rb Rubidium 85.4678	38 Sr Strontium 87.62	39 Y Yttrium 88.90585	40 Zr Zirconium 91.224	41 Nb Niobium 92.90638	42 Mo Molybdenum 95.94	43 Tc Technetium (98)	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.90550	46 Pd Palladium 106.42	47 Ag Silver 107.8682	48 Cd Cadmium 112.411	49 In Indium 114.818	50 Sn Tin 118.710	51 Sb Antimony 121.760	52 Te Tellurium 127.60	53 I Iodine 126.90447	54 Xe Xenon 131.29
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HOW TO READ THE PERIODIC TABLE

13	14
Al	Si
Aluminum	Silicon
26.981538	28.0855



LET'S PUT SOME STUFF TOGETHER?

3. An atom has 18 n° and an atomic mass of 33 amu.
How many p^{+} does that atom have?

G:

U:

E:

S

S

What element is this on the periodic table?



ISOTOPES AND THE PERIODIC TABLE

13	14
Al	Si
Aluminum	Silicon
26.981538	28.0855



ISOTOPE, RADIOACTIVITY & HALF-LIVES

- Turn to page 514. Read the “Integrating Life Science– Carbon Dating”

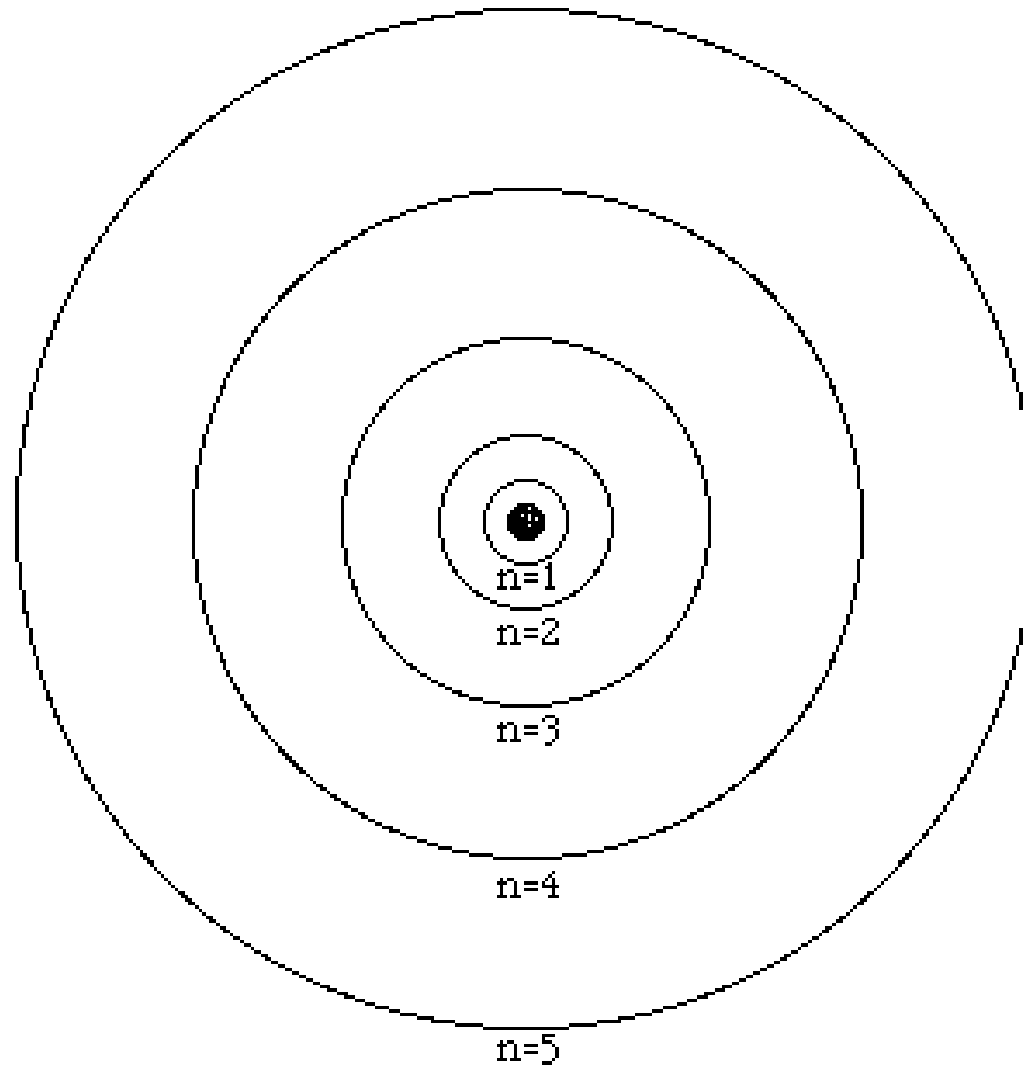


NEUTRAL ATOMS?

- What does an Neutral atom mean?
- Neutral Atoms have the same number of electrons as protons. B/C the charge must be 0.



ELECTRONS & THE BOHR MODEL



Orbit n	Distance from Nucleus
1	0.529 Å
2	2.116 Å
3	4.761 Å
4	8.464 Å
5	13.225 Å



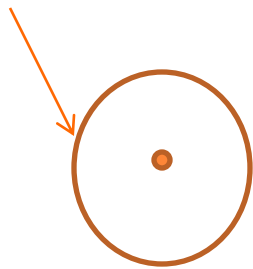
USING THE PERIODIC TABLE TO MAP OUT ELECTRONS

The Periodic Table of the Elements

Each row on the periodic table represents an energy level for the Bohr Model.

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3 Li Lithium 6.941	4 Be Beryllium 9.012182											5 B Boron 10.811	6 C Carbon 12.0107	7 N Nitrogen 14.00674	8 O Oxygen 15.9994	9 F Fluorine 18.9984032	10 Ne Neon 20.1797
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Hydrogen has one energy level



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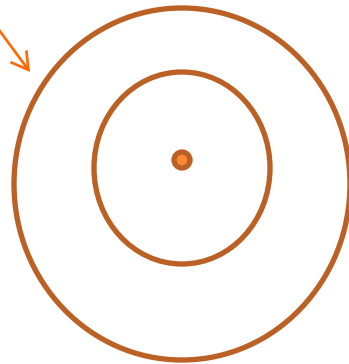
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If we look at Li, it has **two** energy levels where electrons are found.

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USING THE PERIODIC TABLE TO MAP OUT ELECTRONS

You read the periodic table left to right like when you read a book.

How many electrons can fit in the first energy level?

ANS: 2

How many electrons can fit in the second energy level?

ANS: 8

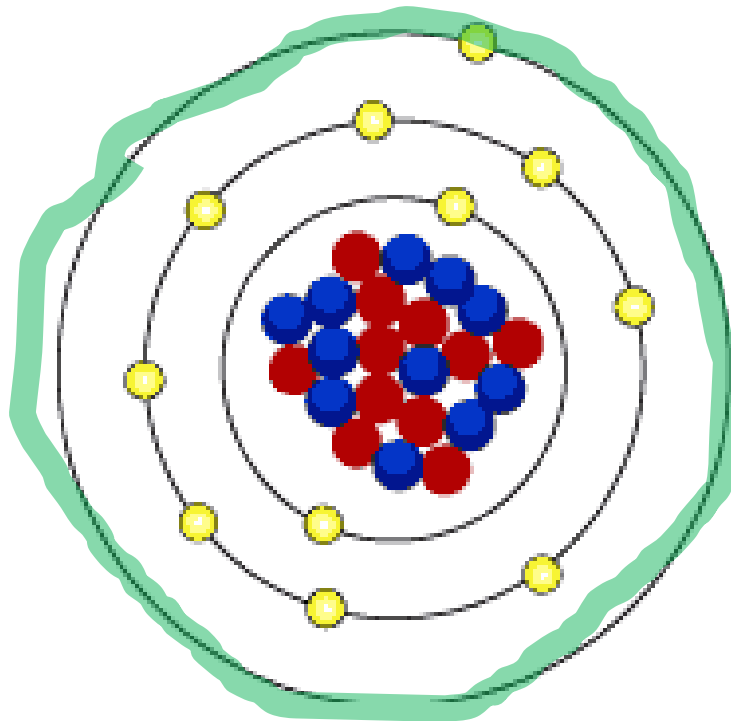
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WHAT ARE VALENCE ELECTRONS?

- **valence electrons** are the outermost electrons of an atom, which are important in determining how the atom reacts chemically with other atoms.



How many valence electrons does the atom have?

1 valence e⁻



(LEWIS) DOT DIAGRAMS

How does the Lewis dot diagram relate to the number of valence e^- in an atom?



WHERE ON THE PERIODIC TABLE ARE THE MOST STABLE GROUP OF ELEMENTS?

- - Why?
 - How many valence electrons do these element have?



ALL ATOMS WANT TO BE STABLE!

- How many valence electrons will an atom need in order to become stable?



HOW DOES AN ATOM BECOME STABLE?

- Using your models & smarties, create an atom of Na.
 - How many valence electrons does an atom of Na need to gain or lose in order to become stable?
 - Thus if an atom gains or loses electrons what does it now become?



IONS V. ATOMS

What is the difference between an atom and an ion_ [www.keepvid.com].mp4

Atoms vs. Ions [www.keepvid.com].mp4



ATOMS ARE LAZY!

- Atoms will take the shortest path to stability, thus it depends on the number of valence electrons an atom has to determine this path to stability.



HOW DO WE WRITE AN ATOM V. AN ION

- We use super scripts to identify the difference in protons v. electrons?

Na

Na⁺¹



Periodic Table

1A																	8A
1 H 1.008	2A										3A	4A	5A	6A	7A	2 He 4.003	
3 Li 6.941	4 Be 9.012											5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18
11 Na 23.00	12 Mg 24.31	8B										13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.06	17 Cl 35.45	18 Ar 39.95
		3B	4B	5B	6B	7B				1B	2B						
19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.90	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.70	29 Cu 63.55	30 Zn 65.38	31 Ga 69.72	32 Ge 72.59	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.80
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	90 Th 232.0	91 Pa 231.0	92 U 238.0	93 Np 237.0	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (260)

COLOR AND LABEL ON YOUR PERIODIC TABLE

○ Metals

- 3 Properties of Metals
- Alkali Metals
- Alkaline Earth Metals

○ Nonmetals

3 Properties of Nonmetals

Nobel Gases-and their properties

Halogens-and their properties

○ Metalloids-and their properties

