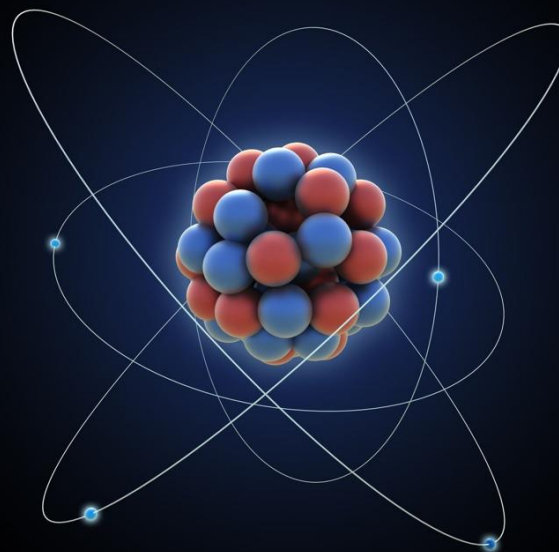




Chapter 2. Atoms, Molecules and Ions

General Chemistry I, CHEM 103-002

Lecture 4: Chemical Formula, Periodic Table, Ionic and Molecular Compounds

September 9th 2026

HW#1 due today at 5pm

How to study for CHEM103

- Read book and solve on your own book examples.
- Come and participate in lecture.
- At the end of each book chapter, there are additional exercises with an answer key provided at the end of the book.
- Go over lecture slides and solve lecture problems.
- Break up and do homework over multiple days.
- Ask yourself if you are comfortable in achieving the learning objectives outlined?
- Go to office hours with your questions. Email to arrange an appointment for office hours if you can't make a specific office hours.

Office Hours: Tuesday 9:15-10:15am
(in Park 22) Thursday 9:15-10:15am
 or by appointment (email me)
or email me with questions!

TA Hours w/Ramona: Wednesday 2:00-4:00pm in **Park 252**



Q-center: <https://www.brynmawr.edu/inside/offices-services/q-center/q-center-schedule>

Announcements

- Class TA Office Hours with Ramona: Wednesday 2PM-4PM in Park 252.
- Plan for this week CHEM 103:
 - Complete Chapter 2
 - Homework 2: Will be posted tomorrow (9/10) at 9am and due Wednesday (9/16) 5pm.
 - Recitation Worksheet #2 for Friday recitation
- Recitation Period:
 - Lowest score of all recitation worksheets will be dropped
 - First 20 minutes we will spend solving altogether one problem.
 - Last 20-30 minutes spend on completing on your own recitation worksheet with closed book. Bring calculator. Need to submit worksheet at the end of recitation period.

Learning Objectives for Chapter Units 2.3 – 2.6

- Calculate atomic weights of elements when given isotope distribution or mass spectrometry data. Solve problems involving isotope distribution and atomic masses.
- Write and interpret symbols that depict the atomic number, mass number, and charge of an atom or ion.
- Calculate average atomic mass and isotopic abundance.
- Explain the organization of elements in the periodic table.
- Understand the structure of the periodic table; be able to rapidly find relevant information in it. Use it confidently to 1) classify elements as metals, nonmetals or metalloids (semimetals) and 2) identify if an element belongs to a key group/region discussed in class (alkali metals, transition metals, halogens, noble gases...).
- Know that matter can be made up of single atoms (elements), molecules (elements and compounds) or networks/extended structures (elements and compounds).
- Name and write formulas of the seven diatomic elements.
- Use the periodic table to predict charges of ions from key groups (e.g., alkali metals).
- Name and write formulas of common monoatomic ions.
- Define ionic and molecular (covalent) compounds.
- Predict the type of compound formed from elements based on their location within the periodic table.
- Determine formulas for simple ionic compounds.

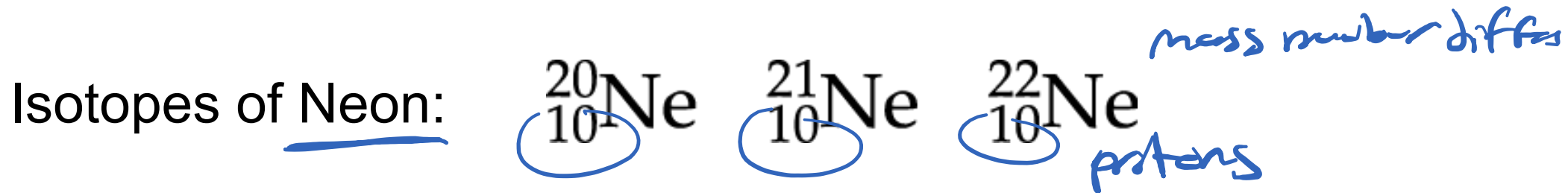
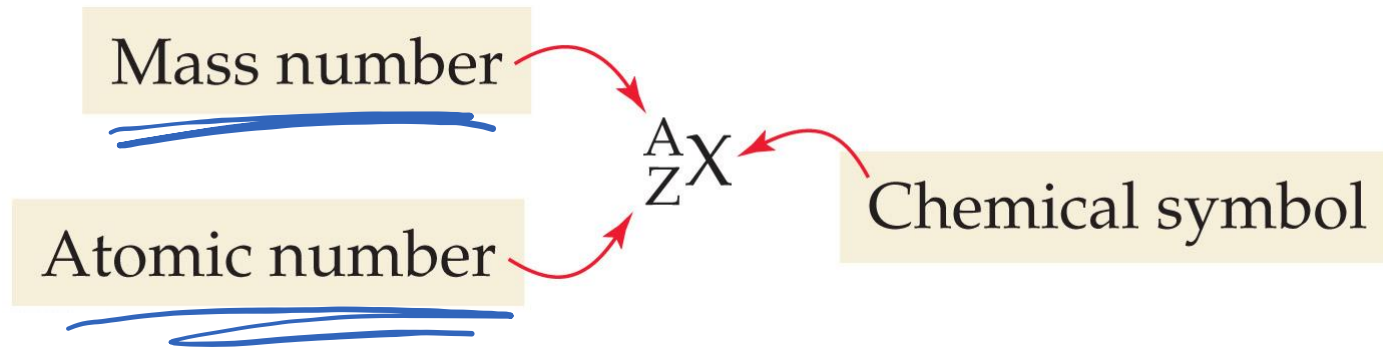
Chapter Unit 2.3

Atomic Structure, Symbolism and Isotopes

Isotopes: When the Number of Neutrons Varies

- All atoms of a given element have the same number of protons.
- They do not necessarily have the same number of neutrons.
- Atoms with the **same number of protons** but **different numbers of neutrons** are called **isotopes**.
- All elements have their own unique percent **natural abundance** of isotopes.

Isotope Symbol Notation

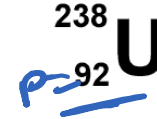


Mass number (A) = # protons + # neutrons

$$A = Z + \text{\# neutrons}$$

Participation Questions

1. How many protons and neutrons are in this isotope of Uranium?



$$A = Z + \text{neutrons}$$

$$n = A - Z$$

$$n = 146$$

2. If an atom has a mass number of 32 and has 17 neutrons, it is an isotope of which element?

P

$$A = 32$$

$$n = 17$$

$$Z = A - n$$

$$Z = 15$$

3. What is unique for each element?

protons

4. What are the atomic number, mass number, and symbols for the chlorine isotope with 18 neutrons?

$$n = 18 \Rightarrow Z = 17$$

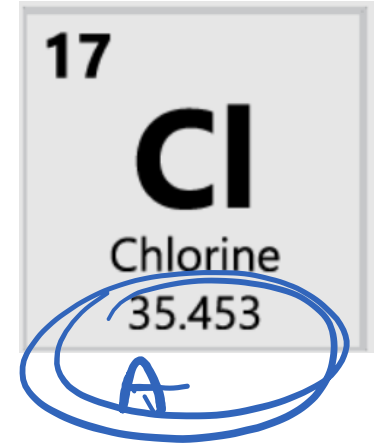
$$A = 35$$

<https://docs.google.com/forms/d/e/1FAIpQLSfxgeXLY0WCnx2nsFg0-XBYdBVzkUOLEzNL0Efjvov509VPyQ/viewform?usp=publish-editor>

Atomic Mass

Atomic mass: mass of element listed in periodic table

Atomic mass on periodic table is a weighted average based on the natural abundance of each **isotope!**



	# protons	# neutrons	Mass Number (A)	Mass (amu)	Percent Abundance
Cl-35	17	18	35	34.45 amu	75.77%
Cl-37	17	20	37	36.97 amu	24.23%

$$\text{Atomic mass} = (75.77\% \times 34.45 \text{ amu}) + (24.23\% \times 36.97 \text{ amu})$$

A

abundance
percent

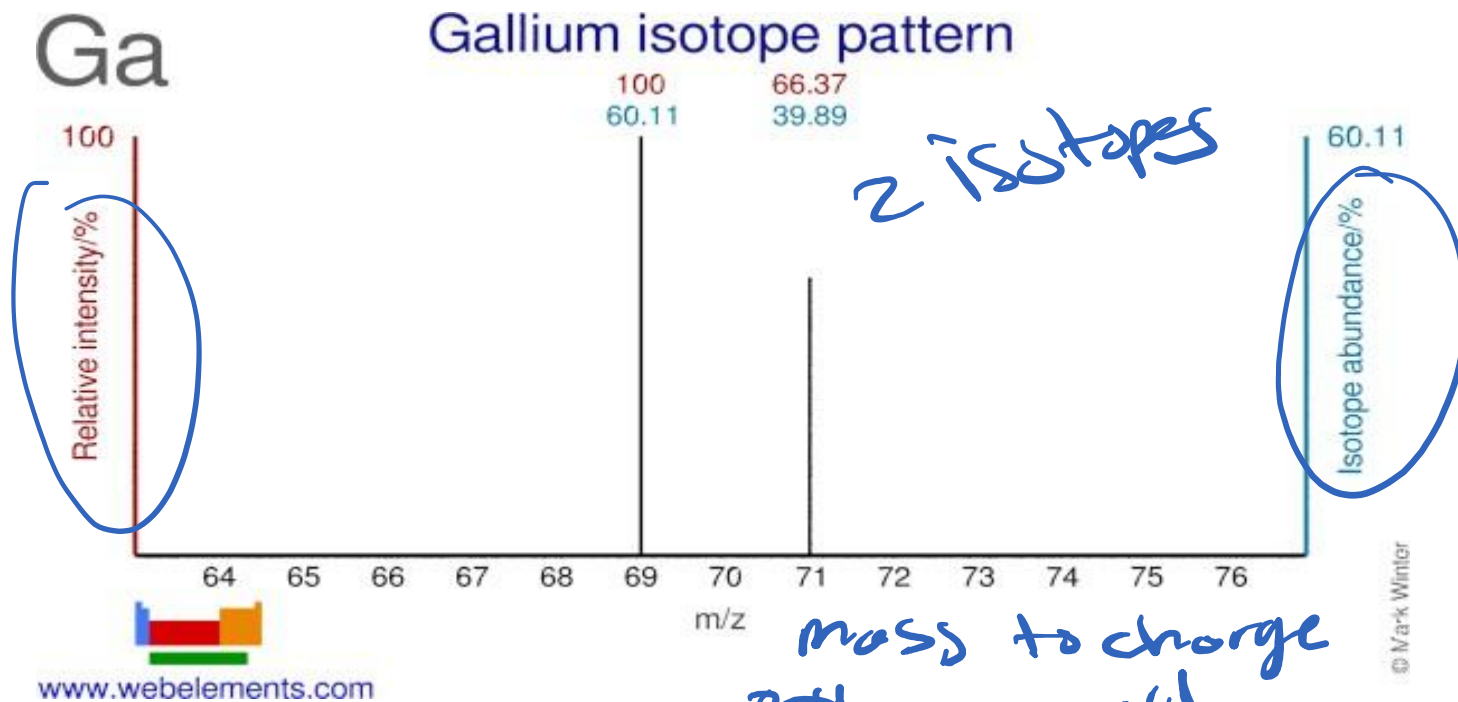
amu of
specific isotope

$$= (0.7577 \times 34.45 \text{ amu}) + (0.2423 \times 36.97 \text{ amu}) = 35.45 \text{ amu}$$

$^{31}_{31}\text{Ga}$

Example element mass spectrum: gallium (Ga)

Charge for in mass spectra
our class will be +1



1. What stable isotopes of Gallium can we derive from the given mass spectrum?
2. State what are the number of protons, electrons, and neutrons in each of them.

<https://docs.google.com/forms/d/e/1FAIpQLScLi3-NmHHyGEOXQc8Ya6HW6YAWMJV-TtLnOdKg87iNscSaw/viewform?usp=header>

$^{69}_{31}\text{Ga}$
 $^{71}_{31}\text{Ga}$

$A = Z + n \Rightarrow 31 \text{ proton, } 31e, 38 \text{ neutrons}$

$31 \text{ prot, } 31e, 40 \text{ neutrons}$

Practice problem

What are the percent natural abundances of the two naturally occurring isotopes of boron, ^{10}B and ^{11}B ? These isotopes have masses of 10.012937 u and 11.009305 u, respectively.

wt% of $^{10}\text{B} = X$, $^{11}\text{B} = 1 - X$, $A = 10.811 \text{ amu}$ (from periodic table)

$$(X)(10.012937 \text{ amu}) + (1-X)(11.009305 \text{ amu}) = 10.811 \text{ amu} \Rightarrow$$

$$(10.012937 \text{ amu})X + 11.009305 \text{ amu} - (11.009305 \text{ amu})(X) = 10.811 \text{ amu} \Rightarrow$$

$$\underset{123456}{11.009305 \text{ amu}} - \underset{123}{10.811 \text{ amu}} = (\underset{123456}{11.009305 \text{ amu}})X - (\underset{123456}{10.012937 \text{ amu}})X \Rightarrow$$

$$\underset{123}{0.198395 \text{ amu}} = (\underset{123456}{0.996368 \text{ amu}})X \Rightarrow$$

6 DP millionth place

$$\boxed{X = 0.199}$$

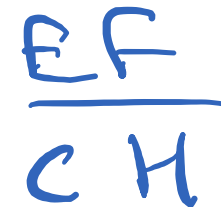
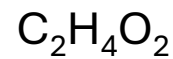
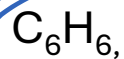
$$X = 19.9\% \text{ } ^{10}\text{B} \quad \text{so} \quad ^{11}\text{B} = 1 - X \quad \underline{\underline{^{11}\text{B} = 0.801 \Rightarrow 80.1\%}}$$

Chapter Unit 2.4

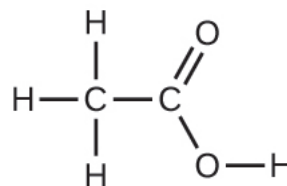
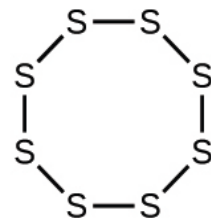
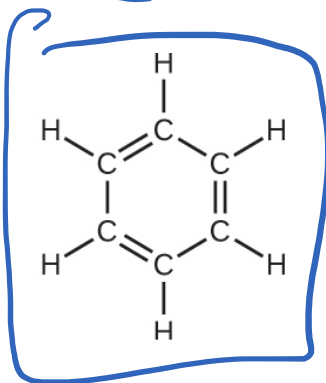
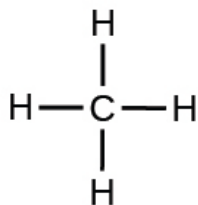
Chemical Formula

Chemical Formula

- Molecular Formula



- Structural Formula



- Empirical Formula

ratio of all types of atoms to each.
Not actual # of atoms

Chemical Formula

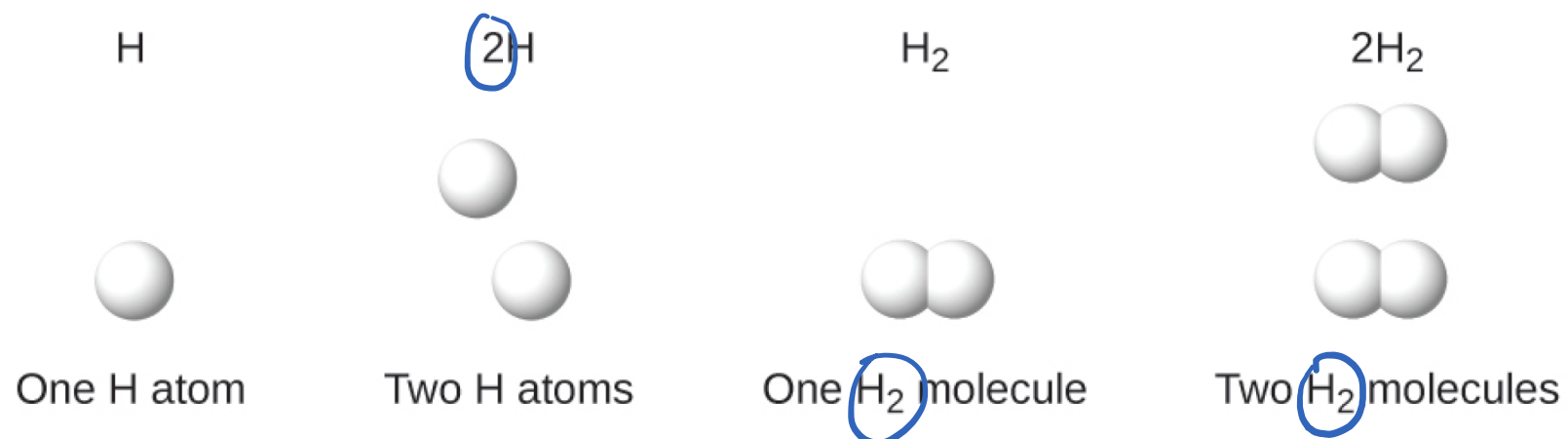
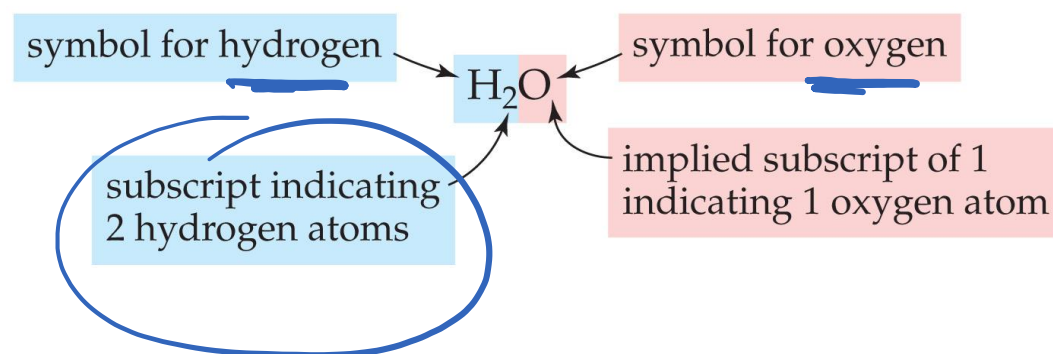


FIGURE 2.18 The symbols H, 2H , H_2 , and 2H_2 represent very different entities.

Chemical/Molecular Formula

Indicate the **ratio of each element** in the compound

Ratio is always the **same for a given compound**



Example: H_2O

H = symbol for hydrogen; subscript 2 means 2 H atoms

O = symbol for oxygen; implied subscript 1 means 1 O atom

Table Sugar: $C_{12}H_{22}O_{11}$

12 C atoms, 22 H atoms, 11 O atoms in every molecule

Ratio 12:22:11

Chapter Unit 2.5

The Periodic Table

Periodic Table

Organized by Dmitri Mendeleev (1869)

When elements are arranged in order of increasing mass, certain sets of properties recur periodically. Left spaces for then undiscovered elements; predicted their properties

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
H	He	Li	Be	B	C	N	O	F	Ne	Na	Mg	Al	Si	P	S	Cl	Ar	K	Ca

Arranged elements in rows so vertical columns share similar properties.

1 H							2 He
3 Li	4 Be	5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg	13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
19 K	20 Ca						

Periodic Law: It's all about the protons and electrons (electron configuration)

The **periodic law**, is as follows: the properties of the elements are periodic functions of their atomic numbers.



Protons: Identity

- Defines the Element
- Sets the Sequence
- Anchors the Electrons

Electrons: Periodicity

- Drives Chemical Reactions
- Creates the "Periodicity"



If protons are the foundation and address of a house, electrons are the architecture and the people living inside—they determine what the house actually looks like and how it interacts with the neighborhood.

Locating Metals, Nonmetals, Metalloids

Metals

Nonmetals

Metalloids

1A 1	2A 2												3A 13	4A 14	5A 15	6A 16	7A 17	8A 18
1 H													5 B	6 C	7 N	8 O	9 F	10 Ne
2 3 Li	4 Be												13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
3 11 Na	12 Mg	3B 3	4B 4	5B 5	6B 6	7B 7	8B 8	9 9	10 10	1B 11	2B 12		31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
4 19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn		49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
5 37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd		81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
6 55 Cs	56 Ba	57 La	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg		113	114 Fl	115	116 Lv	117 **	118
7 87 Fr	88 Ra	89 Ac	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn							
Lanthanides			58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu		
Actinides			90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr		

Metals

Electrical - Conductive

Thermal - Conductive

Metallic gray luster

Most are solids**

Malleable - sheets

Ductile – wires

Tend to form (+) ions

Nonmetals

Electrical - Insulator

Thermal - Insulator

No luster

All phases

Brittle

Nonductile

Tend to form (-) ions, but
(+) ions are not uncommon.

Green =
main graph

Introduction

21

Main Group Elements and Transition Elements

Main-group elements		Transition elements										Main-group elements						
1A												13 14 15 16 17 18						
1	2											3A	4A	5A	6A	7A	8A	
1	2											3	4	5	6	7	2	
1	2											Ne						
2	4											Al	Si	P	S	Cl	Ar	
2	4											Ga	Ge	As	Se	Br	Kr	
3	12	3B	4B	5B	6B	7B	8B				1B	2B	13	14	15	16	17	18
3	12	3B	4B	5B	6B	7B	8B				1B	2B	Al	Si	P	S	Cl	Ar
4	20	21	22	23	24	25	26	27	28	29	30		31	32	33	34	35	36
4	20	21	22	23	24	25	26	27	28	29	30		Ga	Ge	As	Se	Br	Kr
5	38	39	40	41	42	43	44	45	46	47	48		49	50	51	52	53	54
5	38	39	40	41	42	43	44	45	46	47	48		In	Sn	Sb	Te	I	Xe
6	56	57	72	73	74	75	76	77	78	79	80		81	82	83	84	85	86
6	56	57	72	73	74	75	76	77	78	79	80		Tl	Pb	Bi	Po	At	Rn
7	88	89	104	105	106	107	108	109	110	111	112		113	114	115	116	117	118
7	88	89	104	105	106	107	108	109	110	111	112		Fr	Fl	Lv	**		

For main group elements, **properties** can generally be predicted based on the **element's position**.

Groups 1A Alkali Metals

- When burned in air, alkali metals form either the oxide, peroxide, or superoxide as the principal product, depending on the size of the cation.

M + O ₂ →	Li ₂ O	Na ₂ O ₂	KO ₂	RbO ₂	CsO ₂
Anion	oxide	peroxide	superoxide	superoxide	superoxide

Alkali metals

Alkaline earth metals

1A	2A	Transition metals					
1 H							
3 Li	4 Be						
11 Na	12 Mg						
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr		
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo		
55 Cs	56 Ba	57 La	72 Hf	73 Ta	74 W		
87 Fr	88 Ra	89 Ac	104 Rf	105 Db	106 Sg		
		Lanthanides		58 Ce	59 Pr		
		Actinides		90 Th	91 Pa		

Alkali metals




Noble gases

Halogens

6A	7A	8A
8 O	9 F	2 He
16 S	17 Cl	10 Ne
34 Se	35 Br	18 Ar
52 Te	53 I	36 Kr
84 Po	85 At	54 Xe
116 Lv	117 **	86 Rn
69 Tm	70 Yb	71 Lu
101 Md	102 No	103 Lr

MO

Groups 2A Alkaline Earth

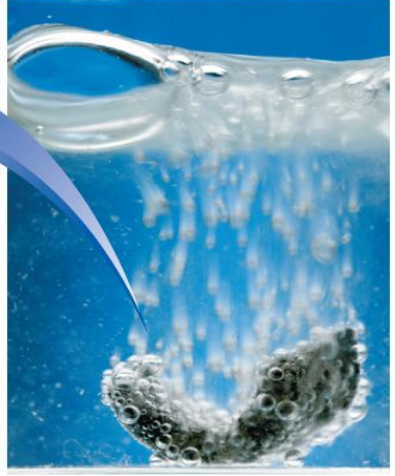
Alkali metals
↓
1A
Alkaline earth metals
↓
2A

1 H	3 Li	11 Na	19 K	37 Rb	55 Cs	87 Fr
2 He	4 Be	12 Mg	20 Ca	38 Sr	56 Ba	88 Ra
			21 Sc	39 Y	57 La	89 Ac
			22 Ti	40 Zr	72 Hf	104 Rf
			23 V	41 Nb	73 Ta	105 Db

Lanthanides
Actinides

58 Ce	90 Th
----------	----------

Alkaline earth metals



- Be
- Mg
- Ca
- Sr
- Ba

Group numbers
↓
4A 5A 6A 7A 8A
Noble gases
↓
2

6 C	7 N	8 O	9 F	10 Ne
14 Si	15 P	16 S	17 Cl	18 Ar
32 Ge	33 As	34 Se	35 Br	36 Kr
50 Sn	51 Sb	52 Te	53 I	54 Xe
82 Pb	83 Bi	84 Po	85 At	86 Rn
114 Fl	115 Lv	116 Lv	117 **	118

67 Ho	68 Er	69 Tm	70 Yb	71 Lu
99 Es	100 Fm	101 Md	102 No	103 Lr

Groups 5A Pnictogen

Alkali metals ↓ 1A		Alkaline earth metals ↓ 2A			
1 H		4 Be			
3 Li		12 Mg			
11 Na					
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo
55 Cs	56 Ba	57 La	72 Hf	73 Ta	74 W
87 Fr	88 Ra	89 Ac	104 Rf	105 Db	106 Sg
		Lanthanides ↓			
		58 Ce	59 Pr		
		90 Th	91 Pa		
		Actinides			

Pnictogens (Group 15)




N
P
As
Sb
Bi

				Noble gases ↓ 8A	
Group numbers				2	
5A	6A	7A		He	
7 N	8 O	9 F		10 Ne	
15 P	16 S	17 Cl		18 Ar	
33 As	34 Se	35 Br		36 Kr	
51 Sb	52 Te	53 I		54 Xe	
83 Bi	84 Po	85 At		86 Rn	
115	116 Lv	117 **		118	
68 Er	69 Tm	70 Yb	71 Lu		
100 Fm	101 Md	102 No	103 Lr		

The group 15 elements, known as pnictogens (from Greek *pnigein*, meaning "to choke"). This refers to the asphyxiating properties of pure nitrogen gas, which is the first element in the group, and to the poisonous, choking nature of some compounds formed by other elements in the group, such as arsenic.

Groups 6A Chalcogen

Alkali metals ↓ 1A		Alkaline earth metals ↓ 2A													
1	H	4	Be												
3	Li	12	Mg												
11	Na	20	Ca	21	Sc	22	Ti	23	V	24	Cr	25	Mn	26	Fe
19	K	38	Sr	39	Y	40	Zr	41	Nb	42	Mo	43	Tc	44	Ru
37	Rb	56	Ba	57	La	72	Hf	73	Ta	74	W	75	Re	76	Os
55	Cs	88	Ra	89	Ac	104	Rf	105	Db	106	Sg	107	Bh	108	Hs
87	Fr														
				Lanthanides											
				Actinides											
				58	Ce	90	Th								

Chalcogens (Group 16)

O
S
Se
Te
Po



					Noble gases ↓ 8A	
Group numbers					2	He
6A	5A	6A	7A		10	Ne
6	7	8	9		18	Ar
C	N	O	F		36	Kr
14	15	16	17		54	Xe
Si	P	S	Cl		86	Rn
32	33	34	35		118	
Ge	As	Se	Br			
50	51	52	53			
Sn	Sb	Te	I			
82	83	84	85			
Pb	Bi	Po	At			
114	115	116	117			
Fl	Lv	**				
118						
119	120	121	122	123	124	125
Uu	Uu	Uu	Uu	Uu	Uu	Uu
Es	Fm	Md	No	Lr		

The Group 16 elements are named chalcogen from the Greek, meaning "ore-forming," as these elements readily combine with metals to form ores in nature.



CuFeS₂
Chalcopyrite
"Fool's gold"

Groups 7A Halogens

Alkali metals

Alkaline earth metals

1A	2A	Transi					
1 H							
3 Li	4 Be						
11 Na	12 Mg						
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	
55 Cs	56 Ba	57 La	72 Hf	73 Ta	74 W	75 Re	
87 Fr	88 Ra	89 Ac	104 Rf	105 Db	106 Sg	107 Bh	

Lanthanides

Actinides

58 Ce	59 Pr	60 Nd
90 Th	91 Pa	92 U

Halogens

F
Cl
Br
I
At



Noble gases

5A	6A	7A	8A
7 N	8 O	9 F	2 He
15 P	16 S	17 Cl	18 Ar
33 As	34 Se	35 Br	36 Kr
51 Sb	52 Te	53 I	54 Xe
83 Bi	84 Po	85 At	86 Rn
115	116 Lv	117 **	118

68 Er	69 Tm	70 Yb	71 Lu
100 Fm	101 Md	102 No	103 Lr

NaCl
NaF

The word "halogen" means "salt former" or "salt maker". When halogens react with metals, they produce a wide range of salts.

Groups 8A Noble Gases

Alkali metals										Alkaline earth metals										Transition metals										Noble gases																													
1A										2A										6A										7A										8A																			
1 H										4 Be										8 O										9 F										2 He																			
3 Li										6 Mg										16 S										17 Cl										10 Ne																			
11 Na										12 Mg										34 Se										35 Br										18 Ar																			
19 K										20 Ca										52 Te										53 I										36 Kr																			
37 Rb										38 Sr										84 Po										85 At										54 Xe																			
55 Cs										56 Ba										116 Lv										117 Ts										86 Rn																			
87 Fr										88 Ra																														118 Og																			
										Lanthanides																																																	
										Actinides																																																	
										58 Ce										59 Pr										60 Nd										61 Pm										62 Sm									
										90 Th										91 Pa										92 U										93 Np										94 Pu									

Practice Self-Exercise

1. Atoms of each of the following elements are essential for life. Give the group name for the following elements:

- Calcium
- Chlorine
- Sodium
- Sulfur

2. Give the group name for each of the following elements:

- Krypton
- Selenium
- Barium
- Lithium

[illegible]

Chapter Unit 2.6

Ionic and Molecular Compounds

Atom

Protons, neutron and electrons

Protons = # Electrons

Atoms are neutral
uncharged particles

Ion

Protons, neutron and electrons

Protons $\neq$ # Electrons

Ions are charged particles

Cations vs Anions

Cation – positively charged particle (**atom has lost one or more electrons**)



Anion – negatively charged particle (**atom has gained one or more electrons**)



Ion Charge = # protons - # electrons

Valence Electrons

Valence electrons: located in the outer most shell of an atom.

have the highest energy of all electrons in an atom.

responsible for the **reactivity** and other properties of an atom.

Main Group Elements have same number of valence electrons as their group number (column)

Li has 1 valence e^- , Be has 2 valence e^- , B has 3 valence e^- , ...

		Group number																	
		1A	2A											3A	4A	5A	6A	7A	8A
1		1 H																	2 He
2		3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
3		11 Na	12 Mg	3B	4B	5B	6B	7B	8B		1B	2B	13 Al	14 Si	15 P	16 S	17 Cl	18 Ar	
4		19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
5		37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
6		55 Cs	56 Ba	57 La	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
7		87 Fr	88 Ra	89 Ac	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113	114 Fl	115	116 Lv	117 **	118

Ions & Periodic Table

Main group elements tend to form ions that have the same number of **valence electrons** as the nearest noble gas.

- Li tends to lose 1 electron (become Li^+) to become like He
- Be tends to lose 2 electrons (become Mg^{2+}) to become like He
- F tends to gain 1 electron (become F^-) to become like Ne
- O tends to gain 2 electrons (become O^{2-}) to become like Ne

e

Group number

	1A																		8A
1	1 H	2A											3A	4A	5A	6A	7A		2 He
2	3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne	
3	11 Na	12 Mg	3B	4B	5B	6B	7B	8B				1B	2B	13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
4	19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr	
5	37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe	
6	55 Cs	56 Ba	57 La	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn	
7	87 Fr	88 Ra	89 Ac	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113	114 Fl	115	116 Lv	117 **	118	

Ions and the Periodic Table

reach noble gas



This is a very important slide to study!!!

1A	2A											3A	4A	5A	6A	7A	8A
														N ³⁻	O ²⁻	F ⁻	
Li ⁺	Be ²⁺											Al ³⁺			S ²⁻	Cl ⁻	
Na ⁺	Mg ²⁺											Ga ³⁺			Se ²⁻	Br ⁻	
K ⁺	Ca ²⁺											In ³⁺			Te ²⁻	I ⁻	
Rb ⁺	Sr ²⁺																
Cs ⁺	Ba ²⁺																

Transition metals form cations with various charges

1+ 2+ (3+) (-2) (-1)

Ions and the Periodic Table: Practice Exercise

(a) How many protons does potassium (K) have?

19

2-
19 K

(b) What type of ion will K normally form?

+1

(c) Write a reaction showing a K atom forming this ion.



(d) What group/family does K belong to?

alkali

(e) Determine the charge of a magnesium ion with 10 electrons

10e
2=12 protons neutral ^{12}Mg 12e $\rightarrow$ $\boxed{\text{Mg}^{2+}}$

Group number ↓		8A
1A	2A	2
1 H	4 Be	He
3 Li	12 Mg	10 Ne
11 Na	20 Ca	18 Ar
19 K	28 Ni	36 Kr
37 Rb	38 Sr	54 Xe
55 Cs	56 Ba	86 Rn
87 Fr	88 Ra	118