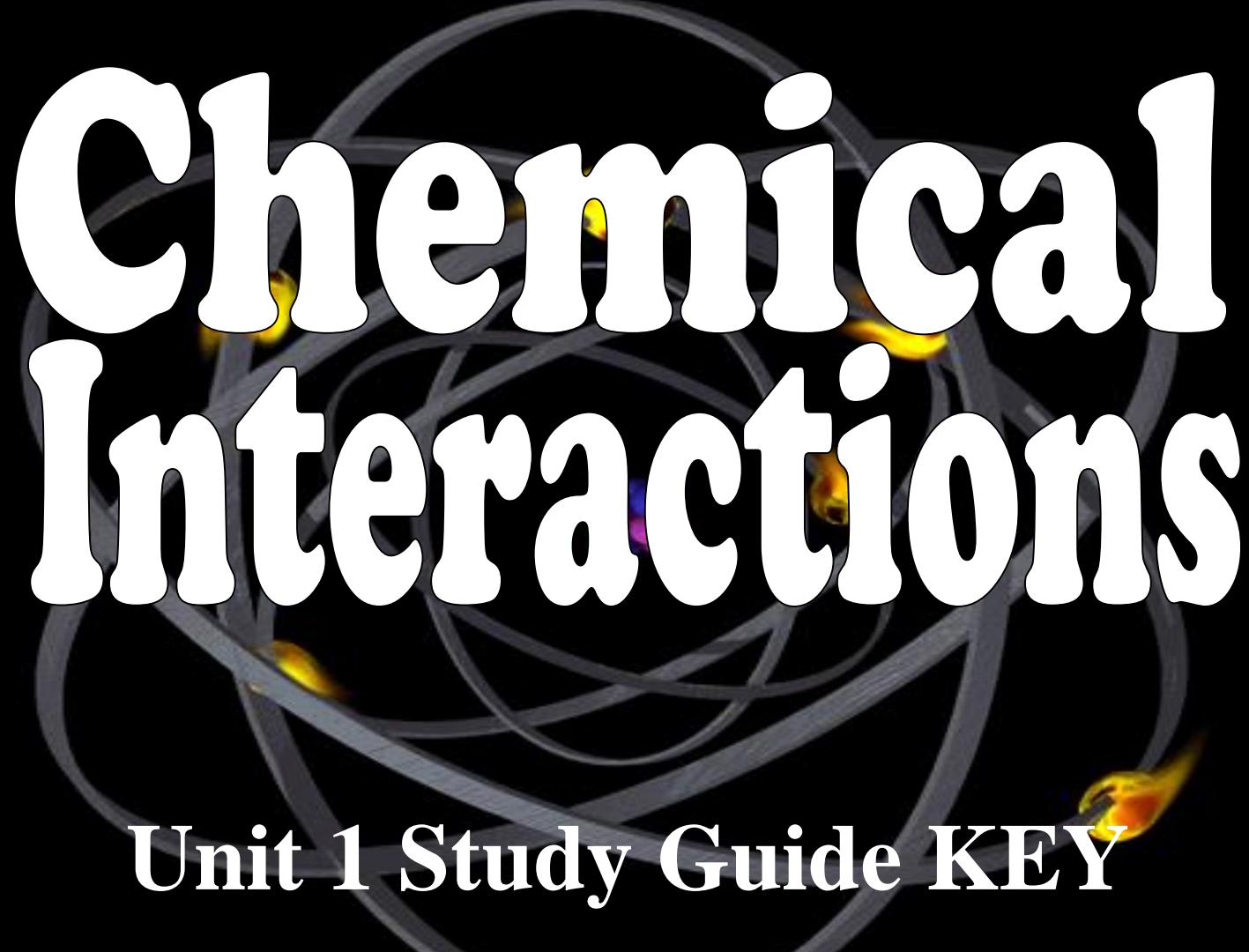


# Chemical Interactions



Unit 1 Study Guide KEY

8<sup>th</sup> Grade Science

## **Part A: Use your notes to help you complete each statement.**

1. A **MIXTURE** is made of two or more substances that are mixed together, but NOT chemically combined.
2. A **COMPOUND** is made of two or more elements that are chemically combined.
3. Classify each item listed below as an element (E), mixture (M), or compound (C).

Stainless Steel **M**

Kool Aid **M**

Cool Whip **M**

Gold **E**

Carbon Monoxide **C**

Sodium **E**

Graphite **E**

$\text{H}_2\text{SO}_4$  **C**

4. The **ATOMIC NUMBER** is the number of protons  
OR electrons in an atom.

$$A^{\#} = P \text{ or } E$$

5. The **ATOMIC MASS** is the number of protons and  
neutrons in an atom.

$$M^{\#} - A^{\#} = N$$

6. A **BOHR** diagram is used to show the location of all the electrons in an atom.

7. A **LEWIS** structure is used to show the number of valence electrons.

*Remember ... You will be allowed to use YOUR colored periodic table  
and can write NOTES (not typed) on that page only.*

## 8. Complete the chart about subatomic particles.

Particle	Proton	Neutron	Electron
Charge	+	None	-
Location	NUCLEUS	NUCLEUS	ENERGY LEVELS

## 9. Use the information to calculate each answer.

A) If an atom has an atomic number of 9 and an atomic mass of 19, how many protons does it have? 9

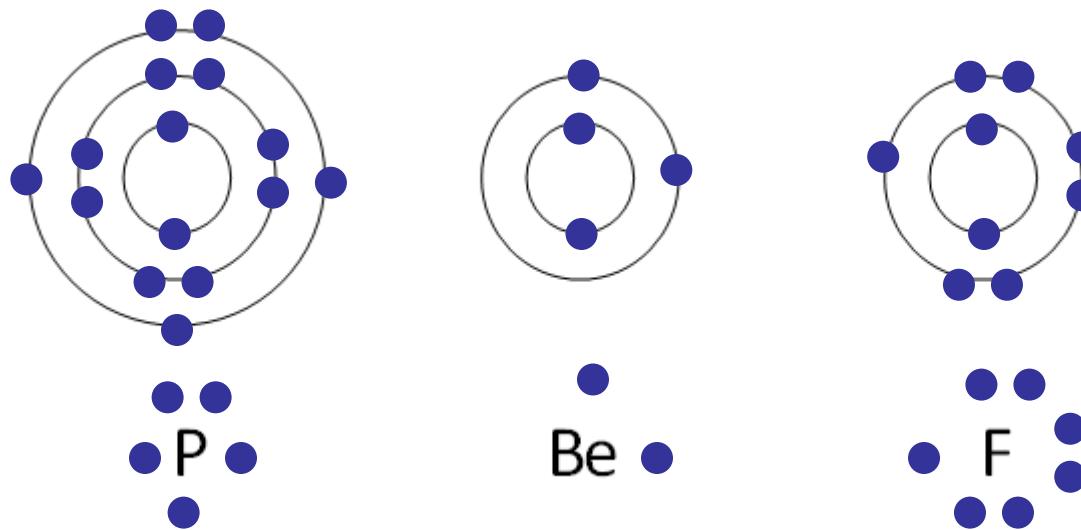
$$A\# = P \text{ or } E$$

$$M\# - A\# = N$$

B) If an atom has an atomic number of 5 and an atomic mass of 11, how many electrons does it have? 5

C) If an atom has an atomic number of 31 and an atomic mass of 70, how many neutrons does it have? 39

**10. Draw the Bohr Diagram AND Lewis Structure for each element shown.**



**Bohr Diagram – All the electrons like a “bullseye”**

**Lewis Structure – Just the valence electrons**

11. To which family does each element belong?

Colums = Groups

Na - Alkali Metal

Xe - Noble Gases

Sb - Nitrogen Family

Al - Boron Family

Fl - Carbon Family

At - Halogen (Halide)

Alkali Metals  
↓  
**1** H 1.008  
2

Alkaline Earth Metals  
↓  
3 Li 6.94  
4 Be 9.0122  
11 Na 22.990  
12 Mg 24.305

### Transition Metals (Groups 3-12)

CLASSIFICATION KEY											
METAL				NONMETAL				METALLOID			
PHASE AT ROOM TEMPERATURE KEY											
<input type="checkbox"/> SOLID				<input checked="" type="checkbox"/> LIQUID				<input type="checkbox"/> GAS			
3	4	5	6	7	8	9	10	11	12		

1	2	3	4	5	6	7	8	9	10	11	12
H 1.008	Be 9.0122	Li 6.94	Mg 24.305	Ca 40.078	Sc 44.956	Ti 47.867	V 50.942	Cr 51.996	Mn 54.938	Fe 55.845	Co 58.933
K 39.098	Ca 40.078	Sc 44.956	Ti 47.867	V 50.942	Cr 51.996	Mn 54.938	Fe 55.845	Co 58.933	Ni 58.693	Cu 63.546	Zn 65.38
Rb 85.468	Sr 87.62	Y 88.906	Zr 91.224	Nb 92.906	Mo 95.95	(98)	Tc 101.07	Ru 102.91	Rh 106.42	Ag 107.87	Cd 112.41
Cs 132.91	Ba 137.33	57-71 *	Hf 178.49	Ta 180.95	W 183.84	Re 186.21	Os 190.23	Ir 192.22	Pt 195.08	Au 196.97	Hg 200.59
Fr (223)	Ra (226)	89-103 #	Rf (265)	Db (268)	Sg (271)	Bh (270)	Hs (277)	Mt (276)	Ds (281)	Rg (280)	Cn (285)

6 \* Lanthanide series

57 La 138.91	58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm (145)	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25
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7 # Actinide series

89 Ac (227)	90 Th 232.04	91 Pa 231.04	92 U 238.03	93 Np (237)	94 Pu 244	95 Am (243)	96 Cm (247)
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Boron Family

Nitrogen Halogens

Family (Halides)

Oxygen Family (Chalcogen)

Noble Gases

5 B 10.81	6 C 12.011	7 N 14.007	8 O 15.999	9 F 18.998	10 Ne 20.180
13 Al 26.982	14 Si 28.085	15 P 30.974	16 S 32.06	17 Cl 35.45	18 Ar 39.948
31 Ga 69.723	32 Ge 72.630	33 As 74.922	34 Se 78.97	35 Br 79.904	36 Kr 83.798
49 In 114.82	50 Sn 118.71	51 Sb 121.76	52 Te 127.60	53 I 126.90	54 Xe 131.29
81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po (209)	85 At (210)	86 Rn (222)
112 Cn (285)	113 Nh (286)	114 Fl (289)	115 Mc (289)	116 Lv (293)	117 Ts (294)

Column

= Group or Family

Same # of VALENCE ELECTRONS

## 12. Identify whether the element is a metal (M), nonmetal (N), or metalloid (MD).

Ca - M    Ge - MD    F - N    Hg - M    H - N    Cf - M

Alkali Metals		Alkaline Earth Metals		Transition Metals (Groups 3-12)										Boron Family		Carbon Family		Nitrogen Halogens Family (Halides)		Oxygen Family (Chalcogen)		Noble Gases															
1	H 1.008	2	Be 9.0122	3	Li 6.94	4	Mg 24.305	5	Sc 44.956	6	Ti 47.867	7	V 50.942	8	Cr 51.996	9	Mn 54.938	10	Fe 55.845	11	Co 58.933	12	Cu 63.546	Zn 65.38	B 10.81	C 20.011	N 14.007	O 15.999	F 18.998	He 4.0026							
3	Na 22.990	4	Mg 24.305	5	Sc 44.956	6	Ti 47.867	7	V 50.942	8	Cr 51.996	9	Mn 54.938	10	Fe 55.845	11	Co 58.933	12	Cu 63.546	Zn 65.38	Ga 69.723	Al 26.982	Si 28.085	P 30.974	S 32.06	Cl 35.45	Ne 20.180										
4	K 39.098	5	Ca 40.078	6	Sc 44.956	7	Ti 47.867	8	V 50.942	9	Cr 51.996	10	Mn 54.938	11	Fe 55.845	12	Co 58.933	Cu 63.546	Zn 65.38	Ga 69.723	Ge 72.630	As 74.922	Se 78.97	Br 79.904	Kr 83.798												
5	Rb 85.468	6	Sr 87.62	7	Y 88.906	8	Zr 91.224	9	Nb 92.906	10	Tc (98)	11	Mo 95.95	12	Ru 101.07	13	Rh 102.91	14	Pd 106.42	15	Ag 107.87	Cd 112.41	In 114.82	Sn 118.71	Sb 121.76	Te 127.60	I 126.90	Xe 131.29									
6	Cs 132.91	7	Ba 137.33	8	Y 137.33	9	Zr 178.49	10	Nb 180.95	11	Tc 183.84	12	Mo 186.21	13	Ru 190.23	14	Rh 192.22	15	Pt 195.08	16	Au 196.97	17	Hg 200.59	18	Tl 204.38	19	Pb 207.2	20	Bi 208.98	21	Po (209)	22	At (210)	23	Rn (222)	24	Og (294)
7	Fr (223)	8	Ra (226)	9	Y #	10	Rf (265)	11	Db (268)	12	Sg (271)	13	Bh (270)	14	Hs (277)	15	Mt (276)	16	Ds (281)	17	Rg (280)	18	Cn (285)	19	Nh (286)	20	Fl (289)	21	Mc (289)	22	Lv (293)	23	Ts (294)	24	Og (294)		

6 * Lanthanide series	57 La 138.91	58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm (145)	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.05	71 Lu 174.97
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7 # Actinide series	89 Ac (227)	90 Th 232.04	91 Pa 231.04	92 U 238.03	93 Np (237)	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 (262)
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# 13. How many energy levels would each atom have?

H - 1 Po - 6 He - 1 Ar - 3 Am - 7 Db - 7

Alkali Metals		Alkaline Earth Metals		Transition Metals (Groups 3-12)										Boron Family		Carbon Family		Nitrogen Halogens Family (Halides)		Oxygen Family (Chalcogen)		Noble Gases	
1	H 1.008	2	Li 6.94	Be 9.0122	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18			
2	Na 22.990	Mg 24.305	Sc 44.956	Ti 47.867	V 50.942	Cr 51.996	Mn 54.938	Fe 55.845	Co 58.933	Ni 58.693	Cu 63.546	Zn 65.38	Ga 69.723	B 10.81	C 12.011	N 14.007	O 15.999	F 18.998	He 4.0026				
3	K 39.098	Ca 40.078	Sc 44.956	Ti 47.867	V 50.942	Cr 51.996	Mn 54.938	Fe 55.845	Co 58.933	Ni 58.693	Cu 63.546	Zn 65.38	Ga 69.723	Al 26.982	Si 28.085	P 30.974	S 32.06	Cl 35.45	Ne 20.180				
4	Rb 85.468	Sr 87.62	Y 88.906	Zr 91.224	Hf 92.906	Ta 95.95	W (98)	Re 101.07	Os 102.91	Ru 106.42	Pd 107.87	Cd 112.41	In 114.82	Ge 72.630	As 74.922	Se 78.97	Br 79.904	Ar 39.948	Kr 83.798				
5	Rb 85.468	Sr 87.62	Y 88.906	Zr 91.224	Hf 92.906	Ta 95.95	W (98)	Re 101.07	Os 102.91	Ru 106.42	Pd 107.87	Cd 112.41	In 114.82	Sn 118.71	Sb 121.76	Te 127.60	I 126.90	Xe 131.29	Rn (222)				
6	Cs 132.91	Ba 137.33	57-71 *	72 178.49	73 180.95	74 183.84	75 186.21	76 190.23	77 192.22	78 195.08	79 196.97	80 200.59	81 204.38	82 207.2	83 208.98	84 Po (209)	85 At (210)	86 Rn (222)					
7	Fr (223)	Ra (226)	89-103 #	Rf (265)	104 (268)	105 (271)	106 (270)	107 (277)	108 (276)	109 (281)	110 (280)	111 (285)	112 (286)	113 (289)	114 (289)	115 (289)	116 Lv (293)	117 Ts (294)	118 Og (294)				

6 \* Lanthanide series

57 La 138.91	58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm (145)	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50
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7 # Actinide series

89 Ac (227)	90 Th 232.04	91 Pa 231.04	92 U 238.03	93 Np (237)	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)
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**ROW** = Period

Same # of ENERGY LEVELS

# 14. How many valence electrons would each an atom of each element have?

Li 1 Ga 3 I 7 Sr 2 Se 6 Bi 5

**Classification Key:** METAL (Green), NONMETAL (Red), METALLOID (Blue)

**Phase at Room Temperature Key:** SOLID (White), LIQUID (Black), GAS (Yellow)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18			
H 1.008	Be 9.0122	Li 6.94	Mg 24.305	Ca 40.078	Sc 44.956	Ti 47.867	V 50.942	Cr 51.996	Mn 54.938	Fe 55.845	Co 58.933	Ni 58.693	Cu 63.546	Zn 65.38	B 10.81	C 12.011	N 14.007	O 15.999	F 18.998	He 4.0026
Na 22.990	Mg 24.305	K 39.098	Ca 40.078	Sc 44.956	Sc 47.867	Ti 50.942	V 51.996	Cr 54.938	Mn 55.845	Fe 58.933	Co 58.693	Ni 63.546	Cu 65.38	Zn 69.723	Al 26.982	Si 28.085	P 30.974	S 32.06	Ne 20.180	
Rb 85.468	Sr 87.62	Y 88.906	Zr 91.224	Nb 92.906	Mo 95.95	Tc (98)	Ru 101.07	Rh 102.91	Pd 106.42	Ag 107.87	Cd 112.41	In 114.82	Ga 118.71	Ge 121.76	As 127.60	Se 127.60	Br 128.904	Ar 39.948		
Cs 132.91	Ba 137.33	* 57-71	Hf 178.49	Ta 180.95	W 183.84	Re 186.21	Os 190.23	Ir 192.22	Pt 195.08	Au 196.97	Hg 200.59	Tl 204.38	Pb 207.2	Bi 208.98	Po (209)	At (210)	Xe 131.29			
Fr (223)	Ra (226)	# 89-103	Rf (265)	Db (268)	Sg (271)	Bh (270)	Hs (277)	Mt (276)	Ds (281)	Rg (280)	Cn (285)	Nh (286)	Fl (289)	Mc (289)	Lv (293)	Ts (294)	Og (294)			

**6 \* Lanthanide series**

57 La 138.91	58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm (145)	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25	65 Tb 158.93	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu
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**7 # Actinide series**

89 Ac (227)	90 Th 232.04	91 Pa 231.04	92 U 238.03	93 Np (237)	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)
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**Column**  
= Group or Family  
Same # of VALENCE ELECTRONS

**15. Identify each "mystery" element by symbol based on the clues provided.**

Mg I have 12 neutrons and 2 valence electrons.



W I am a transition metal with 74 electrons.

Rn I have a full outer shell and have a total of 6 energy levels.

K I am an Alkali metal in the 4th period.

O I am a gas with 2 electrons in my first energy level and 6 in my second energy level.

*Valence*

At I am a solid halogen with 125 neutrons.

U I am a transition metal with 7 energy levels and 92 electrons.

**NOTE: You will be allowed to use YOUR colored periodic table and can write NOTES (not typed) on that page only.**

*Done? If not, finish your study guide now!*

*We will be having a Mystery Element Quiz TOMORROW!*

*Test will be on Tuesday!*

*Try the Quia Mystery Element Smillionaire game to practice identifying Mystery Elements. You may use your colored periodic table.*

*You will have to sign in to Quia and click the link to the Class Web Page to find the game.*

# Periodic Table Smillionaires

Taylor  
Jessilyn  
Kristen G.  
Brooklyn  
Kristo  
Sydney  
Drew  
Keanez  
ADAM  
Triscuit  
Autumn  
Rhyan  
Novy



**What have we learned so far?**  
**Check off the learning targets you know!**

**I CAN ...**

- Describe the parts of an atom (subatomic particles, nucleus, & electron cloud).
- Use a periodic table to determine the atomic number and atomic mass as well as the number of protons, neutrons, and electrons (total and valence).
- Explain how an atom changes by changing the number of protons, neutrons, or electrons.
- Draw the Bohr diagram for an atom that shows the location of all of its electrons.
- Draw the Lewis structure which shows the number of valence electrons an atom has.
- Predict whether an element will gain or lose electrons in a bond. ?
- Identify the elements in each family on the periodic table.
- Predict the number of valence electrons and the number of energy levels for an element based on its position in the periodic table.
- Identify the chemical symbols and/or formulas for common elements and compounds.
- Determine the elements in a compound and the number of each. ?
- Describe common chemical reactions that take place in the world around us.
- Explain how an ionic bond forms between a metal and a nonmetal.
- Explain how a covalent bond forms between two nonmetals.
- Identify physical and chemical properties of matter.
- Identify physical and chemical changes in matter.
- Explain how specific variables affect the reaction rate of a chemical reaction, i.e. concentration, surface area, and temperature.
- Describe the law of conservation of mass using specific chemical reactions and/or balanced equations.
- Explain the process of polymerization as it relates to the production of petrochemicals (plastics).

