

Weekly Focus: Compare & Contrast **Weekly Skill:** Comprehension

Lesson Summary: This lesson will have students deepen their understanding of atoms and molecules and how they fit into the periodic table of elements.

Materials Needed:

- Chemistry: Atoms and Molecules (compare and contrast) reading **Unit 2.3 Handout 1**
- Matter and the Periodic Table Worksheets **Unit 2.3 Handout 2**
- Symbolic Atoms (Challenge Activity/Homework) **Unit 2.3 Handout 3**

Objectives: Students will be able to...

- Understand the fundamentals of chemical properties with relationship to the periodic table.
- Read passages with vocabulary related to chemical properties

College and Career Readiness Standards: RI, RST, WHST, SL

ACES Skills Addressed: EC, LS, ALS, CT, SM, DFP, N

<u>Notes:</u> Please review and be familiar with classroom routine notes for: reading for fluency strategies (<u>Routine 2</u>), summarizing techniques (<u>Routine 4</u>), and self-management skills (<u>Routine 4</u>). The notes will help with making a smooth transition to each activity. If at all possible, try to use computers for Unit 2.3 Handout 2 (see online resources for the link) for students to navigate websites that will help their digital literacy skills and content knowledge for GED 2014.

GED 2014 Science Test Overview – For Teachers and Students

The GED Science Test will be 90 minutes long and include approximately 34 questions with a total score value of 40. The questions will have focus on three content areas: life science (~40%), physical science (~40%), and Earth and space science (~20%). Students may be asked to read, analyze, understand, and extract information from a scientific reading, a news brief, a diagram, graph, table, or other material with scientific data and concepts or ideas.

The online test may consist of multiple choice, drop down menu, and fill-in-the-blank questions. There will also be a short answer portion (suggested 10 minutes) where students may have to summarize, find evidence (supporting details), and reason or make a conclusion from the information (data) presented.

The work students are doing in class will help them with the GED Science Test. They are also learning skills that will help in many other areas of their lives.



Activities:

Warm-Up: KWL Chart Time: 10 - 15 minutes

- As students enter the class, have the following written on the board or overhead "The periodic table is a list of known elements arranged by their chemical properties." Have students create a "KWL" chart on a piece of notebook paper (below). This helps to activate students' prior knowledge by asking them what they already Know (column 1); students (collaborating as a classroom unit or within small groups) set goals specifying what they Want to learn (column 2); and after reading students discuss what they have Learned (column 3).
- Students apply higher-order thinking strategies which help them construct meaning from what they read and help them monitor their progress toward their goals.

KWL Chart:

K - What (else) do I KNOW?	W - What do I WANT to know?	L - What did I LEARN?

Activity 1: Reading Comprehension Unit 2.3 Handout 1

Time: 35 - 45 minutes

- 1) Hand out Unit 2.3 Handout 1 to students.
- 2) Discuss with students that when reading, they should pay close attention to what all of the passage is about. Inform students the passage will go more in depth on atoms and molecules by comparing and contrasting them. This is a continuation of material covered in the last two lessons.
- **3)** Ask students to read the passage and answer the questions that follow. Circulate the class while students are working independently to help as needed.
- **4)** When students are finished, review answers as a whole class. Ask for students to share their answers if they would like. <u>If there is time</u>, you may have students practice reading for fluency and read the passage to each other in pairs. (see **Classroom Routine 2 Reading for Fluency**)
- 5) Students who finish early can be challenged and encouraged to summarize the reading in 3 to 5 sentences. They can do this on the back of their paper or in a notebook. Explain to students that this is an excellent method for them to self-assess if they understand the material. It is also something they may encounter on the GED 2014 Science Module. (Classroom Routine 4 Summarizing Techniques)

Break: 10 minutes

Activity 3: Elements & the Periodic Table Unit 2.3 Handout 2

Time: 35 - 45 minutes

- 1) Hand out Unit 2.3 Handout 2 to students.
- 2) Discuss with students that when reading, they should pay close attention to what all of the passage is about. Remind students that they should pay close attention to the title and guide words to predict what they will read next. (If there are some students who find the font too small on the Periodic Table, ask them to work in groups)
- 3) Ask students to read the passage and answer the questions that follow. Remind them to pay



attention to the key while using the periodic table. You may wish to have a whole class discussion on the periodic table and how it is read. (Please see the last page of this document.) Circulate the class while students are working independently (or in groups) to help as needed.

- **4)** When students are finished, review answers as a whole class. Ask for students to share their answers if they would like.
- 5) Students who finish early can be challenged and encouraged to summarize the reading in 3 to 5 sentences. They can do this on the back of their paper or in a notebook. Explain to students that this is an excellent method for them to self-assess if they understand the material. It is also something they may encounter on the GED 2014 Science Module. (Classroom Routine 4 Summarizing Techniques)
- **6)** You can challenge all students to think of the kinds of jobs or careers where it would be important to know the symbols in the periodic table.

Wrap-Up: Summarize

Time: 5 - 10 minutes

Have students turn to a partner (or write in their journals) about what they have learned today about the periodic table of elements. Ask them to tell a partner what is one thing new they learned from today's lesson, or what is one wondering they have for the next class. Note: Use Classroom Routine 4 Handout for summarizing techniques.

Extra Work/Homework: Unit 2.3 Handout 3 Time: 20+ minutes outside of class

Students can read and answer questions from worksheet on Symbolic Atoms. This is an advanced activity that may be challenging for some students, but it is an excellent example of some math requirements for GED 2014 within the Science Module.

Differentiated Instruction/ELL Accommodation Suggestions	Activity
The periodic table may be new for some students and a review for others. It could be helpful to show students the color copy with an overhead projector (see last page of this document). Point out the key (which is a strategy they should incorporate in GED 2014). You can orally ask students about different elements they already know. "What is the symbol for Oxygen (O), or Silver (Ag)?"	Unit 2.3 Handout 2
The periodic table may be too small and frustrating for some students with vision difficulties to use alone, you can guide these students into working groups.	Unit 2.3 Handout 2



Online Resources:

This is an **excellent** site for students to practice with elements. If at all possible, have the entire class navigate to the link and practice. If not, try to assign as outside work. There are digital literacy skills involved that will help students for GED 2014.

http://education.jlab.org/elementmath/

This link is a way for students to get more information about each element in the periodic table.

http://education.jlab.org/itselemental/

Suggested Teacher Readings:

- GED Testing Service GED Science Item Sample (to get an idea of what the test may be like)
 http://www.gedtestingservice.com/itemsamplerscience/
- Assessment Guide for Educators: A guide to the 2014 assessment content from GED Testing Service:

http://www.riaepdc.org/Documents/ALALBAASSESSMENT%20GUIDE%20CHAPTER%203.pdf

 Minnesota is getting ready for the 2014 GED test! – The website with updated information on the professional development in Minnesota regarding the 2014 GED.

http://abe.mpls.k12.mn.us/ged 2014 2

Essential Education's 2014 GED Test Curriculum Blueprint (PDF)

http://www.passged.com/media/pdf/educators/curriculum-blueprint.pdf



Unit 2.3 Handout 1 (total of 3 pages)

Chemistry: Atoms and Molecules

What is the difference between atoms and molecules? It is actually pretty simple. Molecules are made up of atoms. Each element on the periodic table of elements is made up of one single type of atom. Molecules are formed when atoms bond. Different types of atoms can form together to make a molecule. Two or more of the same type of atom can also be bonded to make a molecule.

For example, H is the symbol for hydrogen and O is the symbol for oxygen. Water is made up of both hydrogen and oxygen. H_2O is the symbol for water. Two hydrogen atoms and one oxygen atom are bonded together to create a water molecule. Oxygen gas is made up of two oxygen atoms bonded together. O_2 is the symbol for an oxygen molecule.

With so many elements, imagine all the combinations of atoms that have been researched and have yet to be researched. Chemistry is very complicated because there are so many different combinations.

Use the information in the reading passage to answer the following questions.

- 1. Water molecules are made up of
 - a. any two atoms bonded together.
 - b. two hydrogen atoms and one oxygen atom.
 - c. atoms of only one type of element bonded together.
 - d. two oxygen atoms.
- 2. Why does the author describe the atoms that make up water?
 - a. to give an example of a specific molecule
 - b. to show how liquids are different from solids
 - c. to explain why water is so abundant
 - d. to illustrate how simple chemistry is
- 3. Can a single atom be considered a molecule?
 - a. only if the atom is found in water
 - b. no, it takes two or more atoms bonded to create a molecule
 - c. only if it is an oxygen atom floating in the air
 - d. yes, all atoms are made up of many different molecules



- 4. Read the following sentence: "Chemistry is very complicated because there are so many different combinations." The word **complicated** means
 - a. simple and basic
 - b. difficult to understand
 - c. fun and exciting
 - d. able to be learned easily
- 5. What is the main idea of this passage?
 - a. Bonded atoms make up molecules.
 - b. Atoms and molecules are unrelated to each other.
 - c. Water is the most common type of molecule.
 - d. Oxygen and hydrogen are necessary for molecules.

6.	What makes up a molecule of oxygen gas?								
7.	Explain why understanding bonding is important for understanding molecules.								
8. comp	The question below is an incomplete sentence. Choose the answer that best bletes the sentence.								
oxyge	Molecules can be made up of two atoms of the same element;, en gas is made up only of oxygen atoms.								

- a. for example
- b. most importantly
- c. on the other hand
- d. therefore



9. Read the following sentence.

Two hydrogen atoms and one oxygen atom create a water molecule by bonding together.

Answer the questions below based on the information provided in the sentence you just read. One of the questions has already been answered for you.

	1.	What?
		Two hydrogen atoms and one oxygen atom
	2.	What do hydrogen and oxygen atoms do?
	2.	How?
10. some	thing.	Ibulary Word: symbol: a written sign used instead of a word to represent ne vocabulary word in a sentence:
11. pelov		enge: Paraphrase (use your own words) the main idea of the reading passage

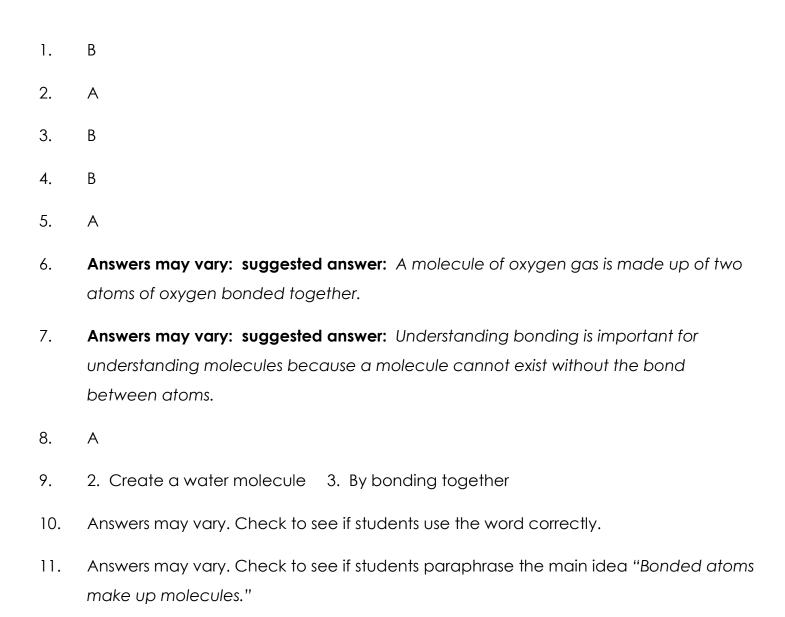




Unit 2.3 Handout 1

Chemistry: Atoms and Molecules

TEACHER ANSWER KEY



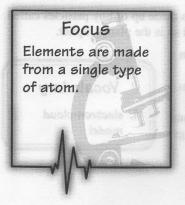
Lesson reformatted from ReadWorks.org (780-Chemistry Atoms and Molecules)



Unit 2.3 Handout 2 (4 pages total)

Matter

Brief #2: Elements



Elements are physical materials that are made up of a single type of atom. For example, iron is an element that is only made up of iron atoms. Carbon is an element that is only made up of carbon atoms.

So let's say, for example, that you could see the individual atoms in a piece of iron. What you would see are trillions of iron atoms, each one having a nucleus containing 26 protons and 26 neutrons, with 26 electrons orbiting that nucleus.

The number of protons in the nucleus of any type of atom is like its fingerprint. It is unique to that atom. If an atom has 6 protons it means that it makes the element called carbon. If an atom has 7 protons it makes the element called nitrogen.

There are only about 100 different types of natural elements present on Earth. Elements are considered pure substances because they are only made up of a single type of atom.

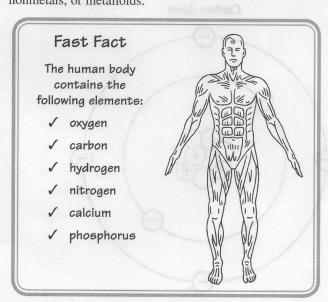
Vocabulary

- 1. elements
- 2. periodic table
- 3. atomic number



Types of Elements

Each of the elements has a different amount of protons and electrons. And different amounts of protons and electrons produce elements with different physical characteristics. For example, the element called mercury has 80 protons and 80 electrons. Mercury is a metallic liquid. The element of helium has 2 protons and 2 electrons. Helium is a nonmetallic gas. Elements can be metals, nonmetals, or metalloids.



Metals are elements like copper, iron, and aluminum. They are usually hard, and strong. They are good conductors of electricity. Nonmetals are elements like selenium and helium. Nonmetals are not good conductors of electricity. Metalloids are elements that have characteristics of both metals and nonmetals.

#2926 Differentiated Lessons

116

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Matter

Brief #2: Elements (cont.)



The Periodic Table (cont.)

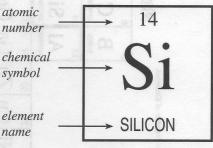
The periodic table is arranged in 7 rows and 18 columns. The elements in the columns are called families. They have certain things in common. The elements in the rows are called periods. They have very little in common.

Each element on the period table has an atomic number. The atomic number tells how many protons are in the nucleus of that particular element. The atomic number for sulfur is 16. That means that the sulfur atom has 16 protons in its nucleus. The elements are arranged from left to right in number order.

If you look carefully, about thee-quarters of the way across the period table, you will see a zig-zag line. All of the elements to the right of this line are non-metals. And all of the elements to the left of this line are metals. The elements that are along the zigzag line are the metalloids.

These are the metalloids:

- ✓ boron
- √ silicon
- ✓ germanium
- √ arsenic
- ✓ antimony
- ✓ tellurium
- ✓ polonium



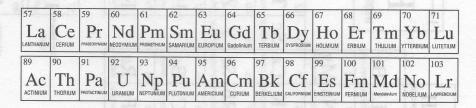
Silicon is a metalloid

Even though aluminum appears along this line, it is a metal.



Lanthanum and Actinide Series

You have probably noticed that there are two rows that appear at the bottom of the periodic table that are separated from the rest. These are called the Lanthanum series and the Actinide series. The Lanthanum series goes from atomic number 57 to atomic number 71. This is really part of row six. It is the elements that come between barium and lutetium. The Actinide series is really part of row seven. It goes from atomic number 89 to atomic number 103. These two rows are pulled to the bottom of the periodic table only so that the periodic table can appear neatly over one page.



926 Differentiated Lessons

118

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Periodic Table of the Elements

American Spellings

	American openings																
hydrogen 1																	helium 2
H														He			
1.00794									Key:								4.002602
lithium	beryllium	1							elemen	t name	l	boron	carbon	nitrogen	oxygen	fluorine	neon
3	4								atomic	number		5	6	7	8	9	10
Li	Be											Ne					
6.941	9.012182								atomic			10.811	12.0107	14.00674	15.9994	18.9984	20.1797
sodium	magnesium										=	aluminum	silicon	phosphorus	sulfur	chlorine	argon
11	12											13	14	15	16	17	18
Na	Mg											ΑI	Si	Р	S	CI	Ar
22.98977	24.3050											26.981538	28.0855	30.97376	32.065	35.453	39.984
potassium	calcium	scandium	titanium	vanadium	chromium	manganese	iron	cobalt	nickel	copper	zinc	gallium	germanium	arsenic	selenium	bromine	krypton
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
39.0983	40.078	44.95591	47.867	50.9415	51.9961	54.93805	55.845	58.9332	58.6934	63.546	65.409	69.723	72.64	74.9216	78.96	79.904	83.798
rubidium	strontium	yttrium	zirconium	niobium	molybdenum	technetium	ruthenium	rhodium	palladium	silver	cadmium	indium	tin	antimony	tellurium	iodine	xenon
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
Rb	Sr	Υ	Zr	Nb	Мо	Тс	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	ı	Xe
85.4678	87.62	88.90585	91.225	92.90638	95.94	[98]	101.07	102.9055	106.42	107.8682	112.411	114.818	118.710	121.760	127.60	126.9045	131.293
cesium	barium	lutetium	hafnium	tantalum	tungsten	rhenium	osmium	iridium	platinum	gold	mercury	thallium	lead	bismuth	polonium	astatine	radon
55	56	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86
Cs	Ва	Lu	Hf	Ta	W	Re	Os	l Ir	Pt	Au	Hg	TI	Pb	Bi	Ро	At	Rn
132.90545	137.327	174.967	178.49	180.9479	183.84	186.207	190.23	192.217	195.078	196.96655	200.59	204.3833	207.2	208.980	[209]	[210]	[222]
francium	radium			dubnium	seaborgium	bohrium	hassium	meitnerium	darmstadtium	roentgenium	ununbium		ununquadium				
87	88	103	104	105	106	107	108	109	110	111	112		114				
Fr	Ra	Lr	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Uub		Uuq				
[223]	[226]	[262]	[261]	[262]	[266]	[264]	[269]	[268]	[271]	[272]	[285]		[289]				

lanthanum	cerium	praseodymium	neodymium	promethium	samarium	europium	gadolinium	terbium	dysprosium	holmium	erbium	thulium	ytterbium
57	58	59	60	61	62	63	64	65	66	67	68	69	70
La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Но	Er	Tm	Yb
138.9055	140.116	140.90765	144.24	[145]	150.36	151.964	157.25	158.9253	162.50	164.930	167.259	168.934	173.04
actinium	thorium	protactinium	uranium	neptunium	plutonium	americium	curium	berkelium	californium	einsteinium	fermium	mendelevium	nobelium
89	90	91	92	93	94	95	96	97	98	99	100	101	102
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No
[227]	232.038	231.0359	238.0289	[237]	[244]	[243]	[247]	[247]	[251]	[252]	[257]	[258]	[259]

Notes: Elements with atomic weights in square brackets have no stable isotopes. Different sources list different atomic weights for elements. The difference arises from the differing atomic weights of various isotopes. We have tried to list the most stable isotope. For example, some sources list the atomic weight of seaborgium as 263 and others 266. The most stable isotope appears have an atomic weight of 266 so we list that weight here. Roentgenium is still the unofficial name of element 111 but it is the one recommended by the IUPAC so we list it here instead of the generic 'unununium'. Aluminum, cesium, and sulfur are the American spellings for aluminium, caesium, and sulphur. This table was downloaded from http://www.science-teachers.com/printable_periodic_tables.htm





PERIODIC TABLE WORKSHEET

Use the periodic table to find the information asked for below. Look carefully at the key in the table.

1.	What is the atomic number of:	2. What is the atomic mass of:
	Calcium	Calcium
	Iron	Iron
	Gold	Uranium
	Uranium	Copper
3.	How many protons do the following hav	e? 4. How many electrons do the following have?
	Calcium	Gold
	Gold	Iron
	Copper	Copper
	Iron	Uranium
5.	Does mercury have more protons and e	electrons than tin?yesno
6.	Is mercury a heavier element than tin?	yesno
7.	Does potassium have more electrons the	an neon?yesno
8.	Does hydrogen have more electrons tha	an Uranium?yesno
9.	Which has more protons, sulfur or iodine	? (circle answer)
10.	Which has more protons, iodine or silvers	? (circle answer)
11.	Write the symbols or the names for each	of these elements:
	Chlorine	Zn
	Copper	Helium
	Potassium	Iron
	Silver	P
	Na	Ne
	Sn	Mercury



PERIODIC TABLE WORKSHEET TEACHER ANSWER KEY

Use a periodic table to find the information asked for below:

1.	What is the atomic number of:	2. What is the atomic mass of:
	Calcium _20 _	Calcium _40.078
	Iron 26 _	Iron _ 55.845
	Gold _ 79	Uranium 238.0289 _
	Uranium _ 92	Copper _63.546 _
3.	How many protons do the following have	e? 4. How many electrons do the following have?
	(same # as the atomic number)	(same # as the atomic number)
	Calcium _20	Gold _ 79
	Gold _ 79	Iron 26
	Copper _29_ _	Copper 29 _
	Iron _ 26 _	Uranium 92 _
5.	Does mercury (80) have more protons a	and electrons than tin (50)? _XX_yesno
6.	Is mercury (200.59) a heavier element th	nan tin (118.710)? XX _yesno
7.	Does potassium (19) have more electron	ns than neon (10)?XXyesno
8.	Does hydrogen (1) have more electrons	sthan Uranium (92)?yes XX no
9.	Which has more protons, sulfur (16) or io	dine (53)? (circle answer) (iodine)
10.	Which has more protons, iodine (53) or s	ilver (47)? (circle answer) (iodine)
11. Wr	ite the symbols or the names for each of	these elements:
	ChlorineCI	zincZn
	CopperCu	Helium He
	Potassium K	Iron Fe
	SilverAg	phosphorusP
	Sodium Na	neon Ne
	tinSn	MercuryHg



Unit 2.3 Handout 3 (1 page total)

mical symbol car ble below shows	show inform	– nation about e a symbol fo		e easily than a						
	how to write	e a symbol fo								
he below shows			r an atom. In	e atomic num	ider reils now	many				
ns there are. In a					tons. The mas	ss number				
the sum of the egatively charge										
nplete the chart.	If there is no	o charge, assu	ume the atom	is neutral.						
11	For	mula I	Example with C	Carbon	atomic numbe	er				
# protons	ator	mic#	6	1						
# neutrons	atomic mass -	atomic number	12-6=6		C+4 ← change					
# electrons	1		6-(+4)=2	12	mass number					
# CICCHOIIS	atomic number	- charge	0-(++)-2							
hat you have lea	erned from th	ne diagram to	complete the	chart.		nol a				
nat you have lee	anica nom a	ie diagram te	complete the	. Criar c.						
Element/Ion	Atomic Number	Mass Number	Charge	Protons	Neutrons	Electron				
12	Number	Number								
I Ma										
Mg	3			6						
Mg ₂₄ ⁹ F ⁻¹	9)			(
24				(
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9 -1 19 16 -2 S 32 1 H 1 4 - +2	Fluoria	Linol (Charge		no	VOIO 200	not (
9 F-1 19 16 -2 S 32 1 H 1	Fluoria	Linol (Charge		no no	Osto Osto	not (
9 F-1 19 16 -2 S 32 1 H 1 4 Be +2 9	Fluorin			no	1000	lon Cha				
9 -1 F 19 16 -2 S 32 1 H 1	rihouli	Linol (Charge)		no	7000	not @				
9 F-1 19 16 -2 S 32 1 H 1 4 Be +2 9	shoul4	Charge		no co	NOIO SOLV	not (sn2				



Unit 2.3 Handout 3 (1 page total)

TEACHER ANSWER KEY

	Element/ion	Atomic	Mass	Charge	Protons	Neutrons	electrons
		number	number				
1	Mg	12	24	0	12	12	12
2	F	9	19	-1	9	10	10
3	S	16	32	-2	16	16	18
4	Н	1	1	0	1	0	1
5	Ве	4	9	+2	4	5	2
6	Na	11	23	=1	11	12	10
7	K	19	39	0	19	20	19



