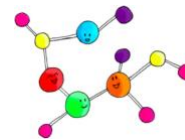


Honors Chemistry Summer Assignment



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Welcome to Honors Chemistry! Congratulations on choosing to challenge yourself by being a part of Honors Chemistry this upcoming school year. A basic understanding of chemistry provides us with the foundation we need to better understand what's happening "behind the scenes" in the world around us. This course is designed to challenge you and prepare you for advanced science courses such as AP Chemistry, AP Biology, and/or AP Environmental Science. You will need to be organized, work cooperatively as well as independently, think critically, and participate regularly and actively (even from home!) in this class. Our goal this year is to get you to appreciate that **CHEMISTRY IS EVERYWHERE!**



Google Classroom

Please use the following Google Classroom Join Code if you have not already joined the "Honors Chemistry Summer '25" Class: **ms66dkf**



COMPLETED

Find the "1-Introduce Yourself" assignment on Google Classroom. Be sure to complete this assignment by July 30th.



Before we get started with the content in this packet, it is important to understand what chemistry is, its origins and meaning. Watch this short YouTube clip using the link below. The video clip is called, "Introduction to Chemistry," and is only a few minutes in length.

<http://www.youtube.com/watch?v=izeuGr0lbN0> (Find this on Google Classroom as "2-Intro Video")



COMPLETED

Read "Chemistry in Context". You will find this in the links portion of Google Classroom or the following link. (3-Chemistry in Context) <https://bit.ly/437BvHZ>



Introduction to Chemistry

1. What is the definition of chemistry?

Data: There are two types of data that can be collected from an experiment: **qualitative** and **quantitative**.

2. Using the URL listed below, define these two terms. Make sure to analyze examples given to fully understand two. In class, we will discuss further what makes good qualitative and quantitative observation. For now, understanding what they are is sufficient. <https://bit.ly/34EEB7m> (4-*Qualitative and Quantitative Data* on GC)

- a. Qualitative Data

- b. Quantitative Data:

Experimentation: Testing the hypothesis usually required multiple trials to assure results **accurate** and **precise**. These are two more terms in which it will be vital for you to understand. To be accurate is not the same as to be precise.

3. Use the following link to help you better understand the two and write a definition for each below.

<https://bit.ly/2TzCBeI> (5-*Accuracy and Precision* on GC)

- a. Accuracy:

- b. Precision:



Read "Phases and Classifications of Matter." You will find this in the links portion of Google Classroom or the following link. (6-*Phases and Classifications of Matter*) <https://bit.ly/3FdGfCQ>

4. Define the following terms:

- a. Matter:

- b. Mass:

- c. Volume:



States of Matter

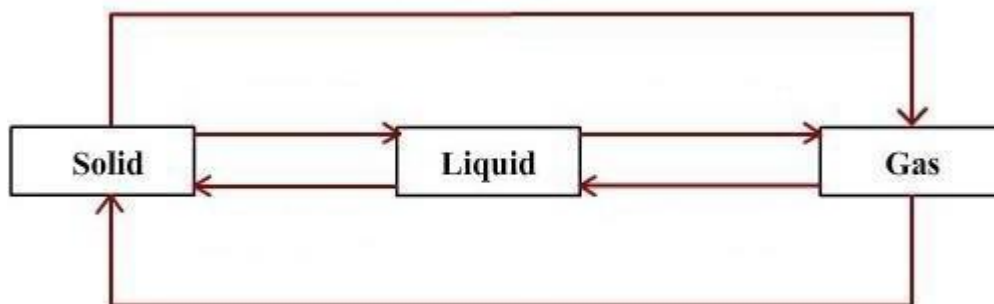
<https://www.youtube.com/watch?v=bMbmQzV-Ezs> (7-States of Matter on G.C)

Investigate each state of matter using the link above. Once your investigation is complete, answer the following questions regarding the properties of each state.

5. In the table below, list the properties of each state of matter, an example of each & sketch a diagram of their particles.

	Solid	Liquid	Gas
Examples			
Particle Diagram - show how the particles are arranged. Use circles to represent particles.			
Properties			

Now that you have an understanding of matter and its different states, you will be reviewing state changes. Using prior knowledge and credible sources, label each arrow in the diagram below with the correct name of the process that is occurring. **Note:** There are six arrows therefore you should have six labels.





Classifying Matter and Change

COMPLETED

6. Use "6-Phases and Classifications of Matter," that you used before, to help you define the following terms. Give examples of each:

Type of Matter	Definition	Examples
pure substance		
element		
compound		
mixture		
heterogeneous mixture		
homogeneous mixture/solution		

7. Compare and contrast an **atom** and a **molecule**. Draw examples of each as well:

<u>Atom</u>	<u>Molecule</u>



Chemical Symbols

There are 118 chemical elements on the periodic table. Each element has a chemical name and a chemical symbol such as sodium (Na). You will notice that not all of the chemical symbols seem to correspond to their name. Look at the examples below.

Chemical Name	Chemical Symbol
Potassium	K
Carbon	C

“C” for carbon obviously makes sense but “K” for potassium does not. This occurs because the symbols of these elements are derived from the Latin language. It is vital that you are VERY familiar with the most common elements. We will be having a quiz over the 40 elements found in the following Quizlet within the first few weeks of school. More to come on this quiz at the beginning of the year. It is recommended that you start memorizing them now.

Quizlet Link: <https://quizlet.com/9vkdc0?x=1qgt&i=rejby> (*Elements to Know-Quizlet on GC*)

Note: When memorizing elements & symbols, keep in mind that spelling should be CLOSE and symbols involving more than one letter are always written with the first letter capitalized and the second lowercase. This is important to help identify when one element ends and the next begins.

Example: **CS** – would be a compound containing carbon and sulfur
 Cs – would be the element cesium

Practice:

	Name	Symbol
1.		Au
2.		Be
3.	Zinc	
4.	Lead	
5.	Neon	
6.		B
7.		Si
8.		S
9.		Pt
10.	Sodium	
11.	Iron	
12.	Helium	
13.	Cobalt	
14.		H
15.	Aluminum	
16.	Silver	
17.	Lithium	
18.		Mg
19.		Hg
20.		O



Parts of the Atom

COMPLETED

PART I: ATOM SCREEN

Go to the "Build and Atom Simulation" (8-Build and Atom Simulation on GC) <https://bit.ly/437QyBz>

1. Explore the **Build an Atom** simulation by clicking on various things in the simulation.
 - a) List two things you observed in the simulation.
 - b) What particle(s) are found in the center of the atom?
2. Play until you discover which **particle(s)** determine(s) the name of the **element** you build. What did you discover?
3. What is the **name** of the following atoms?
 - a) An atom with 3 protons and 4 neutrons: _____
 - b) An atom with 2 protons and 4 neutrons: _____
 - c) An atom with 4 protons and 4 neutrons: _____
4. Play with the simulation to discover which particles affect the **charge** of an atom or ion.
 - a) Fill in the blanks below to show your results:

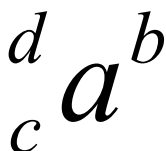
Neutral atoms have the same number of protons and electrons.

Positive ions have _____ protons than electrons.

Negative ions have _____ protons than electrons.
 - b) Develop a relationship (in the form of a single sentence or equation) that can predict the charge based on the number and types of particle.
5. Play with the simulation to discover what affects the **mass** number of your atom or ion.
 - a) What is a rule for determining the mass number of an atom or ion?
6. Practice applying your understanding by playing 1st and 2nd levels on the game screen.

PART II: SYMBOL SCREEN

7. Using the *Symbol* readout box, figure out **which particles** affect each component of the atomic symbol.
- a) In the atomic symbol below, label each letter (*a*, *b*, *c*, and *d*) with:
- the **particle(s)** used to determine the letter, and
 - **how** the value of each letter is determined.



8. Create a definition (using a complete sentence) for each of these items based on your labels from the atomic symbol above.
- a) Element Symbol
- b) Charge
- c) Atomic Number
- d) Mass Number
9. Practice applying your understanding by playing the 3rd and 4th game levels. Play until you can get all the questions correct on the 4th level.
10. In addition to atomic symbol, we can represent atoms by name and mass number.
- a) Complete the table below:

Symbol	Name
${}^{12}_{6}\text{C}^{+1}$	Carbon-12
${}^{18}_{9}\text{F}$	
${}^{11}_{5}\text{B}$	

- b) Each representation (Symbol and Name) in the table above provides information about the atom. Describe the similarities and differences between the *Symbol* and *Name* representations.

PART III: ISOTOPES

11. Play with the simulation to determine:
- Which particles affect the stability of the atom? _____
 - Which particles do not affect the stability of the atom? _____
12. What are the names of the stable forms of oxygen?
- Oxygen-16
 - Oxygen-_____
 - Oxygen-_____
 - List all of the things that are the same about these atoms (ignore the electrons).
- e) List all of the things that are different about these atoms (ignore the electrons).
13. The atoms in the previous question are **isotopes** of each other. Based on this information, list the requirements for two atoms to be isotopes of each other.
14. Test your understanding of isotopes by examining the relationships between the pairs of atoms listed below:

Atom 1	Atom 2	Relationship between atom 1 and atom 2
${}^{12}_{6}\text{C}$	${}^{13}_{6}\text{C}$	<input type="checkbox"/> Isotopes <input type="checkbox"/> Same Atom, Not Isotopes of Each Other <input type="checkbox"/> Different Element
Carbon-12	${}^{12}_{6}\text{C}$	<input type="checkbox"/> Isotopes <input type="checkbox"/> Same Atom, Not Isotopes of Each Other <input type="checkbox"/> Different Element
Argon-40	Argon-41	<input type="checkbox"/> Isotopes <input type="checkbox"/> Same Atom, Not Isotopes of Each Other <input type="checkbox"/> Different Element
${}^{11}_{5}\text{B}$	Boron-10	<input type="checkbox"/> Isotopes <input type="checkbox"/> Same Atom, Not Isotopes of Each Other <input type="checkbox"/> Different Element
An atom with 13 protons and 13 neutrons	An atom with 14 protons and 13 neutrons	<input type="checkbox"/> Isotopes <input type="checkbox"/> Same Atom, Not Isotopes of Each Other <input type="checkbox"/> Different Element

EXERCISES

15. The periodic table has a great deal of information about every atom. Using your periodic table, answer the following questions:

- What is the atomic number of chlorine (Cl)? _____
- What is the atomic number of tungsten (W)? _____
- How many protons are there in any Cl atom? _____
- How many protons are there in any Te atom? _____
- Can you tell from the periodic table exactly how many neutrons are in an atom?

16. Complete the following table:

Name	Symbol	Atomic number	Mass Number	Number of neutrons	Number of Electrons	Charge
hydrogen-2	${}^2\text{H}$	1	2	1	1	0
	${}^3\text{H}$					
sodium-22	${}^{22}\text{Na}^+$				10	
		12	24		12	
		12	25		13	
	${}^{46}\text{Tl}^{2-}$					
	${}^{107}\text{Ag}$					
	${}^{19}\text{F}^-$					
carbon-12					6	
carbon-13					6	
carbon-14					6	
carbon-12					7	
carbon-12					5	
	${}^4\text{He}$					
		8		8	10	
argon-40		18			18	
	${}^{70}\text{Ga}$					
	${}^{70}\text{Ga}^{3+}$					
		4	9		2	
		7		8	8	

17. To test your knowledge of isotopes, draw arrows between all pairs of atoms in the table above that are isotopes of each other.



Periodic Table Basics

Similar to the Atom Basics section, we expect from your previous science courses that you have a basic understanding of the Periodic Table. This table is an arrangement of all chemical elements that provides us with an enormous amount of information. We will spend some time looking at the different pieces of information that it tells us beyond what you already know. For now, you should be able to answer the following questions. Once again, if you begin struggling with the content, start looking for online resources to help you. I provided a good source to get you started.

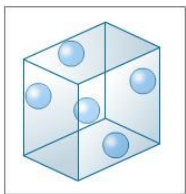
<https://www.ptable.com/> (9-Table on GC. Go ahead and bookmark this one!)

Periodic Table of the Elements

1 1A												18 8A						
1	2											13	14	15	16	17	2	
1 H Hydrogen 1.008	2 He Helium 4.003											3A	4A	5A	6A	7A		
2	3	4											5	6	7	8	9	10
3	3 Li Lithium 6.941	4 Be Beryllium 9.012											5 B Boron 10.811	6 C Carbon 12.011	7 N Nitrogen 14.007	8 O Oxygen 15.999	9 F Fluorine 18.998	10 Ne Neon 20.180
3	11 Na Sodium 22.990	12 Mg Magnesium 24.305	3B	4B	5B	6B	7B	8B		1B	12B	13 Al Aluminum 26.982	14 Si Silicon 28.086	15 P Phosphorus 30.974	16 S Sulfur 32.065	17 Cl Chlorine 35.453	18 Ar Argon 39.948	
4	19 K Potassium 39.098	20 Ca Calcium 40.078	21 Sc Scandium 44.956	22 Ti Titanium 47.867	23 V Vanadium 50.942	24 Cr Chromium 51.996	25 Mn Manganese 54.938	26 Fe Iron 55.845	27 Co Cobalt 58.933	28 Ni Nickel 58.693	29 Cu Copper 63.546	30 Zn Zinc 65.38	31 Ga Gallium 69.723	32 Ge Germanium 72.64	33 As Arsenic 74.922	34 Se Selenium 78.96	35 Br Bromine 79.904	36 Kr Krypton 83.798
5	37 Rb Rubidium 85.468	38 Sr Strontium 87.62	39 Y Yttrium 88.906	40 Zr Zirconium 91.224	41 Nb Niobium 92.906	42 Mo Molybdenum 95.94	43 Tc Technetium 97.907	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.906	46 Pd Palladium 106.42	47 Ag Silver 107.868	48 Cd Cadmium 112.411	49 In Indium 114.818	50 Sn Tin 118.71	51 Sb Antimony 121.76	52 Te Tellurium 127.60	53 I Iodine 126.904	54 Xe Xenon 131.293
6	55 Cs Cesium 132.905	56 Ba Barium 137.327	57 La Lanthanum 138.905	72 Hf Hafnium 178.49	73 Ta Tantalum 180.948	74 W Tungsten 183.84	75 Re Rhenium 186.207	76 Os Osmium 190.23	77 Ir Iridium 192.217	78 Pt Platinum 195.084	79 Au Gold 196.967	80 Hg Mercury 200.59	81 Tl Thallium 204.383	82 Pb Lead 207.2	83 Bi Bismuth 208.980	84 Po Polonium [209]	85 At Astatine [210]	86 Rn Radon [222]
7	87 Fr Francium 223.02	88 Ra Radium 226.025	89 Ac Actinium 227.028	104 Rf Rutherfordium 261.109	105 Db Dubnium 262.114	106 Sg Seaborgium 263.118	107 Bh Bohrium 264.125	108 Hs Hassium 265.13	109 Mt Meitnerium 268.139	110 Ds Darmstadtium 281.162	111 Rg Roentgenium 273.154	112 Cn Copernicium [285]	113 Nh Nihonium [284]	114 Fl Flerovium [289]	115 Mc Moscovium [288]	116 Lv Livermorium [293]	117 Ts Tennessine [292]	118 Og Oganesson [294]
			6	58 Ce Cerium 140.116	59 Pr Praseodymium 140.908	60 Nd Neodymium 144.242	61 Pm Promethium [145]	62 Sm Samarium 150.36	63 Eu Europium 151.964	64 Gd Gadolinium 157.25	65 Tb Terbium 158.925	66 Dy Dysprosium 162.50	67 Ho Holmium 164.930	68 Er Erbium 167.259	69 Tm Thulium 168.934	70 Yb Ytterbium 173.04	71 Lu Lutetium 174.967	
			7	90 Th Thorium 232.038	91 Pa Protactinium 231.036	92 U Uranium 238.029	93 Np Neptunium 237.05	94 Pu Plutonium 244.064	95 Am Americium 243.061	96 Cm Curium 247.07	97 Bk Berkelium 247.07	98 Cf Californium 251.08	99 Es Einsteinium 252.083	100 Fm Fermium 257.095	101 Md Mendelevium 258.098	102 No Nobelium 259.101	103 Lr Lawrencium 262.11	

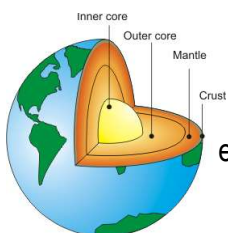
The Royal Society of Chemistry
<http://www.rsc.org>

Using <https://www.ptable.com/>, color in each section of the Periodic Table a DIFFERENT COLOR. Use the boxes above the Periodic Table to match each color you chose to the correct section.



How many elements are gaseous at room temperature?

Where do the gaseous elements tend to be located on the table?



What are the top eight elements found in the Earth's crust?

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

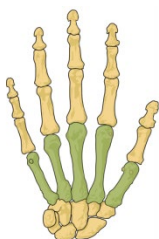
What element is used in batteries?



What element is used in making paint?



What is a major element found in our bones?



Get to Know the Elements

Use the periodic table in pictures at <http://elements.wlonk.com> to answer the following questions!

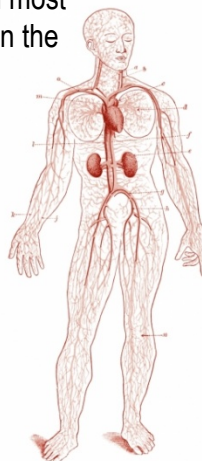
Which elements are magnetic?

- 1.
- 2.
- 3.



What are the top ten most abundant elements in the human body?

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.



Where do the elements in the human body tend to be located on the table?

Which elements are liquid at room temperature?



What radioactive element has the lowest atomic number?

How many of the elements are radioactive?



Where do the radioactive elements tend to be located on the table?



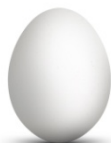
Which elements are considered "Noble Metals"?

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

What element is used in bicycles?



What is a major element found in eggs?

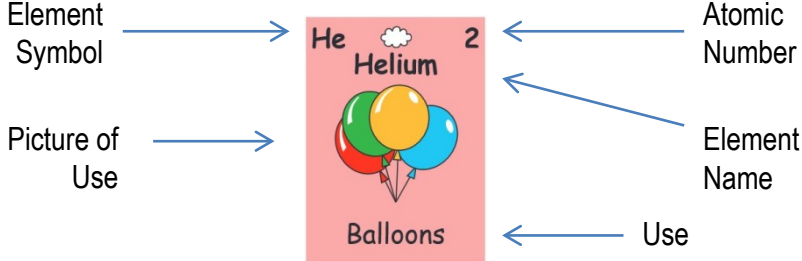


What is a major element found in chlorophyll?



Where do the Noble Metals tend to be located on the table?

Use this key to fill in the missing information in the element squares below.



Period: 1
 Group: 18
 Family: Noble Gases

Ne

Period:
 Group:
 Family:

38

Period:
 Group:
 Family:

Mercury

Period:
 Group:
 Family:

Cu

Period:
 Group:
 Family:

Tantalum

Period:
 Group:
 Family:

82

Period:
 Group:
 Family:

Sb

Period:
 Group:
 Family:

Arsenic

Period:
 Group:
 Family:

63

Period:
 Group:
 Family:

Uranium

Period:
 Group:
 Family:

Os

Period:
 Group:
 Family:

55

Period:
 Group:
 Family:

We will spend very little, if any, time reviewing the material in this packet at the beginning of the school year. As an incoming Honors Chemistry student, all this material should be well within your grasp. **THERE WILL BE A TEST OVER THIS MATERIAL WITHIN THE FIRST 8 DAY CYCLE OF THE SCHOOL YEAR.** It is important to realize going into next year that it is not enough to just complete an assignment. This assignment is a tool to help you better grasp the material. You need to spend time to make sure you are comfortable recalling and discussing the material with other people.

The following link is a Quizlet that has been created with the most important vocabulary from this assignment. These are terms that we will be using throughout the school year. You are expected to feel comfortable using the terms when we start the year.

Vocabulary Quizlet: "Vocabulary to Know" <https://bit.ly/4dsGC9j>

Next school year will be challenging but rewarding school year for you in chemistry if you come into the school year with the proper mindset. Know that we as Honors Chemistry teachers want you to succeed and will be a resource for you throughout the year. Enjoy the rest of your summer. Next year will be a big year!