

HOMEWORK

It is all about the learning

Unit 4 HW

Name:		Period:	1/3 5/7 6/8 10/12	Due:	/ / 17
Unit 4:	Chemical Bonding				
<i>Standards Assessed</i>					<i>Pre-Rating</i>
4.a I can explain how atoms combine to form molecules by sharing electrons to form covalent or metallic bonds or by exchanging electrons to form ionic bonds.					
4.b I can explain how chemical bonds between atoms in molecules such as H ₂ , CH ₄ , NH ₃ , H ₂ CCH ₂ , N ₂ , Cl ₂ , and many large biological molecules are covalent.					
4.c I can explain how salt crystals, such as NaCl, are repeating patterns of positive and negative ions held together by electrostatic attraction.					
4.d I can draw Lewis dot structures.					
4.e I can explain how electronegativity and ionization energy relate to bond formation.					
<i>Homework Instructions</i>					
<p><u>Annotate the problems</u>, just like you would during an exam. Keep up with the homework each night, and ask questions during class or office hours on homework problems. You should also be reviewing vocabulary and your notes each night. <u>Remember, homework must be fully completed in order for an exam to go in the gradebook.</u></p>					

Question 4.1) Draw Lewis structures for the following neutral atoms: Na, Si, Cl, Xe, B, and O.	Standard	4.d
Response:		
Grading notes:		

Question 4.2) Fill in the table below	Standard	4.d				
Response:						
Element	#V.E.	Metal or Nonmetal	High or Low E.N.	Gain or lose e-	Ion formed	Cation or Anion
Lithium (Li)						
Strontium (Sr)						
Chlorine (Cl)						
Bismuth (Bi)						
Lead (Pb)						
Nitrogen (N)						
Astatine (At)						
Sulfur (S)						
Cesium (Cs)						
Grading notes:						

Use the scenario below to answer questions 4.3-4.5

Ionic bonds form when atoms transfer valence electrons in order to fill each other's electron shells and make stable ions. Ionic bonds form a repeating structure of negative and positive charge, with the ratio of cations to anions always the same. In order for the ratio of cations to anions to be 1:1, the valence electrons need to perfectly match up so that each atom's octet is filled. The atoms in the table below all participate in ionic bonds with a 1:1 ratio of anions to cations.

Elements participating in 1:1 ionic bonds.
Na
Al
O
Mg
F
N

Question 4.3) Draw Lewis dot structures for each element in the scenario.	Standard	4.d
Response:		
Grading notes:		

Question 4.4) Which pairs of atoms will bond such that all of the metal's valence electrons can be given to satisfy all the nonmetals full octet? Draw a diagram showing this process for each pair.	Standard	4.d
Response:		
Pair 1:	Pair 2:	Pair 3:
Grading notes:		

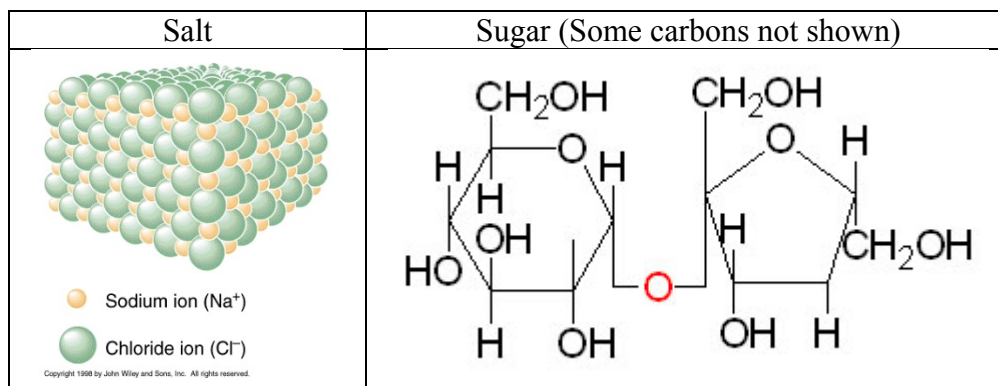
Question 4.5) Sodium and oxygen won't bond together in a 1 to 1 ratio. Why doesn't sodium just give two electrons to oxygen?	Standard	4.d
Response:		
Grading notes:		

Question 4.6) identify each compound as ionic, covalent, or metallic based on its description.	Standard	4.a
Response:		
Descriptions	Ionic, Covalent, or Metallic bond	
This compound will conduct electricity well.		
This compound has strong bonds and is very difficult to melt.		
This compound will conduct electricity when dissolved in water, but not in its solid state.		
This compound consists of only non-metals.		
This compound is a gas at room temperature		
This compound can be bent and reshaped as a solid.		
This compound exists in highly ordered crystals.		
Grading notes:		

Question 4.7) Identify each compound as ionic, covalent, or metallic based on its component elements.	Standard	4.a																																																												
Response:																																																														
<table border="1"> <thead> <tr> <th>Compound</th> <th>Type of bond</th> </tr> </thead> <tbody> <tr><td>NaCl</td><td></td></tr> <tr><td>Br₂</td><td></td></tr> <tr><td>BrF</td><td></td></tr> <tr><td>K</td><td></td></tr> <tr><td>Fe</td><td></td></tr> <tr><td>FeCr</td><td></td></tr> <tr><td>MgBr₂</td><td></td></tr> <tr><td>Au</td><td></td></tr> <tr><td>H₂</td><td></td></tr> <tr><td>H₂O</td><td></td></tr> <tr><td>SrS</td><td></td></tr> <tr><td>BaO</td><td></td></tr> <tr><td>O₂</td><td></td></tr> <tr><td>HF</td><td></td></tr> </tbody> </table>	Compound	Type of bond	NaCl		Br ₂		BrF		K		Fe		FeCr		MgBr ₂		Au		H ₂		H ₂ O		SrS		BaO		O ₂		HF		<table border="1"> <thead> <tr> <th>Compound</th> <th>Type of bond</th> </tr> </thead> <tbody> <tr><td>HI</td><td></td></tr> <tr><td>KCl</td><td></td></tr> <tr><td>AgAu</td><td></td></tr> <tr><td>K₂O</td><td></td></tr> <tr><td>Cs₃P</td><td></td></tr> <tr><td>NH₃</td><td></td></tr> <tr><td>N₂O₂</td><td></td></tr> <tr><td>Li₂O</td><td></td></tr> <tr><td>CuNi</td><td></td></tr> <tr><td>Cl₂</td><td></td></tr> <tr><td>BaS</td><td></td></tr> <tr><td>Na₂S</td><td></td></tr> <tr><td>CoCl₄</td><td></td></tr> <tr><td>BeO</td><td></td></tr> </tbody> </table>	Compound	Type of bond	HI		KCl		AgAu		K ₂ O		Cs ₃ P		NH ₃		N ₂ O ₂		Li ₂ O		CuNi		Cl ₂		BaS		Na ₂ S		CoCl ₄		BeO		
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Use the scenario below to answer questions 4.8-4.10

Donald is baking cookies for Daisy. His recipe calls for both sugar and salt, but in much different amounts. He has two identical containers that he used to keep his salt and sugar in. Unfortunately, he forgot to label which container was salt and which was sugar! Sugar has the chemical formula $C_{12}H_{22}O_{11}$, and has the structure shown below. Salt has the chemical formula $NaCl$, and has the structure shown below.



Question 4.8) Draw the lewis dot structures for all the atoms involved in this scenario. (Na, Cl, C, O, and H)

Standard

4.d

Response:

Grading notes:

Question 4.9) What type of bonding occurs in salt and what type of bonding occurs in sugar? List some likely properties for each compound.

Standard

4.a

Response:

Salt:

Sugar:

Grading notes:

Question 4.10) How could Donald test which compound is which without using his sense of taste?

Standard

4.a

Response:

Grading notes:

Question 4.11) In the ionic compound below, identify the cation and anion as shown in the first example.	Standard	4.c
Response:		
Ionic Compounds	Cation	Anion
<i>EX: BaCl₂</i>	<i>Ba²⁺</i>	<i>Cl⁻</i>
KCl		
FeCl ₃		
SrBr ₂		
K ₂ O		
BaO		
Na ₃ P		
LiCl		
MgS		
CoCl ₆		
Grading notes:		

Question 4.12) Why can't an ionic compound be composed of purely cations?	Standard	4.c
Response:		
Grading notes:		

Question 4.13) Why do metals always form cations in ionic bonds?	Standard	4.c
Response:		
Grading notes:		

Question 4.14) Diagram and explain how the bond in KCl forms.	Standard	4.c
Response:		
Grading notes:		

Question 4.19) Diagram and describe what is happening in the bond in Calcium chloride (CaCl ₂)	Standard	4.c
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Response:

	Diagram	Description (Discuss EN, electrons, any ions present, and the structure)
Before bonding		
During bonding		
After bonding		

Grading notes:

Question 4.20) Which is an ionic salt: Mg, Cl ₂ , or MgCl ₂ ? Describe two properties of an ionic salt.	Standard	4.c
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Response:

Grading notes:

Question 4.21) Jazmin is working as an engineer and is trying to choose between the three compounds to make some electrical wiring: CuZn, P ₂ S ₃ , and Na ₃ N. Which compound should she choose and why?	Standard	4.a
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Response:

Grading notes:

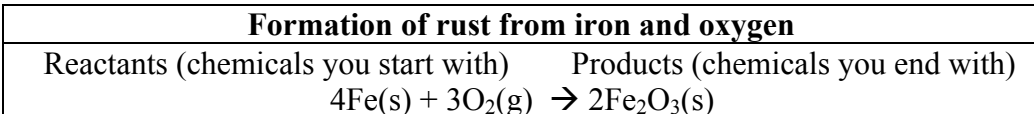
Question 4.22) Diagram a crystal lattice for an ionic solid that has lost all of its cations. Will this crystal be very stable? Why/why not?	Standard	4.c
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Response:

Grading notes:

Use the scenario below to answer questions 4.23-4.25

Rust is a big issue, especially for older cars or machinery. The iron in the metal of the cars can react with oxygen, forming rust. Because rust is porous, it allows more oxygen to get to the iron underneath, which further rusts the car. This vicious cycle continues until a car virtually falls apart. For the purposes of this scenario, assume that iron has 3 valence electrons.



Question 4.23) Fill in the table below, identifying the type of bonding in each chemical, the behavior of the electrons, and at least one property of that type of bond.	Standard	4.a	
Response:			
	Iron (Fe)	Oxygen (O ₂)	Rust (Fe ₂ O ₃)
Type of bond			
Behavior of electrons			
One likely property			
Grading notes:			

Question 4.24) Diagram and describe what is happening in the bond in rust (Fe ₂ O ₃)?	Standard	4.c
Response:		
	Diagram	Description (Discuss EN, electrons, any ions present, and the structure)
Before bonding		
During bonding		
After bonding		
Grading notes:		

Question 4.25) Why do nonmetals share electrons with each other instead of transferring electrons like in ionic bonds?	Standard	4.b, 4.e
Response:		
Grading notes:		

Question 4.26) Of the three compounds, NH ₃ , NaCl, and Au, which is most likely to be bonded together through the sharing of electrons? Explain.	Standard	4.b
Response:		
Grading notes:		

Question 4.27) Diagram and explain the bonding in H ₂ O.	Standard	4.b, 4.d, 4.e
Response:		
	Diagram	Description (Discuss EN, electrons, any ions present, and the structure)
Before bonding		
During bonding		
After bonding		
Grading notes:		

Question 4.28) Carbon can form many different types of compounds: graphite (pencil lead), diamond, buckeyballs (soccerball shaped compounds), and carbon nanotubes to name a few. What type of bonding is present in these compounds? Explain.	Standard	4.b
Response:		
Grading notes:		

Use the scenario below to answer questions 4.29-4.31

It is February and getting “cold” here in L.A. Your family may soon be turning on the gas to the radiator for some heat in the house or apartment. The gas that is burnt for heat is primarily methane gas, with the chemical composition CH_4 . When methane burns, it reacts with two oxygen molecules to form two water molecules and one carbon dioxide molecules. The process releases a lot of heat, which can be used to heat a room.

Question 4.29) Are the bonds between the elements in the combustion reaction strong or weak? Explain how you know.	Standard	4.a
Response:		
Grading notes:		

Question 4.30) Diagram and describe what is happening in the bond in methane gas.	Standard	4.b, 4.d, 4.e
Response:		
	Diagram	Description (Discuss EN, electrons, any ions present, and the structure)
Before bonding		
During bonding		
After bonding		
Grading notes:		

Question 4.31) Diagram and describe what is happening in the bond in carbon dioxide.	Standard	4.b, 4.d, 4.e
Response:		
	Diagram	Description (Discuss EN, electrons, any ions present, and the structure)
Before bonding		
During bonding		
After bonding		
Grading notes:		

Question 4.32) Why are metallic compounds malleable whereas ionic compounds are brittle?	Standard	4.a, 4.c
Response:		
Grading notes:		

Question 4.33) Each combination of electronegativities produces a characteristic bond. The highest electronegativity is 4.0 and the lowest is 0.0. Identify which type of bond will occur when atoms of the specified electronegativity bond.	Standard	4.e
Response: a) Both elements have an electronegativity of 0.9 b) One element has an electronegativity of 0.9 and the other has an electronegativity of 3.5. c) Both elements have an electronegativity of 3.5.		
Grading notes:		

Question 4.34) Rank each set of atoms from high to low ionization energy, atomic radius, and electronegativity.	Standard	3.h, 3.i
Response:		
Set 1: The Period 3 elements		
Electronegativity	Atomic Radius	Ionization Energy
Set 2: The Halogens		
Electronegativity	Atomic Radius	Ionization Energy
Set 3: Y, O, Ba, and F		
Electronegativity	Atomic Radius	Ionization Energy
Grading notes:		

Question 4.35) Metals always form positive ions. In a metallic bond, all of the metals form cations and yet they don't repel each other. Explain.	Standard	4.a
Response:		
Grading notes:		

Use the scenario below to answer questions 4.29-4.31

Electricity and electronics have revolutionized how we as people interact with our world. Jose is designing some wires for carrying electricity. He wants the main wire to conduct electricity, but then he also wants to coat the wire in a material that is an insulator, so that electricity stays in the wire. That way, the electric current only goes where the wire goes, and won't accidentally go into other conductive surfaces the wire touches. He has the two materials: copper (Cu) and isoprene (C₃H₈).

Question 4.36) Which compound should he use for the wire and which should he use for the insulation? Explain.	Standard	4.a
Response:		
Grading notes:		

Question 4.37) Diagram and describe what is happening in the bond in copper.	Standard	4.a
Diagram	Description (Discuss EN, electrons, any ions present, and the structure)	
Grading notes:		

Question 4.38) Diagram and describe what is happening in the bond in isoprene. (the skeleton structure is already diagramed, you need to diagram the electrons)	Standard	4.b
	Diagram	Description (Discuss EN, electrons, any ions present, and the structure)
Before bonding	<pre> H H C H H C C H H C C H H </pre>	
During bonding	<pre> H H C H H C C H H C C H H </pre>	
After bonding	<pre> H H C H H C C H H C C H H </pre>	
Grading notes:		