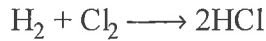


Name: \_\_\_\_\_

key

Unit 7 Practice Test: Bonding

4 1) Given the reaction:



Which of the following statements *best* describes the energy change as bonds are formed and broken in this reaction?

- 1) The breaking of the Cl—Cl bond releases energy.
- 2) The breaking of the H—H bond releases energy.
- 3) The forming of the H—Cl bond absorbs energy.
- 4) The forming of the H—Cl bond releases energy.

1 2) The electronegativity value of an element is a measure of the atoms

- 1) ability to attract electrons
- 2) ability to attract protons
- 3) degree of conductivity
- 4) degree of stability

1 3) Which electronegativity is possible for an alkali metal?

- 1) 1.0
- 2) 2.0
- 3) 3.0
- 4) 4.0

3 4) Which compound is ionic? → m to NM

- 1) HCl NM to NM
- 2) SO<sub>2</sub> NM to NM
- 3) CaCl<sub>2</sub> m to NM
- 4) N<sub>2</sub>O NM to NM

2 5) Which liquid is the *best* conductor of electricity?

- 1) H<sub>2</sub>O(l) covalent
- 2) NaOH(aq) ionic
- 3) CCl<sub>4</sub>(l) covalent
- 4) CH<sub>3</sub>OH(l) covalent

1 6) What type of bonding is found in the molecule HF?

- 1) polar covalent
- 2) nonpolar covalent
- 3) ionic
- 4) metallic

3 7) Which compound contains *both* covalent bonds and ionic bonds? → look for m w/ a PAI

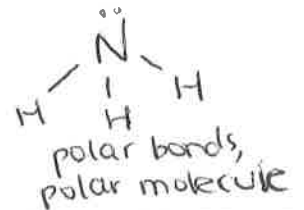
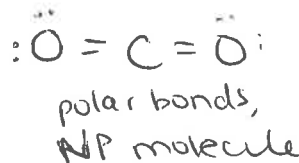
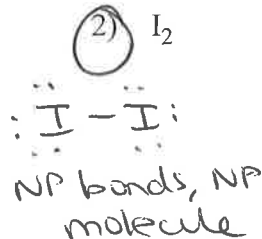
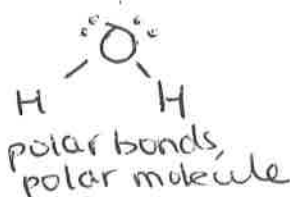
- 1) NaCl(s) ionic
- 2) HCl(g) covalent
- 3) NaNO<sub>3</sub>(s) NO<sub>3</sub><sup>-1</sup> is a PAI
- 4) N<sub>2</sub>O<sub>5</sub>(g) covalent

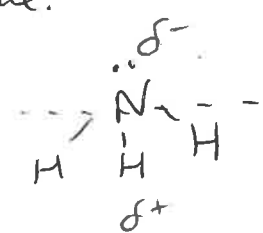
4 8) Compounds with the *greatest* ionic character would form when fluorine reacts with

- 1) metalloids (semimetals)
- 2) noble gases
- 3) Group 13 elements
- 4) alkali metals

2 9) Which of the following is a nonpolar molecule containing a nonpolar covalent bond?

- 1) H<sub>2</sub>O
- 2) I<sub>2</sub>
- 3) CO<sub>2</sub>
- 4) NH<sub>3</sub>

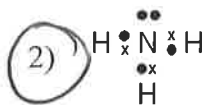


- 2 10) What type of bonds are formed when two non-metal atoms combine?  
 1) network bonds  
 2) covalent bonds  
 3) metallic bonds  
 4) ionic bonds
- 1 11) A substance was found to be a soft, nonconducting solid at room temperature. The substance is *most likely*  
 1) a molecular solid  
 2) a network solid  
 3) a metallic solid  
 4) an ionic solid
- 2 12) The *greatest* degree of ionic character would be found in a bond between sulfur and  
 1) phosphorus 2.2  
 2) oxygen 3.4  
 3) bromine 3.0  
 4) chlorine 3.2  
*→ greatest difference in electronegativity*
- 2 13) Which formula represents an ionic compound?  
 1)  $\text{NH}_3(\text{g})$   
 2)  $\text{NaCl}(\text{s})$   
 3)  $\text{H}_2\text{O}(\text{l})$   
 4)  $\text{CCl}_4(\text{l})$   
*LM to NM*
- 4 14) Which of the following is a property of network solids, but *not* of molecular solids?  
 1) water soluble  
 2) high malleability  
 3) electrical insulators  
 4) high melting points
- 3 15) Which substance will conduct electricity in *both* the solid phase and the liquid phase?  
 1)  $\text{AgCl}$   
 2)  $\text{HCl}$   
 3)  $\text{Ag}$   
 4)  $\text{H}_2$   
*metal.*
- 4 16) Why is  $\text{NH}_3$  classified as a polar molecule?  
 1)  $\text{NH}_3$  is a gas at STP.  
 2) Nitrogen and hydrogen are both nonmetals.  
 3) N—H bonds are nonpolar.  
 4)  $\text{NH}_3$  molecules have asymmetrical charge distributions.  

- 3 17) Atoms of nonmetals generally react with atoms of metals by  
 1) gaining electrons to form covalent compounds  
 2) sharing electrons to form covalent compounds  
 3) gaining electrons to form ionic compounds  
 4) sharing electrons to form ionic compounds
- 2 18) Which of the following is a molecular substance?  
 1)  $\text{KClO}_3$   
 2)  $\text{CO}_2$   
 3)  $\text{KCl}$   
 4)  $\text{CaO}$   
*→ NM to NM*  
*M to NMs*     *NM to NM*     *M to NM*     *M to NM*
- 3 19) When sodium reacts with chlorine to form sodium chloride, electrons are lost by  
 1) chlorine, only  
 2) both sodium and chlorine  
 3) sodium, only  
 4) neither sodium nor chlorine
- 1 20) When phosphorus and chlorine atoms combine to form a molecule of  $\text{PCl}_3$ , 6 electrons will be  
 1) shared unequally  
 2) shared equally  
 3) gained  
 4) lost  
*polar bonds*

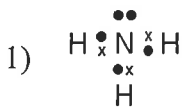
2 21) Which molecule contains a polar covalent bond?



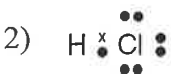
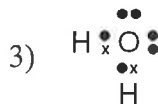
↓  
two different  
NMS



4 22) Which molecule contains a nonpolar covalent bond?



same  
two NMS



1 23) A diamond consists of covalently bonded carbon atoms. The diamond is an example of

- 1) a network solid  
2) an ionic solid

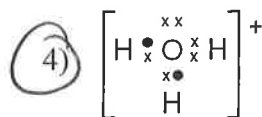
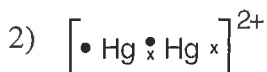
- 3) a metallic solid  
4) a molecular solid

2 24) Which factor distinguishes a metallic bond from an ionic bond or a covalent bond?

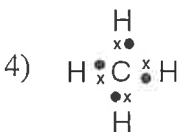
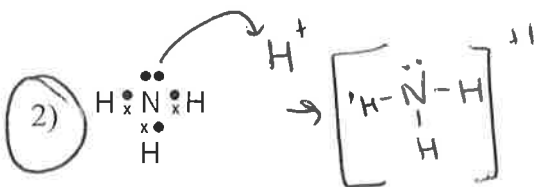
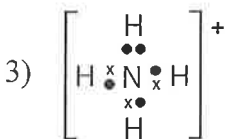
- 1) the unequal sharing of electrons  
2) the mobility of electrons

- 3) the equal sharing of electrons  
4) the mobility of protons

4 25) Which species contains a coordinate covalent bond?



2 26) Which of the following could form a coordinate covalent bond?



1 27) Which substance is a good conductor of electricity in *both* the solid and liquid phases?

- 1) a metallic substance  
2) a molecular substance  
3) an ionic substance  
4) a network substance

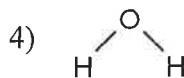
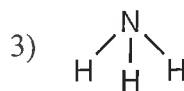
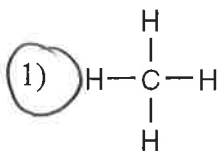
3 28) Which two compounds contain only polar molecules?

- 1) ~~CO and CO<sub>2</sub>~~ → symmetrical  
2) ~~CCl<sub>4</sub> and CH<sub>4</sub>~~ both symmetrical  
3) HCl and NH<sub>3</sub> asymmetrical  
4) HCl and Cl<sub>2</sub>  
↳ Cl<sub>2</sub> is symmetrical

2 29) Which formula represents a tetrahedral molecule?

- 1) HBr H-Br: linear  
2) CH<sub>4</sub> H-C(H)-H  
3) Br<sub>2</sub> linear  
4) CaCl<sub>2</sub> ionic

1 30) Which structural formula represents a nonpolar symmetrical molecule?



1 31) Which compound is an example of a network solid?

- 1) SiO<sub>2</sub>(s)  
2) H<sub>2</sub>O(s)  
3) CO<sub>2</sub>(s)  
4) SO<sub>2</sub>(s)

4 32) Which substance contains particles held together by metallic bonds?

- 1) Ne(s)  
2) N<sub>2</sub>(s)  
3) I<sub>2</sub>(s)  
4) Ni(s)

3 33) Which formula represents a polar molecule containing polar covalent bonds? → two different NMS

- 1) ~~NaCl~~ ionic  
2) ~~CO<sub>2</sub>~~ symmetrical  
3) H<sub>2</sub>O and asymmetrical  
4) ~~Cl<sub>2</sub>~~ NP bonds

2 34) The shape and bonding in a diatomic bromine molecule are best described as

- 1) asymmetrical and nonpolar  
2) symmetrical and nonpolar  
3) symmetrical and polar  
4) asymmetrical and polar

4 35) Which substance contains positive ions immersed in a sea of mobile electrons? metallic bonding

- 1) O<sub>2</sub>(s)  
2) SiO<sub>2</sub>(s)  
3) CuO(s)  
4) Cu(s)

1 36) Which element has a crystalline lattice composed of positive ions through which electrons flow freely?

- 1) calcium  
2) sulfur  
3) carbon  
4) bromine
- metallic bonding

Questions 37 through 39 refer to the following:

In the laboratory, a student compares the properties of two unknown solids. The results of his experiment are reported in the data table below.

	Substance A	Substance B
Melting Point	low	high
Solubility in Water	nearly insoluble	soluble
Hardness	soft, waxy crystals	hard crystals
Electrical Conductivity	poor conductor in both solid and aqueous states	poor conductor in the solid state, but good conductor in the aqueous state

\_\_\_ 37) Predict the type of bonding in substance A.

covalent

\_\_\_ 38) Predict the type of bonding in substance B.

ionic

\_\_\_ 39) Explain why substance A is a poor conductor of electricity, but substance B is a good conductor in the aqueous state.

A is a poor conductor of electricity because it contains covalent bonds and thus it cannot produce mobile ions. However, B is a good conductor in the aqueous state because it is made up of ionic bonds, and thus produces mobile ions in solution.

Questions 40 through 42 refer to the following:

Given the binary compound formed from magnesium and chlorine:

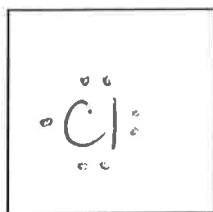
\_\_\_ 40) What type of bond forms between magnesium and chlorine? [Give one reason to support your answer.]

ionic, because it is a bond between a metal and a non-metal.

\_\_\_ 41) In the boxes below, draw the Lewis electron-dot diagrams for the elements Mg and Cl.

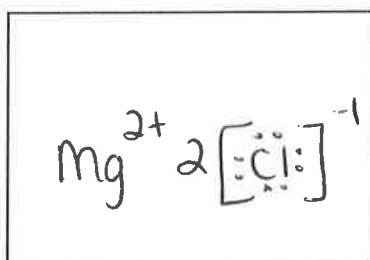


magnesium

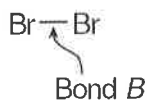
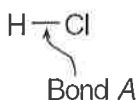


chlorine

\_\_\_ 42) In the box below, draw the Lewis electron-dot structure for the compound formed from magnesium and chlorine. [Include any charges or partial charges.]



\_\_\_ 43)



State *one* way in which bond *A* and bond *B* are the same and *one* way in which they are different.

Similarity: Bond A and B are similar because both are covalent bonds (NM to NM)

Difference: Bond A is a polar bond while Bond B is a non-polar bond.