

1. Given the balanced equation representing a reaction:



What occurs during this change?

- A) Energy is absorbed and a bond is broken.
B) Energy is absorbed and a bond is formed.
C) Energy is released and a bond is broken.
D) Energy is released and a bond is formed.
2. A chemical bond results when two nuclei have a simultaneous attraction for
- A) nucleons B) protons
C) neutrons D) electrons
3. Given the Lewis electron-dot diagram:
- ```
 H
 |
H : C : H
 |
 H
```
- Which electrons are represented by all of the dots?
- A) the carbon valence electrons, only  
B) the hydrogen valence electrons, only  
C) the carbon and hydrogen valence electrons  
D) all of the carbon and hydrogen electrons
4. An element with an electronegativity of 0.9 bonds with an element with an electronegativity of 3.1. Which phrase best describes the bond between these elements?
- A) mostly ionic in character and formed between two nonmetals  
B) mostly ionic in character and formed between a metal and a nonmetal  
C) mostly covalent in character and formed between two nonmetal  
D) mostly covalent in character and formed between a metal and a nonmetal
5. In which compound do the atoms have the greatest difference in electronegativity?
- A) NaBr    B) AlCl<sub>3</sub>    C) KF    D) LiI
6. Which element is most likely to form a compound with krypton?
- A) fluorine                      B) chlorine  
C) bromine                      D) iodine
7. Which substance contains bonds that involved the transfer of electrons from one atom to another?
- A) CO<sub>2</sub>    B) NH<sub>3</sub>    C) KBr    D) Cl<sub>2</sub>

8. Which type of bond is found in sodium bromide?

A) covalent                      B) hydrogen  
C) ionic                          D) metallic

9. Which formula correctly represents the compound calcium hydroxide?

A) CaOH                          B) Ca<sub>2</sub>OH  
C) CaOH<sub>2</sub>                      D) Ca(OH)<sub>2</sub>

10. As sodium reacts with fluorine to form the compound NaF, each sodium atom will

A) gain 1 electron              B) gain 2 electrons  
C) lose 1 electron              D) lose 2 electrons

11. Which substance is an electrolyte?

A) CH<sub>3</sub>OH                      B) C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>  
C) H<sub>2</sub>O                            D) KOH

## Do Now Unit 5 Chemical Bonding

12. The data table below represents the properties determined by the analysis of substances *A*, *B*, *C*, and *D*.

| Substance | Melting Point ( $^{\circ}\text{C}$ ) | Boiling Point ( $^{\circ}\text{C}$ ) | Conductivity |
|-----------|--------------------------------------|--------------------------------------|--------------|
| <i>A</i>  | -80                                  | -20                                  | none         |
| <i>B</i>  | 20                                   | 190                                  | none         |
| <i>C</i>  | 320                                  | 770                                  | as solid     |
| <i>D</i>  | 800                                  | 1250                                 | in solution  |

Which substance is an ionic compound?

- A) *A*                      B) *B*                      C) *C*                      D) *D*

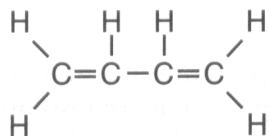
13. A characteristic of ionic solids is that they

- A) have high melting points  
 B) have low boiling points  
 C) conduct electricity  
 D) are non-crystalline

14. Which substance contains metallic bonds?

- A) Hg(*l*)                      B) H<sub>2</sub>O(*l*)  
 C) NaCl(*s*)                      D) C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>(*s*)

15. Given the formula of a substance:



What is the total number of shared electrons in a molecule of this substance?

- A) 22    B) 11    C) 9    D) 6

16. Which two substances are covalent compounds?

- A) C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>(*s*) and KI(*s*)  
 B) C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>(*s*) and HCl(*g*)  
 C) KI(*s*) and NaCl(*s*)  
 D) NaCl(*s*) and HCl(*g*)

17. The bonds in the compound MgSO<sub>4</sub> can be described as

- A) ionic, only  
 B) covalent, only  
 C) both ionic and covalent  
 D) neither ionic nor covalent

18. Which element has atoms that can form single, double, and triple covalent bonds with other atoms of the same element?

- A) hydrogen                      B) oxygen  
 C) fluorine                      D) carbon

19. A substance was found to be a soft, non-conducting solid at room temperature. The substance is most likely

- A) a molecular solid    B) a network solid  
 C) a metallic solid    D) an ionic solid

20. Which characteristic is a property of molecular substances?

- A) good heat conductivity  
 B) good electrical conductivity  
 C) low melting point  
 D) high melting point

21. Which type of bonding involves positive ions immersed in a sea of mobile electrons?

- A) ionic                      B) nonpolar covalent  
 C) polar covalent                      D) metallic

22. Which formula represents a nonpolar molecule containing polar covalent bonds?

- A) H<sub>2</sub>O    B) CCl<sub>4</sub>    C) NH<sub>3</sub>    D) H<sub>2</sub>

23. The degree of polarity of a chemical bond in a molecule of a compound can be predicted by determining the difference in the

- A) melting points of the elements in the compound  
 B) densities of the elements in the compound  
 C) electronegativities of the bonded atoms in a molecule of the compound  
 D) atomic masses of the bonded atoms in a molecule of the compound

## Do Now Unit 5 Chemical Bonding

24. At STP, fluorine is a gas and iodine is a solid. This observation can be explained by the fact that fluorine has
- weaker intermolecular forces of attraction than iodine
  - stronger intermolecular forces of attraction than iodine
  - lower average kinetic energy than iodine
  - higher average kinetic energy than iodine

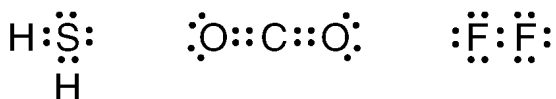
25. Which statement best explains why a CH<sub>4</sub> molecule is nonpolar?

- C and H are nonmetals.
- C and H have the same electronegativity.
- CH<sub>4</sub> has a symmetrical charge distribution.
- CH<sub>4</sub> is a gas at room temperature.

26. Which two compounds contain only polar bonds?

- CCl<sub>4</sub> and CH<sub>4</sub>
- HCl and Cl<sub>2</sub>
- HCl and NH<sub>3</sub>
- CO and O<sub>2</sub>

Base your answers to questions **27** and **28** on your knowledge of chemical bonding and on the Lewis electron-dot diagrams of H<sub>2</sub>S, CO<sub>2</sub>, and F<sub>2</sub> below.



27. Which atom, when bonded as shown, has the same electron configuration as an atom of argon?

28. Explain, in terms of structure and/or distribution of charge, why CO<sub>2</sub> is a nonpolar molecule.

29. Base your answer to the following question on the table below.

Physical Properties of Four Gases

| Name of Gas                | hydrogen | hydrogen chloride | hydrogen bromide | hydrogen iodide |
|----------------------------|----------|-------------------|------------------|-----------------|
| Molecular Structure        | H-H      | H-Cl              | H-Br             | H-I             |
| Boiling Point (K) at 1 Atm | 20.      | 188               | 207              | 237             |
| Density (g/L) at STP       | 0.0899   | 1.64              | ?                | 5.66            |

Explain, in terms of intermolecular forces, why hydrogen has a *lower* boiling point than hydrogen bromide.

30. Base your answer to the following question on the information below.

Each molecule listed below is formed by sharing electrons between atoms when the atoms within the molecule are bonded together.

Molecule *A*: Cl<sub>2</sub> Molecule *B*: CCl<sub>4</sub> Molecule *C*: NH<sub>3</sub>

Explain how the bonding in KCl is different from the bonding in molecules *A*, *B*, and *C*.