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B. Two.
C. Three.
D. Five.
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B. that would result in a positive ion.
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Magnesium ions carry a 2+ charge, and chloride ions carry a 1– charge. What is the chemical formula for the ionic compound magnesium chloride?

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B. Mg₂Cl
C. MgCl₂
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A. has only one shell of electrons.
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An atom loses an electron to another atom. Is this an example of a physical or a chemical change?

A. Physical change involving the formation of negative ions.
B. Chemical change involving the formation of negative ions.
C. Physical change involving the formation of positive ions.
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An atom loses an electron to another atom. Is this an example of a physical or a chemical change?

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Classify the following bond as ionic, covalent, or metallic (Na, atomic number 11; Cl, atomic number 17)

Na with Cl    Na with Na    Cl with Cl

A. metallic, covalent, covalent
B. ionic, metallic, covalent
C. ionic, ionic, covalent
D. covalent, metallic, ionic
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- Na with Na
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B. ionic, metallic, covalent
C. ionic, ionic, covalent
D. covalent, metallic, ionic
In terms of the periodic table, is there an abrupt or gradual change between ionic and covalent bonds?

A. An abrupt change that occurs across the metalloids.
B. Actually, any element of the periodic table can form a covalent bond.
C. There is a gradual change: the farther apart, the more ionic.
D. Whether an element forms one or the other depends on nuclear charge and not the relative positions in the periodic table.
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Which bond is most polar?

A.  H-N  
B.  N-C  
C.  C-C  
D.  O-H
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B. N-C
C. C-C
D. O-H
Hydrogen chloride, HCl, is a gas at room temperature. Would you expect this material to be very soluble or not very soluble in water?

A. HCl is very soluble in water by virtue of the dipole/dipole attractions occurring between the HCl and H₂O molecules.

B. It is not very soluble because it is a gas, and all gases have very low solubility in water at room temperature.

C. HCl is very soluble in water, because it is such a small molecule, there is little electrical attraction to other HCl molecules.

D. It is not very soluble, because as a gas with low density, it floats to the surface of the water and then into the surrounding atmosphere.
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Atoms of metallic elements can form ionic bonds, but they are not very good at forming covalent bonds. Why?

A. These atoms are too large to be able to come in close contact with other atoms.

B. They have a great tendency to lose electrons.

C. They are on the wrong side of the periodic table.

D. Their valence shells are already filled with electrons.
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How many electrons are used to draw the electron-dot structure for hydrogen peroxide, a covalent compound with the formula \( \text{H}_2\text{O}_2 \)?

A. 14  
B. 8  
C. 7  
D. 4
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[There are two electrons per bond]
The source of an atom’s electronegativity is the

A. kinetic energy which electrons orbiting the nucleus have.

B. repulsive force occurring among electrons within the same shell.

C. repulsive force occurring between electrons within neighboring shells.

D. effective nuclear charge.
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Two molecules, A and B, have very different physical properties. A and B do not mix. Molecule A boils at 80°C and freezes at –30°C. Molecule B boils at 35°C and freezes at –100°C. Which molecule is likely to have the largest dipole?

A. Molecule A
B. Molecule B
C. Not enough information was given.
D. Both have similar dipoles.
E. Molecule A and molecule B are the same, but each has different properties.
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E. Molecule A and molecule B are the same, but each has different properties.
Magnesium chloride, MgCl\textsubscript{2}, crystals are composed of

A. a two-dimensional array of [-Mg-Cl-Cl-] units.

B. a multitude of Mg\textsuperscript{2+} ions and Cl\textsuperscript{-} ions grouped together in a three-dimensional array with a 1:2 ratio of Mg\textsuperscript{2+} to Cl\textsuperscript{-}.

C. units of MgCl\textsubscript{2} molecules held together by dipole interactions.

D. groups of Mg\textsuperscript{2+} ions and Cl\textsubscript{2} molecules.
Magnesium chloride, MgCl₂, crystals are composed of

A. a two-dimensional array of [-Mg-Cl-Cl-] units.

B. a multitude of Mg²⁺ ions and Cl⁻ ions grouped together in a three-dimensional array with a 1:2 ratio of Mg²⁺ to Cl⁻.

C. units of MgCl₂ molecules held together by dipole interactions.

D. groups of Mg²⁺ ions and Cl₂ molecules.
When nitrogen and fluorine combine to form a *molecule*, the most likely chemical formula is

A. N$_3$F
B. N$_2$F
C. NF$_4$
D. NF
E. NF$_3$
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A. $\text{N}_3\text{F}$
B. $\text{N}_2\text{F}$
C. $\text{NF}_4$
D. $\text{NF}$
E. $\text{NF}_3$
The charges with sodium chloride are all balanced—for every positive sodium ion, there is a corresponding negative chloride ion. Because its charges are balanced, how can sodium chloride be attracted to water, and vice versa?

A. This is not a matter of attraction. Sodium chloride dissolves in water, because water provides a medium in which the individual sodium and chloride ions can disperse.

B. Dispersion forces come into play as the sodium chloride and water come into close proximity.

C. Hydrogen bonding in water allows the sodium chloride molecule to be attracted to the water molecule.

D. As a water molecule gets close to the sodium chloride, it can distinguish the various ions. It is thus attracted to an individual ion by ion–dipole forces.
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Why are ion–dipole attractions stronger than dipole–dipole attractions?

A. The chemical bond in an ion–dipole molecule is similar to a covalent bond.

B. Like charge (dipole) does not attract like charge (another dipole).

C. Dipole areas are subject to changing from positive to negative regions on the molecule.

D. The magnitude of the electric charge associated with an ion is much greater.
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Which of the following compounds might best help to make water and gasoline mix into a single liquid phase?

A. The molecule in the middle—because when the salts mix into the water, it will help separate the water and decrease the attraction for itself.

B. The molecule on the far left—because the O-H bond is polar, and the carbon and hydrogen bonds are nonpolar.

C. The molecule on the right will form attractions with the polar ends of the water, allowing the gasoline a chance to mix with the water.

D. All of these molecules would be equally effective at increasing the mixing of gasoline and water.
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D. All of these molecules would be equally effective at increasing the mixing of gasoline and water.
Which of the following intermolecular forces best describes why nonpolar molecules like gasoline (C₈H₁₈) have only limited solubility in water?

A. Dipole–dipole.
B. Induced dipole–induced dipole.
C. Ion-dipole.
D. Dipole–induced dipole.
Which of the following intermolecular forces best describes why nonpolar molecules like gasoline \((\text{C}_8\text{H}_{18})\) have only limited solubility in water?

A. Dipole–dipole.

B. Induced dipole–induced dipole.

C. Ion-dipole.

D. Dipole–induced dipole.

Explanation:
The strong dipole-dipole attractions among water molecules keep the water molecules from interacting significantly with the nonpolar gasoline molecules.
Which of the following substances should be most soluble in hexane, $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$?

A. $\text{I}_2$
B. $\text{CH}_3\text{CH}_2\text{OH}$
C. $\text{H}_2\text{O}$
D. HF
E. NaCl
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A. I\(_2\)
B. CH\(_3\)CH\(_2\)OH
C. H\(_2\)O
D. HF
E. NaCl