

- (c) The O₂-Fe bond can be readily broken, depending on whether oxygen needs to be picked up or released to tissue cells. The ability of hemoglobin to bind to oxygen depends on the partial pressure of O₂ in the surrounding air or water, and on temperature, pH, and CO₂ levels. The affinity of hemoglobin for oxygen decreases if temperature increases, pH decreases, or CO₂ levels increase.

Make a Summary

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1. Table 1: Forces Acting Between Entities

Force or bond	Central entity	Surrounding entities
covalent	central atom	surrounding atoms
covalent network	nonmetal or semi-metal atom	all surrounding nonmetal atoms
dipole-dipole	positive end of one polar molecule	negative end of another polar molecule
hydrogen	hydrogen atom nucleus (proton) bonded to a F, N, or O atom of one molecule	pair of electrons on F, O, or N atom on another molecule
ionic	cation	anion
London	nucleus of atom in one molecule	electrons in surrounding molecules
metallic	cation of a metal	electrons of surrounding cations in same metal

2. Table 2: Summary of Properties of Substances

Substance	Hardness	Melting point	Electrical conductivity		
			Solid	Liquid	Solution
molecular	low	low	none	none	none
ionic	high	high	none	high	high
covalent network	high	high	none	none	none
metallic	variable	high	high	high	—

- When atoms collide, bonding electrons may be shared if their electronegativities are equal or relatively close, or bonding electrons may be transferred if their electronegativities are significantly different.
 - The shape of a molecule affects physical properties such as melting point and boiling point. This effect is primarily due to the effect of shape on intermolecular forces. The shape of a molecule would also affect how the molecule reacts. We know that the shape of protein molecules (e.g., enzymes) directly impacts the function of these proteins. If there is any change in shape of a protein molecule, the protein molecule will no longer function properly.
 - The bonding between entities of a substance largely controls the physical and chemical properties of that substance. Different entities form different types of intramolecular and intermolecular bonds. For example, sodium and chlorine combine to form sodium chloride held together by ionic bonding. A group of sodium chloride ions will form a lattice structure that provides additional strength to the molecules of sodium chloride. This lattice structure helps explain why sodium chloride has a high melting point.
 - For C₂H₅OH(l) and CH₃OCH₃(l), the differences in physical properties can be explained by intermolecular forces. These molecules are isoelectronic (same London forces) and both are polar. However, C₂H₅OH(l) will have hydrogen bonding forces between its molecules, significantly affecting various physical properties.

Both SiO₂(s) and CO₂(s) appear to be molecular, but SiO₂(s) is a covalent network solid with a 3-D arrangement of covalent bonds within the sample. This covalent bonding throughout the sample greatly affects the physical properties. On the other hand,

CO₂(s) has only weak London forces between its molecules, making this a gas under normal conditions.

UNIT 1 REVIEW

Part 1

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- 2, 1, 4, 3
- C
- D
- A
- C
- C
- 2, 1, 4, 3
- A
- B
- D
- C
- B
- B
- A
- D

Part 2

(Pages 138–141)

- PCl₅. Instead of one lone pair and three bonding electrons, each of the five electrons in phosphorus bonds with a chlorine atom.
- PCl₅ is a solid because the London forces are stronger due to the increased number of electrons on each molecule.
- HCl(aq)
- PCl₃ has a trigonal pyramidal shape.
- Chemical reactivity increases with increasing atomic sizes in Groups 1 and 2.
 - Chemical reactivity decreases with increasing atomic sizes in Groups 16 and 17.
 - Chemical reactivity decreases and then increases from left to right along Period 3.
 - Chemical reactivity does not vary significantly within Group 18.
- Electronegativity generally decreases as you go down a group.
 - Electronegativity generally increases from left to right along periods.
- Metals react with nonmetals to form ionic compounds. Nonmetals react with other nonmetals to form molecular compounds.
- eight
- The electronegativities of the main group metals are lower than the electronegativities of the main group nonmetals.
- $:\ddot{\text{N}}\text{e}:$ 4 lone pairs, 0 bonding electrons
 - $\cdot\ddot{\text{Al}}\cdot$ 0 lone pairs, 3 bonding electrons
 - $\cdot\ddot{\text{Ge}}\cdot$ 0 lone pairs, 4 bonding electrons