

Short Notes on Intermolecular Forces Worksheet

Name: _____

Period: _____

1st strong; Pol NP; IMF

1. List the types of intermolecular forces present in:

a. N_2 C, NP, LDF

b. H_2O H-bonding

c. H_2S

d. $CuCl_2$ - Ionic - electrostatic

2. List the intermolecular forces present in:

a. CH_4 C, NP, LDF

b. CH_3Cl Polar Dipole-Dipole

c. carbon-diamond or graphite

network solid
LDF

d. H_2 NP
LDF

3. Which should have a higher melting point, CCl_3F or KCl ? Why? 1st list shape, 2nd IMF, 3rd strongest IMF (that will answer the why?)

Covalent v.s. Ionic Electrostatic attraction stronger

4. Arrange in order of increasing (from lowest to highest) boiling points: Br_2 , KCl , Cl_2 . Explain the order.

Cl_2 Br_2 KCl

5. For each of the following pairs of molecular substances, choose the one with a higher boiling point and then explain why that substance has a higher boiling point. 1st list shape, 2nd IMF, 3rd strongest IMF

a. HF or HCl Hydrogen bonding

b. O_2 or S_8 same IMF S_8 has higher mass

c. SiH_4 or PH_3 Dipole Dipole (SiH_4 - NP)

d. CH_4 or C_2H_6 C_2H_6 has same IMF (LDF) but higher mass

6. Explain in terms of structure why?: 1st list shape, 2nd IMF, 3rd strongest IMF

a. $NaCl$ has a higher melting point than ICl

Ionic Electrostatic

b. SiO_2 has a higher melting point than CO_2

Both NP LDF SiO_2 higher mass

c. H_2O has a higher boiling point than H_2S

Hydrogen bonding

7. Explain in your own words the difference between:

a. polar covalent bonds and dipole forces

Intramolecular Bonds vs Intermolecular

b. ionic bonding and covalent bonding

ionic e^- transfer to form ions v.s. covalent share e^-

c. Ionic bonding and metallic bonding

Ionic transfer e^- ; metallic share all electrons with the metal cations

8. Indicate where a hydrogen bond exists in the following diagram of water:

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9. Rank the following from strongest to weakest intermolecular forces: Cl_2 , CH_4 , BF_3 , SCl_2 , CO_2
 1st list shape, 2nd IMF, 3rd strongest IMF

NP NP NP P NP
 71 16 68 44

SCl_2 , Cl_2 , BF_3 , CO_2 , CH_4
 Di-Di LDF

10. Which of the following compounds are likely to dissolve in water?

- Polar a) SCl_2 $\text{Cl}^{\delta-} \text{S}^{\delta+} \text{Cl}$
 Polar b) O_2
 Polar c) NaCl
 Polar d) CO_2
 Polar e) PH_3

P find P

11. Which of the following will dissolve in C_6H_{14} (hexane)?

- a) SCl_2
 b) O_2 — NP
 c) NaCl
 d) CO_2 — NP
 e) PH_3

Find NP

12 What is the force of attraction between molecules of the following substances?

- | | |
|--|--|
| a. PCl_3 Di-Di Polar | e. HCl Polar DiPole Dipole |
| b. NiCl_2 Ionic Electrostatic | f. CH_3OH Polar Hydrogen Bonding |
| c. I_2 LDF NP | g. H_3PO_4 Polar " |
| d. HF Polar Hydrogen Bonding | i. BF_3 NonPolar LDF |