

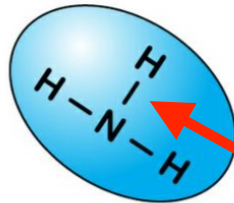
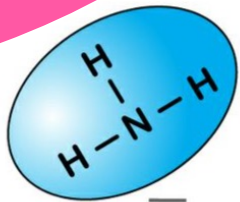
What determines whether a substance will be a solid, liquid, or gas?

The attractive forces between its particles

For covalent compounds these forces are called...

Intermolecular Forces

Draw this diagram!

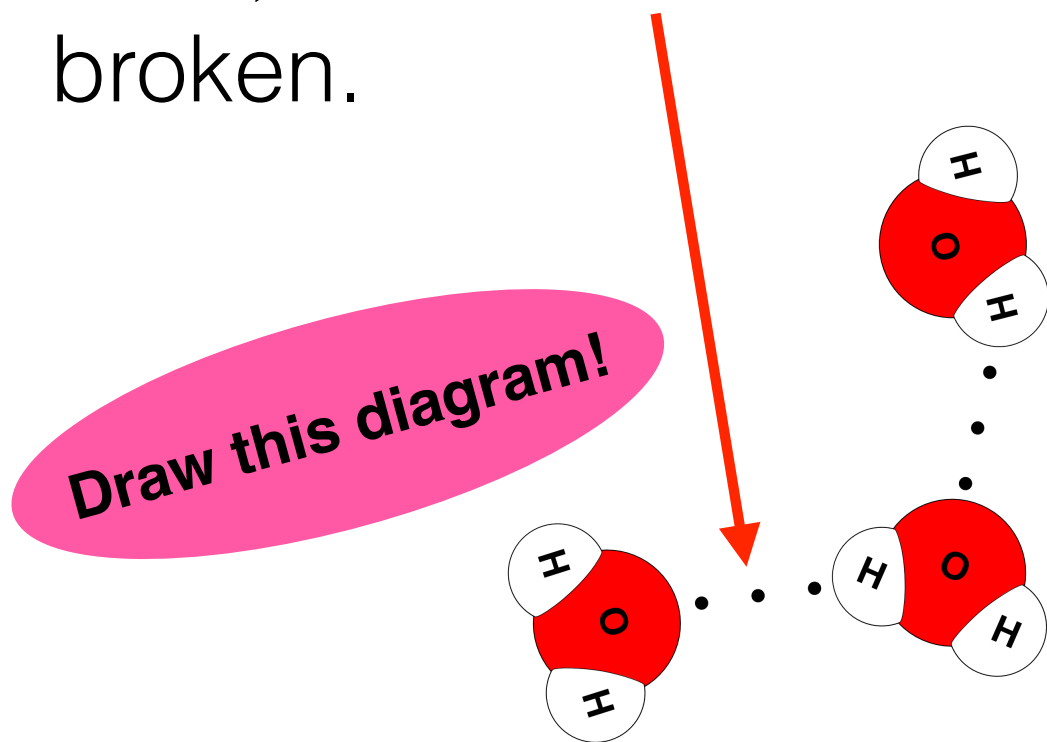


Intermolecular Forces: The attractive forces that exist *between molecules*. (weak)

Covalent Bonds: Sharing of electrons that exist *between atoms*. (strong)

Boiling and Melting Points

When a molecular compound melts or boils, *intermolecular forces* are being broken.



Types of Intermolecular Forces (in order of increasing strength)

1. Dispersion Forces (weakest)
2. Dipole-Dipole Forces
3. Hydrogen Bonds (strongest)

1. Dispersion Forces

(London Dispersion Forces)

Attraction between *nonpolar* molecules

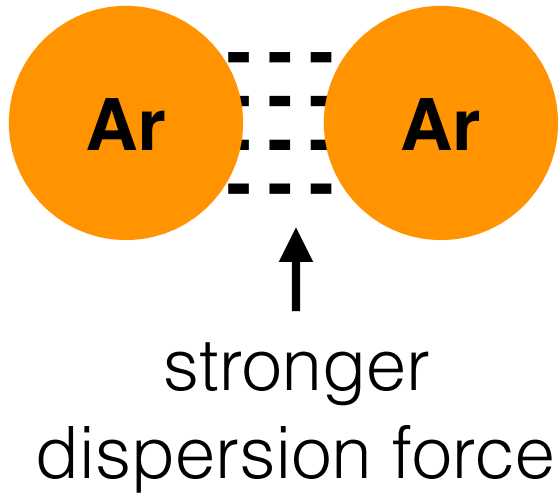
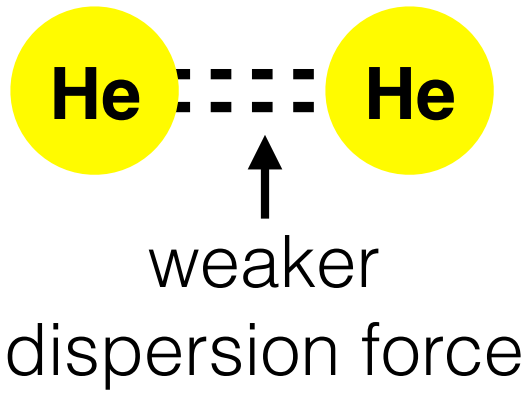
Weakest intermolecular force resulting from momentary shifting of e^- from one side of a molecule to another (temporary/induced dipole)

1. Dispersion Forces

Ex: I_2

**To be completed in class!
(leave 2-3 lines below)**

Draw this diagram!



Larger Atoms or Molecules =
Greater Dispersion Force =
Higher Boiling and Melting Points

2. Dipole-Dipole Forces

Attraction between *polar* molecules

2. Dipole-Dipole Forces

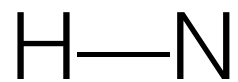
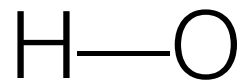
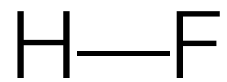
Ex: HCl

To be completed in class!
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3. Hydrogen Bonds

Strongest dipole-dipole attraction

Occurs between molecules that have H bonded to very electronegative atoms:



**H is on
the
FON**

3. Hydrogen Bonds

Ex: H₂O

**To be completed in class!
(leave 2-3 lines below)**

Hydrogen bonds are also what hold the two nucleotide strands together in a DNA molecule.

Is the molecule polar or nonpolar?

nonpolar

polar

**Dispersion
forces**

**Are there any
F–H
O–H
N–H
bonds?**

no

yes

**Dipole-dipole
forces**

Hydrogen bonding

Draw this diagram!

Increasing strength (Higher boiling point)