

Name: Key
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Chemistry 11
SOLUTION CHEMISTRY
THE POLARITY OF MOLECULES

THERE ARE TWO CLASSIFICATIONS FOR BONDING:

1. INTRA-MOLECULAR BONDING (Between atoms WITHIN a molecule)

IONIC- the force that holds a metal + non-metal together
 (transfer of e⁻)

COVALENT- the force that holds non-metals together
 (sharing of e⁻)

2. INTER-MOLECULAR BONDING (Between atoms in DIFFERENT molecules)

DIPOLE-DIPOLE FORCE- The force that forms between atoms of differing electronegativities (hold polar molecules)

HYDROGEN BOND- a special dipole-dipole force between molecules that contain H and one of N, O + F

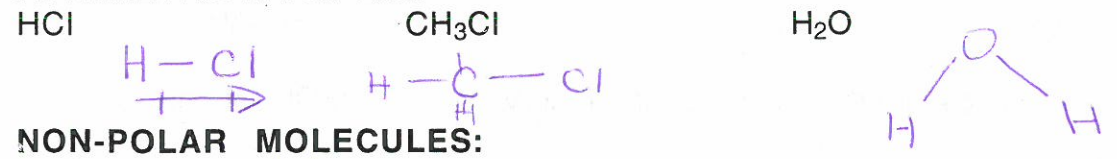
LONDON FORCES- exist in all molecules, however are the only force holding non-polar molecules together.

FOR IDENTIFYING THE TYPE OF INTER-MOLECULAR BONDING YOU MUST BE ABLE TO CLASSIFY A MOLECULE AS EITHER POLAR OR NON-POLAR:

POLAR MOLECULES:

1. contain a dipole (electrons of differing electronegativity)
 2. are asymmetric (lack a mirror image)
- Imp: → we live in a 3-d (not a 2-d) world.

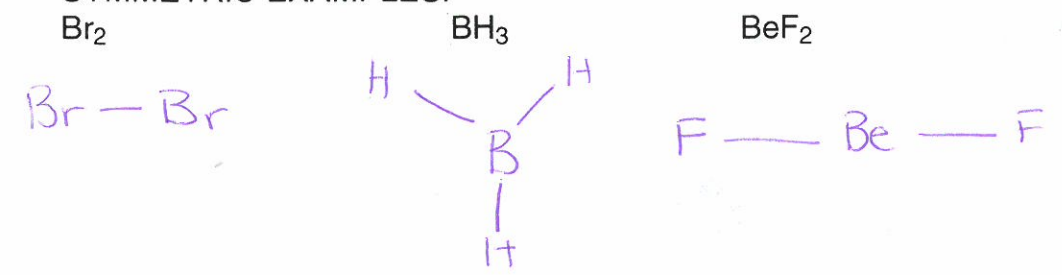
ASYMMETRIC EXAMPLES:



NON-POLAR MOLECULES:

1. can contain
2. are symmetric (have a mirror image)

SYMMETRIC EXAMPLES:



DIPOLE-DIPOLE BOND: arise because of a permanent dipole of one molecule is attracted to the opposite charge of the permanent dipole of another molecule
→ HOLDS POLAR molecules together in solution

HYDROGEN BOND: are a specialized dipole-dipole bond between molecules that contain hydrogen and one (or more) of N, O or F.
→ this is a very important biological bond

LONDON FORCE: the result of temporary dipoles that are created as electrons move in molecules. The temp. positive end of one molecule is attracted to the temp. negative end of another molecule
→ HOLDS TOGETHER ALL molecules H/E is most important for NON-POLAR molecules

RELATIVE STRENGTHS OF BONDS:

IONIC = COVALENT >>> H-BOND > DIPOLE/DIPOLE >>> LONDON FORCES

PROCESS OF SOLVATION "like dissolves like"

In general (however there are exceptions)

POLAR solutes are SOLUBLE in POLAR solvents.

NON-POLAR solutes are SOLUBLE in NON-POLAR solvents.

POLAR solutes are INSOLUBLE in NON-POLAR solvents

HOWEVER, NON-POLAR solutes are ONLY SOMEWHAT INSOLUBLE in POLAR solvents!!!!

---this exception has to do with the fact that all substances (polar and non-polar) are held together by LONDON FORCES. NON-POLAR solutes are ONLY held together by these weak forces and the STRONGER POLAR forces can overcome the weaker forces and allow the NON-POLAR to dissolve.