PChem Unit 3 Cheat Sheet

by NoelleEvelyn via cheatography.com/168075/cs/45270/

Intermolecular forces vs Intramolecular forces

Intermolecular Forces	Between macromolecules
Intramolecular Forces	happen within

IMFs to explain membranes

Hydrophilic heads	in water (polar)
Hydrophobic tails	away from water (nonpolar)

Electroneg. diff. vs bond polarity -> ions

The larger the electronegativity difference, the more polar the bond

When electroneg. greater than 2	bonding e spend most time close to nometals, ionic bond instead of shared e covalent bond

Predicts behavior protein in solvents

Side with most compatible IMFs w/solvent	will be on outside if dissolves (polar)
Oils (hydrocarbons)	opposite water (nonpolar)

PP polymer to degree cross linking chains

Additives (alter properties)	Substances added to polymeric materials
Cross-linking	2 or more molecules together with covalent bond or connecting with ionic
Physical properties	highly increased by degree cross-linking
Low degree cross-linking	More flexible, more soluble
High degree cross-linking	more rigid, higher mp, bp

Predict charges Polyatomic ions

Polyatomic ions	Ionic compounds
ions in lattice	Molecular ions (seceral atoms covalently bonded)

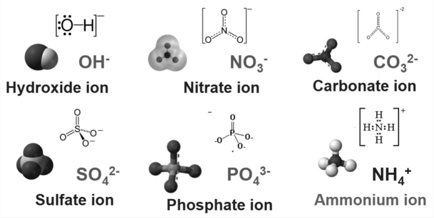
OH- NO3- CO3,2-, SO42-, PO43-, NH4+

Charges balance out

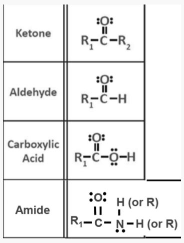
Identify monomers to form Polymers

Monomers	building blocks of polymers
Addition formation	link up amide formation combining carboxylic acide + amine = amine to N
Type of polymerization	impacts final structure

Ionic compound nomenclature



Common Functional groups



Unit cell

Repeating units that build the crystal lattice

Strength + #C influence mixing

A mixture will only mix if it meets atleast one of the two criteria	
1.	Mixed version has more configurations
2.	Mixed version has lower Ep (thermodynamics)
Exothermic reactions desired	Loose energy, don't require energy to occur
Temperature can impact	
Bottom right on PEC diagram	

Polarizability and Molecular Geometry impacts IMFs

Larger	More dispersion, because more space for IMFs interactions
Distertion from polarizability (e cloud disterted by external electric field)	causes temporary dipoles that induce dispersion forces.
Polarizability increases	Dispersion increases

PP. Ionic compounds vs elctrostatic interactions

Ionic compounds tend to be solids with high melting and boiling points, becasue ion-ion electrostatic forces are strong

Size cat. +an. periodic trends, coulumbs law

Cations	Smaller because they loose elctrongs
Anions	Large because gain electrons
If isoelectric ions (all same e configuration)	greatest protons has greatest charge and lowest melting point because smaller radius because e pulled closer
Coulumb's law	F=q1q2/r2

Dispersion

Dispersion	IMFs that area always present
	Induced dipoles
	major contributor to IMFs
Relationships	
Larger	More dispersion
Higher bp and mp	More dispersion
More polarizable	Stronger dispersion

Hydrogen bonding

Definition	Hydrogen atoms covalently bonded to NOF

These bonds have a large electronegativity difference which creates large bond dipoles and large partial charges.

e defficient hydrogen in one molecule gets close with e rich NOF in another

Stronger electrostatic interactions are more likely

Dipole-Dipole Forces

Only occur in polar molecules

Permanent dipole

Definition	Polar molecules have opposite parellel charges, Opposite partial charges interacting with partial charges of other molecules create dipole diploe forces

Predictions of solubility

Soluble if	charge is less than 4
Large radius	More soluble

Electrostatic interactions vs atomic structure

Strucute of ionic compounds maximumizes electrostatic attraction with overall charge neutrality

Solid close together

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Strong, weak electrolytes

Strong electrolytes	Soluble, Charges less than 4, atoms move more freely, conducts electricity
Weak electrolytes	Slightly or nonsoluble, dont conduct electricity, charges greater than 4

Charge neutraity -> formula ionic compounds

Charges =0	
cross multiply	reduce

Features ionic comp. influence solubility

If product of charges greater than 4	Insoluble
The large the ion	more soluble b/c weaker IMFs

Ionic charge vs period. trend e config.

Electronegativity	Increases to top right
E- nuclear attration	increases to top right
Cations	Smaller that og, b/c loose e-
Anions	Large than o.g, b/c gain e-
Charge ions acquire when they react	determined by e configuration driven by stability of full outer shell
electrons go from	metal to nonmetal

IMFs to explain protein structure

Protein	Natural polymer by combo of smaller molecules (monomers)
Primary structure	Unique sequence amino acids
Secondary structure	Localized folding proteins
Tertiary	3D strucute of a peptide chain formed by interactions between R-groups

Strength of IMFs explain protein folding

Protein folding is determinded by strength of IMFs.	
Polar folds	toward water
Intermolecular interactions with H2O and Intramolecular interactions between amino acid residues	folding into structural confirmation that is most energetically stable in the environment
Intra	specific chain folding
Looks for like places to bond to	
Strong stabilizes	

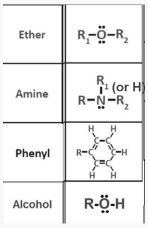
Properties by chain length, branching

Chain length and branching impact chain shape and interactions	
Longer	More density, more IMFs
Shorter, More branching	less rigid, weaker IMFs, lower density

Functional groups relate to IMFs

Add unique characteristics to each monomer
Each has distinct IMFs

Common Functional groups



Funct. groups of polymer chains vs interactions

Functional groups impact	how molecules interact with eachother and other suvstances
Functional groups	predict interactions

Structural Formulas and Line Structures

Double bond	Two parellel lines
Carbons	Bends and Ends
Hydrogen	Fulfill octet rule for carbons

Physical P. strength IMFs + molecular structure

Physical properties	Emerge from IMFs among millions of molecules
IMFs arise because of	uneven changing charge
Stronger IMFs	More Energy required to seperate
Physical properties	determined by polarity and polarizability and possiblity of hydrogen bonding
Physical Properties of carbon based compounds	determined by molecular shape, size and functionality

Periodic trends of IMFs

Stronger IMFs	Higher mp and bp
Stronger IMFs	Lower vapor pressure and viscosity
Polarizability	Tendancy to develope temporary dipoles
Large molecule, Stronger IMFs	more polarizable

Strength of IMFs

Dispersion	Stronger with larger molecules/ more e-
Increases	Dispersion, Dipole-Dipole, Hydrogen bonding, Ion-Dipole
Stronger IMFs	Higher bp

Types of IMFs Present

All have dispersion forces	
Polar	Dipole-Dipole forces
H+N,O,F	Hydrogen Bonding
Ionic compound + polar molecule	Ion-dipole

Relative Energy Range

Intermolecular interactions weaker than	Covalent bonds
Sharing e is a stronger attraction, more stable higher E because e closer to nucleus	