

# SPU27: Snapshots from Edge

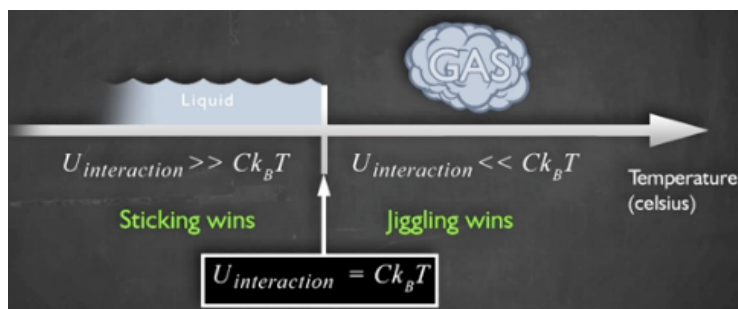
## Bond types:

(It's important to note the strength of the bonds)

Type of Interaction	Interaction Strength	Interaction Energy
Hydrogen bonds	Weak	$4 \times 10^{-20}$ J/molecule
Van der Waals	Very weak	$2 \times 10^{-20}$ J/molecule
Electrostatic	Pretty strong	$2 \times 10^{-19}$ J/molecule
Covalent	Very strong	$8 \times 10^{-19}$ J/molecule

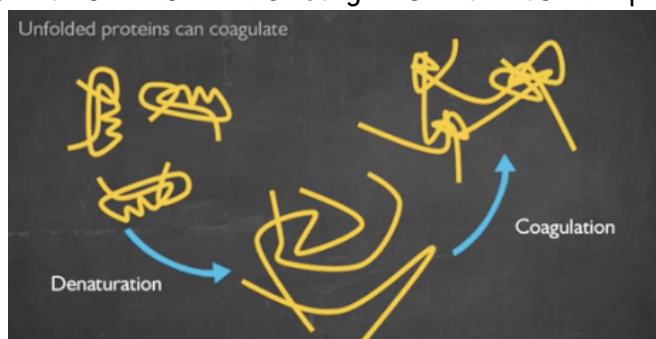
## Interaction energy ( $U_{int}$ ) and Thermal energy ( $Ck_bT$ ):

- The interaction energy is the energy involved in keeping the substance [sticking] together. Thus,  $U_{int}$  is directly proportional to the bond strength, so stronger bonds mean larger  $U_{int}$ .  $Ck_bT$  is the thermal energy, which we can think about in terms of motion [jiggling] from heat at a temperature  $T$ .
- If the thermal energy is larger than  $U_{int}$ , then there's enough motion and energy for the bonds to be broken, so the substance will be less tightly bound, as in a gas. If the thermal energy is smaller than  $U_{int}$ , then the bonds will hold and the substance will be more tightly bound, as in a liquid.
- The equality  $U_{int} = Ck_bT$  is true at a phase transitions. Once you're in a given state, you're on either side of the equality ( $U_{int} > Ck_bT$  or  $U_{int} < Ck_bT$ ).



## Macromolecule: Proteins

Think about what can cause them to denature and then coagulate. How does this process work?



## Macromolecule: Fat - Types of fatty acid chains

Triglycerides consist of a glycerol molecule bound to 3 fatty acid chains, that can be any of the following

