Question 1. *Isotactic Polybutene*

Butene H2C=CH-CH2-CH3 can be reacted to form isotactic polybutene (PB).

(a): Would you expect isotactic polybutene to melt at a higher or lower temperature than atactic polybutene of the same molecular weight?

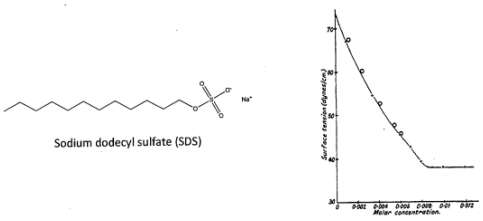
(b): Is isotatic polybutene a thermoplastic or thermoset?

(c): What is the value of the degree of polymerization n of isotactic PB with a molecular weight of 3.091×105 g/mol?

Solution 1.

Question 2. *Critical Micelle Concentration of SDS*

Sodium dodecyl sulfate (SDS) has the structure below. The surface tension of water changes as SDS is added, as shown in the graph below.

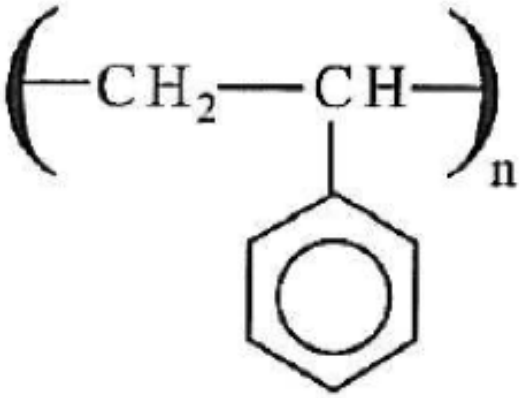


Why does the surface tension of water change as SDS is added?

1. The number of micelles increases, which allows the non-polar tails of SDS to clump together and not interact with the water
2. The SDS will segregate to the surface to replace the unsatisfied bonds of water molecules with the hydrophilic heads of the surfactant
3. The hyrophobic tails of the SDS interact with the water so that air doesn't have to
4. The SDS makes the solution turbid, which decreases the surface energy

Solution 2.

Question 3. *Properties of Polystyrene*
The monomer structure of polystyrene is shown below:



(a): Would you expect polystyrene to be a stiff or a pliable polymer?

1. Stiff
2. Pliable

(b): What kind of synthesis is used in the production of polystyrene from styrene monomers?

1. Addition polymerization
2. Condensation polymerization
3. Anionic polymerization

Solution 3.

Question 4. *Branched vs Unbranched Polymers*
Consider the polymer polybutadiene.

(a) Will linear polybutadiene or branched polybutadiene have a higher molar volume?

(b) Will linear polybutadiene or branched polybutadiene have a higher glass transition temperature?

(c) Will linear polybutadiene or branched polybutadiene have a lower fluidity at a given temperature?

Solution 4.