Microemulsion is clear, thermodynamically stable, isotropic liquid mixtures of oil, water and SCOS combination with complex and diverse microstructures (Basheer et al., 2013).

Many studies revealed that the bioavailability of insulin increased when the PEC surface was more lipophilic. Elsayed et al., 2009 stated, "Significant improvement in the oral absorption of insulin can be achieved by rendering the protein hormone more lipophilic through microemulsion constructed from insulin-chitosan in oleic acid".

Ability cyclodextrin derivatives to form complexes with variety of peptides are well studied. Complexation enhances the stability of peptide formulation and improves their shelf-time (Sajeesh & Sharma, 2006). Zhang et al showed that insulin encapsulated in CS–alginate nanoparticles was protected from degradation and release under simulated gastrointestinal conditions, on forming complex with hydroxypropyl-β-cyclodextrin (HPβCD) polymer.

Oleic acid is the most common fatty acid in food. Oleic acid has been shown to alter membrane permeability by increasing fluidity of the membrane phospholipids. Furthermore, oleic acid containing microemulsion did not exhibit any membrane damage to the GIT lining when passes in it (Aungst et al., 1996; Muranishi, 1990). Thus, the insulin emulsions containing an unsaturated fatty acid are acceptable for use in oral delivery system. The reason for the use of oleic acid as a carrier is the formation of protective hydrophobic coating layer at the surface of insulin-chitosan nanoparticles. This layer is formed due to the interaction between the free chitosan amine groups and the adjacent carboxylic acid groups of oleic acid as dispersion medium.