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A Facile Method for Preparation of Emulsion Using the High Gravity Technique

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ABSTRACT: This study demonstrates a new process for preparation of oil-in-water (O/W) emulsion using the high gravity technique. This involves a mixture of oil and water that are passed through a rotating packed bed, under a high shear force, from which oil is emulsified into tiny droplets and subsequently dispersed in water. The process is cycled in order to break the droplets repeatedly and achieve an emulsion with small size and low polydispersity index (PDI). The advantage of the high gravity technique is that the emulsions with a desired size and polydispersity can be rapidly obtained by tuning experimental parameters, such as relative centrifugal force (*RCF*), cycle times (*CT*), liquid flow rate (V_L) and surfactant concentration ($C_{\text{surfactant}}$). The size of emulsions is shown to decrease with increasing *RCF*, *CT*, V_L and $C_{\text{surfactant}}$. The PDI of emulsion prepared by high gravity technique is also much improved in comparison to that prepared by conventional sonication, which is further confirmed with dynamic light scattering and confocal imaging characterization. To provide an additional perspective on the high gravity technique as a tool to make O/W emulsions, uniformly distributed liquid crystal droplets were prepared by using the high gravity

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