Abstract

Asphaltene finds a distinguished position in current research on liquid and [solid hydrocarbon](https://www.sciencedirect.com/topics/engineering/solid-hydrocarbon) fuels due to its self-aggregating nature. The presence of asphaltene in crude oil will reduce the quality of crude oil itself by increasing the operating cost due to the arterial blockage in extraction, transportation and refining process. To date, the self-association of asphaltene has been widely explored around the world, even at the molecular level. Quite a few studies have led to the development of model compounds that resemble their chemical and colloidal characteristics. Based on the veracity regarding asphaltene structural configuration, it is believed that the mechanism of asphaltene self-aggregation needs special attention to process asphaltenic crude oil. The intention of this review is to understand the mechanism of petroleum asphaltene aggregation with the help of the studied model compounds and discuss the recent developments with respect to its colloidal and interfacial activity. The complexities of asphaltene science have been addressed comprehensively and controversies regarding asphaltene aggregation has been successfully resolved. This review provides insight to readers regarding the asphaltene colloidal and aggregated structure. At last, a point of view toward future advancement is also proposed with the objective of conquering challenges and fortifying further research into this promising field.