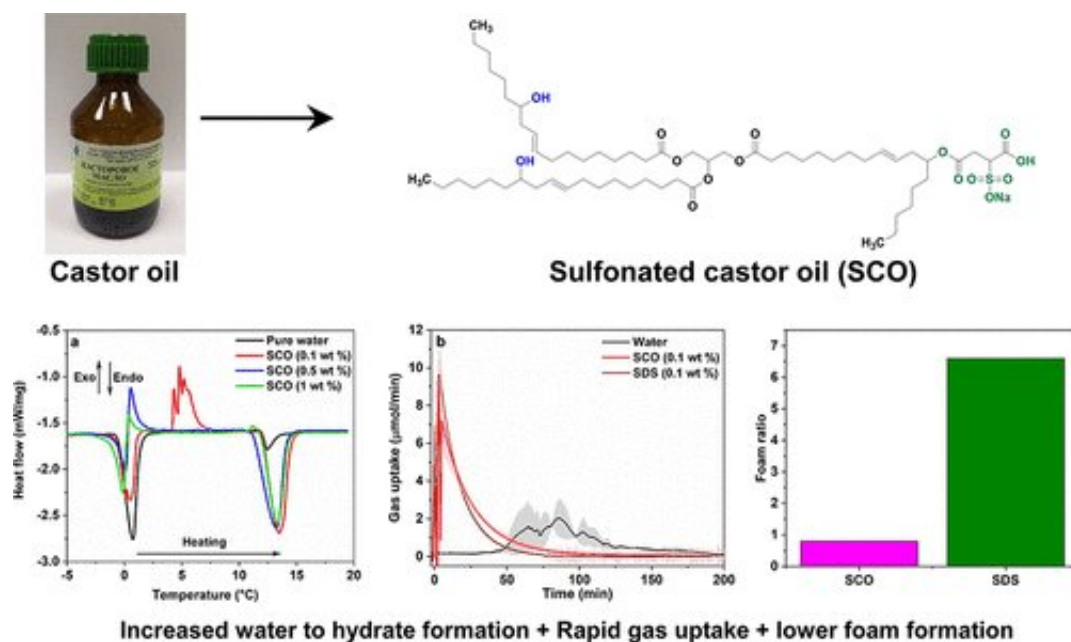


Castor oil used in improvements of production of associated petroleum gas

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Graphical abstract. Credit: *ACS Sustainable Chemistry & Engineering* (2022). DOI: 10.1021/acssuschemeng.2c02329

One of the problems of the oil industry is the burning of associated petroleum gas. Oil companies cannot uncontrollably release gas into the atmosphere or burn it, as this negatively affects the environment and seriously increases carbon footprint. In addition, this is a big lost profit, since this gas is a valuable product.

"A new promoter for intensifying the process of hydrate formation

based on castor oil has shown [high efficiency](#), reduced the time of hydrate formation and significantly increased the conversion. All this will allow the use of hydrate technology for gas storage and transportation. The promoter developed by us will significantly reduce [economic costs](#). The analysis suggests that the most expensive stage is the stage of obtaining hydrates," says Mikhail Varfolomeev, Chair of the Department of Petroleum Engineering.

As the authors noted, the proposed hydrate technology will make it possible to convert gas into a [solid form](#) in the presence of water, where one volume of hydrate can contain up to 180 volumes of gas.

"Our promoters speed up the hydrate formation process and increase the conversion, making the abovementioned technology cost-effective. The new reagent demonstrates an efficiency comparable to the commercial reagent sodium dodecyl sulfate," says Junior Research Associate Yulia Zaripova.

The burning of associated [petroleum gas](#) leads to the emission of toxic substances into the atmosphere, which entails the regular need to pay fines, emphasizes Vice-Rector for Earth Sciences Danis Nurgaliev. Moreover, APG can be used as fuel for power generation directly at or near oilfields.

"Oil and gas companies need ways to store and transport methane, especially when oil is being produced and there is no gas pipeline nearby. An effective method for this can be the conversion of APG into gas hydrates. In fact, what is needed is some fairly simple reactor in which water and methane are mixed in the presence of, for example, a castor oil-based promoter. Thus, a gas hydrate is formed, very similar to ice, which can be cut, placed in a container, stored and transported at reasonable temperatures and low pressures," adds Nurgaliev.

"Sulfonated [castor oil](#) has other significant advantages: synthesis based on available natural raw materials and reduced foaming. Foam can get into various technological units and interferes with the complete extraction of gas from the [hydrate](#). And, of course, the new reagent is biodegradable," says co-author, Research Associate Abdolreza Farhadian.

The study is published in *ACS Sustainable Chemistry & Engineering*.

More information: Abdolreza Farhadian et al, Sulfonated Castor Oil as an Efficient Biosurfactant for Improving Methane Storage in Clathrate Hydrates, *ACS Sustainable Chemistry & Engineering* (2022). DOI: [10.1021/acssuschemeng.2c02329](https://doi.org/10.1021/acssuschemeng.2c02329)

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