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BOOK REVIEW

Zengshe Liu and George Kraus (Eds): Green Materials from Plant Oils

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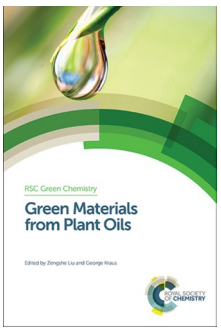

Bibliography
Green Materials from Plant Oils
Zengshe Liu and George Kraus (Eds)
RSC Green Chemistry
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GBP 145.00

Plant oils have long been used to prepare natural polymers, many extracted from source material by water. The range of natural materials is enormous and varied. These include silk, wool, DNA, cellulose, polysaccharides, rubber, varnish and many more, creating a very long history of utilisation of natural products. The editors have brought together workers from the premier US agricultural research establishment, the National Centre for Agricultural Utilization Research (NCAUR), and other similarly recognised international institutions, to publish their latest work in book form. This combined research, laid out over twelve chapters, is centred on that favoured environmentalists' word "sustainable", thereby conforming to the overall remit of the RSC's "Green Chemistry" series. This is Number 29 in that series.

The term sustainability is added for two reasons: environmental (seeking reductions in CO_2 emissions and utilisation of waste products) and the fear that crude oil and natural gas, the major sources of many competing synthetic polymers, are in ever-diminishing supply. Although not highlighted, in reality the driver of the supply/demand curve is the relative cost between competing raw materials. Forecasting the future price of crude oil and gas is difficult enough. However, when the potential raw source is plant based, climate variation can cause crop yields to swing from feast to famine over both short and long time cycles. From this perspective, it is almost impossible to predict whether a particular product from plant oils can compete over the long term with synthetic products.

Oils derived from vegetables (castor, lesquerella, palm, soybean and vernonia) and seeds (cottonseed, grapeseed, linseed, milkweed, moringa, sesame) are the primary base sources for experimentation. The base oils are then photocured, epoxidised, esterified, polymerised, thionised, phosphonatised or acylated, in addition to other standard chemical processing methods. Extensive chemical analysis describing the eventual structures of the resulting products is included in most of the texts, together with any ongoing processing deemed necessary to extract any specifically valuable chemical entities or mixtures. Of major interest are bio-lubricants. Several are claimed to have higher viscosity indices, improved wear characteristics, lower volatility and lower flash points than mineral-based oils, but until their oxidative stability is improved they are unlikely to be significantly adopted into the (shrinking demand) market of automotive lubes.

Although the basic subject area has broad appeal and is not limited to specialists, the advanced nature of the research will tend to limit readership to those directly involved in it.

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