Title (15)	:	**Unravelling the kinetics, isotherms, thermodynamics, and mass transfer behaviours of Zeolite Socony Mobil - 5 in removing hydrogen sulphide resulting from a dark fermentative biohydrogen production process**
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UniKL Author	:	Raja Nazrul Hakim Raja Nazri
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Abstract	:	Research into the speciation of sulfur and hydrogen molecules produced through the complex process of thermophilic dark fermentation has been conducted. Detailed surface studies of solid–gas systems using real biogas (biohydrogen) streams have unveiled the mechanisms and specific interactions between these gases and the physicochemical properties of a zeolite as an adsorbent. These findings highlight the potential of zeolites to effectively capture and interact with these molecules. In this study, the hydrogen sulphide removal analysis was conducted using 0.8 g of the adsorbent and at various reaction temperatures (25–125 °C), a flow rate of 100 mL min−1, and an initial concentration of approximately 5000 ppm hydrogen sulphide. The reaction temperature has been observed to be an essential parameter of Zeolite Socony Mobil - 5 adsorption capacity. The optimum adsorption capacity attains a maximum value of 0.00890 mg g−1 at an optimal temperature of 25 °C. The formation of sulphur species resulting from the hydrogen sulphide adsorption on the zeolite determines the kinetics, thermodynamics, and mass transfer behaviours of Zeolite Socony Mobil - 5 in hydrogen sulphide removal and Zeolite Socony Mobil - 5 is found to improve the quality of biohydrogen produced in thermophilic environments. Biohydrogen (raw gas) yield was enhanced from 2.48 mol H2 mol−1 hexose consumed before adsorption to 2.59 mol H2 mol−1 hexose consumed after adsorption at a temperature of 25 °C.