

## Supporting Information

### Epoxidised soybean oil-Cu/Cu<sub>2</sub>O bio-nanocomposite material: Synthesis and characterization with antibacterial activity

Machhindra S. Bhalerao,<sup>a</sup> Anand V. Patwardhan,<sup>a,\*</sup> Manohar A. Bhosale,<sup>b</sup> Vaishali M. Kulkarni<sup>a</sup> and Bhalchandra M. Bhanage<sup>b</sup>

<sup>a</sup>Department of Chemical Engineering, Institute of Chemical Technology,  
Matunga, Mumbai 400019, Maharashtra, India

<sup>b</sup>Department of Chemistry, Institute of Chemical Technology,  
Matunga, Mumbai 400019, Maharashtra, India

#### Materials

Hydrobromic acid (48 wt%) was obtained from Thomas Baker Chemicals Pvt. Ltd., Mumbai, India. Crystal violet and glacial acetic acid (AR Grade) was procured from S. D. Fine Chem. Ltd., Mumbai, India. Nutrient broth and nutrient agar were purchased from Hi-media Laboratories, Mumbai.

#### Analytical techniques

Titration of the dried samples of ESO was conducted using 0.1 N HBr solution in acetic acid to determine the amount of converted oxirane oxygen content (epoxy value or epoxide value) [AOCS official method CD-59].<sup>1</sup> In addition, the transformation of unsaturated double bonds to oxirane oxygen was confirmed using FTIR spectra. From the oxirane content data, the relative fractional conversion to oxirane oxygen was calculated by following expression:

$$\text{Relative conversion to oxirane (RCO)} = \frac{\text{OO}_{\text{exp}}}{\text{OO}_{\text{the}}} \quad \dots (1)$$

where,  $\text{OO}_{\text{exp}}$  is the experimentally determined oxirane oxygen content in 100 gm of oil and  $\text{OO}_{\text{the}}$  is the theoretically maximum oxirane oxygen content in 100 g of oil, given in eq. 2.

$$\text{OO}_{\text{exp}} = \left[ \frac{\left( \frac{\text{IV}_0}{2A_i} \right)}{100 + \left( \frac{\text{IV}_0}{2A_i} \right) A_o} \right] A_o \times 100 \quad \dots (2)$$

Where  $A_i$  (126.9) and  $A_o$  (16.0) are the atomic weights of iodine and oxygen, respectively, and  $\text{IV}_0$  is the original iodine value of oil sample per 100 gm of oil. The maximum theoretical oxirane oxygen content was determined to be 6.4%. The experimentally determined oxirane oxygen content in 100 gm of oil was to be 5.8%. So the relative percentage conversion to oxirane oxygen is 90.6%. The Iodine value meter (Uniphose Pvt. Ltd. Gujrat Model No. – IVM1121) was used to calculate the iodine value, which in turn states the degree of unsaturation in oil. The percentage conversion of iodine value iodine value was determined to be 92.1%.

### **Experimental setup for epoxidation**

ESO epoxidation was carried out in a glass reactor having dimensions as 65 mm as inner diameter and 250 mL capacity, fitted with a 2 cm diameter four-bladed glass impeller, a dropping funnel, and a water condenser. This reactor was placed in a thermostatic oil bath to maintain the reaction temperature, with temperature control  $\pm 1$  °C. The stirring speed was controlled by a mechanically agitated controller.<sup>2</sup>

## References

- 1 Oxirane Oxygen, Official and recommended practices of the american oil chemists society, 5<sup>th</sup> Ed., *AOCS press*, Champaign, 1997.
- 2 S. Dinda, A. V. Patwardhan, V. V. Goud, N. C. Pradhan, *Bioresour. Technol.*, 2008, **99**, 3737–3744.