

(54) Title of the invention : PRODUCTION OF ULTRA-LOW SULFUR BASE OIL USING ULTRASOUND-ASSISTED EXTRACTIVE/OXIDATIVE DESULFURIZATION PREOCSS

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(71)Name of Applicant :**1)PANDIT DEENDAYALENERGY UNIVERSITY**

Address of Applicant :KNOWLEDGE CORRIDOR, RAISAN VILLAGE, GANDHINAGAR, GUJARAT - 382007, INDIA. -----

Name of Applicant : NA**Address of Applicant : NA****(72)Name of Inventor :****1)TARUN SHAH**

Address of Applicant :KNOWLEDGE CORRIDOR, RAISAN VILLAGE, GANDHINAGAR, GUJARAT - 382007, INDIA. -----

2)MS.KOMAL DESAI

Address of Applicant :KNOWLEDGE CORRIDOR, RAISAN VILLAGE, GANDHINAGAR, GUJARAT - 382007, INDIA. -----

3)DR.SWAPANIL DHARASKAR

Address of Applicant :KNOWLEDGE CORRIDOR, RAISAN VILLAGE, GANDHINAGAR, GUJARAT - 382007, INDIA. -----

4)MS.JALAJA PANDYA

Address of Applicant :KNOWLEDGE CORRIDOR, RAISAN VILLAGE, GANDHINAGAR, GUJARAT - 382007, INDIA. -----

5)DR.SATYAM SHINDE

Address of Applicant :KNOWLEDGE CORRIDOR, RAISAN VILLAGE, GANDHINAGAR, GUJARAT - 382007, INDIA. -----

6)DR.VINAY VAKHARIA

Address of Applicant :KNOWLEDGE CORRIDOR, RAISAN VILLAGE, GANDHINAGAR, GUJARAT - 382007, INDIA. -----

7)DR.THUMMALAPALLI

Address of Applicant :KNOWLEDGE CORRIDOR, RAISAN VILLAGE, GANDHINAGAR, GUJARAT - 382007, INDIA. -----

(57) Abstract :

The titled invention Production of ultra-low sulfur base oil using ultrasound-assisted extractive/oxidative desulfurization process discloses the process to produce ultra clean fuels. Owing to the increasing use of oils and global air production, a comprehensive development towards the production of ultra-clean fuels is increasing day by day. Some most integrated techniques can be used to produce ultra-pure oils. The ultrasound-assisted extractive/oxidative desulfurization process (UEODS) possesses appropriate characteristics concerning the oxidant-ionic liquid (IL) system. 1,3-dimethylimidazolium dimethyl phosphate was synthesized, characterized, and used in the UEODS process as catalyst/extractant. The desulfurization efficiency of 97% and 68% is obtained in the case of model oil and base oil, respectively in a single cycle. Furthermore, to validate the experimental findings two models of machine learning are compared and found to be in good concordance with the experimental observations. Density functional theory proved that the IL has more affinity towards dibenzothiophene sulfone than dibenzothiophene. It also demonstrated that the aromatic rings of IL and S-compounds have CH- π , π - π , and hydrogen bonding interactions. The IL was recycled and reused for 10 cycles. The multistage cycles of desulfurization of actual base oil at optimized conditions can reduce the sulfur content to less than 10 ppm at mild operating conditions.

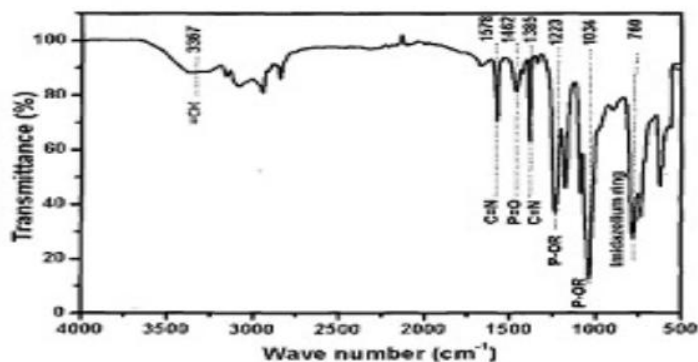


Fig. 1. FT-IR analysis of [MMIM]DMP.

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