TECHNOLOGY OF CONTROLLED PROCESSING OF DIMETHYL SULFOXIDE

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Petroleum base oils (petroleum mineral oils) are manufactured from crude oils by vacuum distillation to produce several distillates and a residual oil that are then further refined. Aromatics including alkylated polycyclic aromatic compounds (PAC) are undesirable constituents of base oils because they are deleterious to product performance and are potentially carcinogenic. Three short-term, non-animal assays all involving extraction of oil with dimethylsulfoxide (DMSO) have been validated for predicting potential carcinogenic activity of petroleum base oils. On the other hand, dimethyl sulfoxide is a feedstock for a large number of organic substances syntheses. Dimethyl sulfone is basically synthesized by oxidation of dimethyl sulfoxide in hot 30% hydrogen peroxide in glacial acetic acid. Synthesis is accompanied by significant losses of hydrogen peroxide, the target product has to be significantly purified. It becomes possible to control the synthesis of pure dimethyl sulfone and methane sulfonic acid when using the electrochemical method of oxidation of dimethyl sulfoxide in its aqueous solution with chemically resistant anode and high overvoltage of oxygen reaction Controlled synthesis is relevant because sulfur tends to change the oxidation rate. Study of kinetics of anodic processes at platinum electrode was performed in the dimethyl sulfoxide concentration range about 1.0…4.0 mol·dm^{-3} . Current raise was observed at potentials that are more positive than 1.3…1.4 V. This potential range corresponds to oxygen release. Dissolved sulfuric acid (0.2 mol·dm^{-3}) was added in order to inhibit the oxygen release and achieve the potential for the formation of peroxide radicals in aqueous solutions of dimethyl sulfoxide. Current-voltage study has shown that the oxidation of dimethyl sulfoxide in aqueous solutions runs through the formation of dimethyl sulfone. Providing a controlled electrochemical syntheses makes it possible to produce dimethyl sulfone avoiding the following oxidation to methane sulfonic acid.

References:

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