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Morphological Variability and Chemical Composition of Essential Oils from Nineteen Varieties of Basil (*Ocimum basilicum* L.) Growing in Sudan

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This study characterized the essential oil compositions of 19 accessions of basil, of which 14 are grown in Sudan as ornamental plants, 3 were introduced from abroad as seeds and 2 were collected from wild Sudanese basil. All were collected as seeds and grown at the University of Gezira farm. Interesting morphological variability among the accessions was noted and recorded in photos. The essential oil content varied from 0.33 to 0.47% in fresh leaves and from 0.13 to 0.4% in fresh flowers. The essential oil components were separated and/ or identified by TLC, GC and GC-MS. Chemical variability among Sudanese basil essential oil was extremely broad. According to the major constituent the basil accessions were classified into 7 groups, namely, high methyl chavicol (>50%), high linalool (>50%), high geraniol (>50%), linalool- methyl cinnamate, linalool-geraniol, methyl cinnamate- linalool and eugenol-linalool. Such classification of Sudanese basil oils is much needed if international marketing of this oil(s) is contemplated. (*International Journal of Chemical Technology* 1 (1): 1-10, 2009; *doi*: 10.3923/ijct.2009.1.10)

Sodium Stearate as Drag Reducing Agent in Non-Aqueous Media

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The aim of the present investigation was to decline the solubility condition that number of previous investigation put for any component to be classified as drag reducing agent. In the present investigation, Sodium Stearate (SS) with different concentrations (50 to 300 w ppm) was used. The solvent was used gas oil flowing in three pipe diameters pipelines (0.508, 0.254 and 0.01905 m) and within flow rate range starting from 1.9 to 4.5 m³ h⁻¹. All the experimental work was carried out in a built-up closed loop liquid circulation system with three testing sections (2 m long) of the three pipe diameters investigated. The experimental results showed that, percentage drag reduction (Dr %) increases by increasing the surfactant concentration and Reynolds number. Also, Dr (%) was found to increase by decreasing the pipe diameter. The results proved that, the additive

solubility in the transported media is not a condition to classify the chemical as drag reducing agent. Experimental work correlation equation was suggested representing the percentage drag reduction as a function of Reynolds number. (*International Journal of Chemical Technology 1 (1): 11-18, 2009; doi: 10.3923/ijct.2009.11.18*)

Coalescence of Water Droplets in Water-in-Crude Oil Emulsions

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Water separated from water-in-crude oil emulsions by chemical demulsification. Coalescence rates of water droplets have been studied in the presence of chemical demulsifier (Decylamine). Droplet size was measured. Fastest coalescence rate was observed during first minute. Binary coalescence time during this period was 10 sec when 50 mg L⁻¹ of Decylamine was added and 5 sec in the presence of 100 mg L⁻¹ of Decylamine emulsifier. Also polyhydric alcohol demulsifiers were investigated. Results show a strong connection (correlation) between good performance (fast coalescence) and the demulsifiers. (*International Journal of Chemical Technology 1 (1): 19-25, 2009; doi: 10.3923/ijct.2009.19.25*)

Preparation and *in vitro* Degradation of Methoxy Poly (Ethylene Glycol)-*b*-Poly (D, L-Lactide) Tubes for Nerve Tissue Engineering

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This study has proposed novel biodegradable nerve guide tubes. Nerve guide tubes were made of a methoxy poly (ethylene glycol)-*b*-poly (D, L-lactide) diblock copolymer. The diblock copolymer was completely amorphous. The nerve guide tubes were prepared by a dip-coating technique. Three types of nerve guides with inner diameter of approximately 790 μm were constructed by variation of the number of dip-coated layers. Wall thicknesses of the tubes were 186, 217 and 278 μm for three, five and seven dip-coating steps, respectively with smooth in surface appearance. All tubes showed good transparent and flexibility that can be used for nerve guide regeneration. Glass transition temperatures of diblock copolymer tubes increased after degradation. From *in vitro* degradation test, it was demonstrated that the tubes with 5 and 7 layers were still undamaged after 3

weeks degradation period. The tubes maintained gross structural integrity in the first 3 weeks except the 3 layer tube, followed by sharp weight loss and most complete disappearance at about 5 weeks degradation period. Porous structures were occurred throughout the tube surfaces and matrices after degradation for a week. (*International Journal of Chemical Technology* 1 (1): 26-32, 2009; *doi*: 10.3923/ijct.2009.26.32)

A Review on Membrane Technologies and Associated Costs for Municipal Wastewater Reuse

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This study seeks to compile data on the technologies and associated costs for wastewater reuse. Reuse of reclaimed water for non-potable applications is currently the rule rather than the exception in many parts of the world. Treatment technology encompasses a vast number of options and membrane processes are regarded as key elements of advanced wastewater reclamation and reuse schemes. The identifiable wastewater reuse schemes using membrane technology worldwide have been critically analyzed in this study. Peer-reviewed journal study, conference papers and information gathered from the internet formed the basis of this review study. Different forms of potential water reuse have been identified. The available cost data was also furnished. Therefore, this study, as a whole adds to both technological and economical aspects of the knowledge-base of wastewater reuse schemes. The membrane technology appears to govern the field of wastewater reuse and this trend is likely to continue in the future. Besides the technical aspect, issues like public acceptance, economic and hygienic risks etc., should be taken into account to counter the obstacles facing implementation of wastewater reuse. (*International Journal of Chemical Technology* 1 (2): 33-43, 2009; *doi*: 10.3923/ijct.2009.33.43)

Development of a Wastewater Treatment System for Chromium Removal Using Chitosan

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This study attempts to evaluate the removal of chromium from aqueous solution using chitosan as an adsorbent. The experiment was conducted by varying chitosan dosage (10-30 mg), pH (5-8), contact time (10-90 min) and agitation

speed (50-250 rpm). The initial Cr concentration was fixed to 20 mg L⁻¹. The results indicated that pH is the most significant factor that affects the removal of Cr. The R² of 0.9963 showed that the overall model is good as the experimental values are close to predicted values. The optimized conditions obtained at 28.79 mg chitosan dosage, pH 6.40, 20.20 min contact time and agitation speed of 156.20 rpm. This optimum condition obtained to achieve 0.05 mg L⁻¹ residual Cr concentration or 99.75% removal that meets Department of Environment Malaysia (DOE) effluent discharge requirement. The design of treatment system that consists of rapid mix, sedimentation and filtration unit is based on the optimum operating conditions. Rapid mix tank was designed with surface area of 9.18 m² and volume of 27.8 m³. Sedimentation basin was designed with surface area of 100 m² and volume of 83.33 m³. Filtration was designed with surface area of 16.67 m². (*International Journal of Chemical Technology* 1 (2): 44-51, 2009; **doi:** 10.3923/ijct.2009.44.51)

Characterization and Chemical Composition of the Fixed Oil of Fourteen Basil (*Ocimum basilicum* L.) Accessions Grown in Sudan

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Oil content, fatty acid composition and lipid profile of seed oils of fourteen basil (*Ocimum basilicum* L.) accessions grown in Sudan were determined. The accessions included wild basil (one accession), two accessions introduced from Germany and one from UAE. The rest (ten) represent basil grown in Sudan as ornamental plants. All were collected as seeds and grown at the University of Gezira farm. The fixed oil components were separated by TLC and GLC. Chemical variability among the fixed oils of Sudanese basil was extremely broad. Seed oil content varied from 8.8 to 30%. The major acylated fatty acids were palmitic (5-13%), stearic (2-3%), oleic (6-10%), linoleic (12-32%) and linolenic acid (49-75%). Linolenic acid, desirable for the potential industrial use of the oil as a drying oil, is high as 75% in seeds of the abundant wild-type of basil; this accession contains high proportion compared to world-wide basil. These results shown basil seed oil especially wild-type appears suitable to be used for industrial purposes. This is promising since seeds of the wild plant, an annual that spontaneously grows during the rainy season in many parts of Sudan, can be cheaply collected in abundance. However, certain accessions e.g., No. 11 contain other constituents such as sterols this may warrant further research. (*International Journal of Chemical Technology* 1 (2): 52-58, 2009; **doi:** 10.3923/ijct.2009.52.58)

Demulsification of Virgin Coconut Oil by Centrifugation Method: A Feasibility Study

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In this study, the potential of centrifugation method in demulsification (emulsion breaking) of coconut milk emulsion is investigated. The conventional methods to produce Virgin Coconut Oil (VCO) by using fermentation and cold pressing need longer time to break these emulsions. Coconut milk from the local market was used as samples for the study. The centrifuge speed was varied from 6000 to 12000 rpm and the centrifugation time was varied from 30 to 105 min. The present research found that, centrifugation method can enhance the demulsification of oil-in-water (O/W) coconut milk emulsions in a very short time compared to the conventional methods. Due to its fast and higher quality of Virgin Coconut Oil (VCO), centrifuge can be used as an alternative demulsification method for oil-in-water coconut milk emulsions. This method provides higher yields, quicker and less expensive. (*International Journal of Chemical Technology* 1 (2): 59-64, 2009; **doi:** 10.3923/ijct.2009.59.64)