P-180 Studies On Heat Transfer Enhacement of CNT-GA Nanofluid in a Laminar Flow Heat Exchanger

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Most of the commonly used heat transfer fluids have low thermal conductivity. For example, water has a thermal conductivity of 0.6 W/mK the value of copper is 386W/mK. This difference in thermal conductivities between liquids and metals makes one consider enhancement of thermal conductivity and heat transfer characteristics of liquids by suspending metal particles in them. Fluids with nanoparticles dispersed in them are known as Nanofluids. However, CNTs with their high vander waals forces, surface area and high aspect ratio inevitably cause self aggregation. Thus, Gum Arabic (GA) was used to stabilize the CNT dispersion in water. This study aims to study the heat transfer enhancement of CNT-GA nanofluid in a laminar flow heat exchanger. 0.01wt% of CNT and 1wt% of GA concentration was used to prepare the aqueous CNT-GA nanofluid. Experiments are carried out at different temperatures ranging from 40-60C, respectively. Considerable heat transfer enhancement was observed using CNT compared to that of water alone.

P-182 Methods of Detection of Hazardous Materials using Quartz Crystal Microbalance

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The development and construction of new sensors for hazardous materials in the environment becomes an active area of research nowadays. Hazardous materials are known to give an adverse effect to human health and environment. Therefore, the early detection of the presence of those materials is crucial. This paper summarizes some current methods of detection of cyanide, mercury, lead, and hydrocarbons using quartz crystal microbalance (QCM). Quartz crystal microbalance (QCM) is an instrument of mass measuring initiated by Sauerbrey, which is widely used as a measurement instrument of small mass in vacuum, gas and liquid phase. Two methods of detections using QCM for each hazardous material were discussed and compared in this paper. The best methods employed are concluded at the end of this paper.

P-186 Production of Vinegar from Star Fruit Juice by Using Bioreactor

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Vinegar was produced in the lab from fermentation of local star fruit (*Averrhoa carambola*) juice in stirred tank bioreactor. Star fruit was chosen due to its availability in local market and its fruiting season is all year around in Malaysia.The fermentation of star fruit juice into vinegar was produced by decomposing sugar contained in the fruit substrate through alcohol and acetic acid fermentation over a period of three days period with the aid of two microorganisms, *Saccharomyces cerevisiae* and *Acetobactor aceti.* Study to optimise the process parameter conditions used are agitation speed, aeration and the concentration of glucose used. The design of the experiment was conducted using Design Expert software to optimize the parameters condition for optimum production of the acetic acid. Analysis at every 12 hours interval were carried for ethanol concentration, reducing sugar level and acetic acid. The findings in this project can be applied to produce vinegar in large amount from our local tropical star fruit juice. The experiment showed that the optimum condition for agitation found were 300 Rpm, aeration was 0.5 Lpm and glucose concentration was 20% consequently produced 1.6335% vinegar.