PROGRAM BOOK

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Chemistry and Applied Chemistry

1. Absorbs Methods Based on Arduino for Sugar Device Detector on Fruit Juice

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Abstract. This study is to design the measurement of sugar content in fruit juice by utilizing the principle of absorption of light on the juice as measured by absorption method. This tool is designed by utilizing the photodiode sensor as its read and LED as the light source. There is a container or cuvette used for the placement of the juice to be measured. After the juice is extracted and placed on the cuvette, the light illuminates the sample in the cuvette and the detector or sensor captures the light missed by the sample. The output of the sensor is amplified by the op-amp and entered into the Arduino reading system to be processed and displayed in a 16x2 LCD. The measurement results of this tool compared with the measurements that have been done in the laboratory using a refractometer tool to produce a comparison of accuracy and accuracy of the readings on the measuring instrument with the percentage of average error in the measuring tool of 5.34%. Here is 2 comparison graphs of the measurement tool with a reflector. In the tool stability measurement , tested 20 times of testing. Each was 10 times test with orange fruit sample and 10 times testing with watermelon sample. Stability test results obtained by the highest difference of 0.03.

Keywords: Sugar; Measuring Instruments; Absorption; Photodiode

2. Physical characteristics and catalytic activity of sulfated sugarcane bagasse silica (SiO2/SO3-H+) for coconut oil transesterification

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Abstract. In this study, silica extracted from sugarcane bagasse was sulfated by wet impregnation method using 0.5 M H2SO4 solution as the sulfating agent. The sulfated silica was subsequently subjected to calcination at different temperatures of 100, 400, 600, and 800 oC, and then tested as catalyst for transesterification of coconut oil using methanol. The experimental results revealed that the catalysts exhibit good catalytic performance, enabling the achievement of up to 85% reaction yields. Physical characteristics of the catalysts were investigated using different techniques, including Fourier infra-red (FTIR) spectroscopy, x-ray diffraction (XRD), scanning electron microscopy (SEM), and particle size analysis (PSA). These characterization techniques reveal that successful sulfation of the silica was achieved.

Keywords: sugar cane bagasse; silica; sulfated; transesterification

3. Utilization of Activated Carbon from Palm Kernel Shells as the Bioadsorbent of Lead Waste

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Abstract. The palm oil industry produces the waste of palm kernel shells which can be used for several purposes, as boiler fuel, cellulose source, and charcoal source. Another alternative to use palm kernel shells is to adsorb the heavy metal, such as lead (Pb), which is dangerous for the health of human beings and environment. This research aims to use palm kernel shells as the activated carbon in adsorbing Pb (II) ions. The pyrolysis was performed on oil palm kernel shells at a temperature of 380oC to obtain the charcoal which was made smaller using the ball mill. The charcoal was then chemically activated with NaOH 0.1 N and liquid smoke. Before and after activation, the sample of charcoal was characterized with Fourier Transform Infrared (FTIR) and Scanning Electron Microscope (SEM). The activated carbon was then used to adsorb Pb (II) ions varied on several concentrations, namely 30, 60, 90, 120, and 150 mg/ liter. The adsorption process was performed in batch reactor with contact times of 30, 60, 90, 120, 150, and 180 minutes and the agitation speed of 100 rpm. The initial concentration of Pb (II) ions before and after adsorption was tested with Atomic Absorption Spectrophotometer (AAS). The research shows that initial concentration and contact time affect the efficiency of Pb (II) removal. The use of NaOH activator is better than liquid smoke. With NaOH activator, the highest adsorption (98.2%) was obtained at a contact time of 12 minutes and initial concentration of 150 ppm. Meanwhile, for the activator of liquid smoke, the removal efficiency of 77.7% was obtained at a contact time of 150 minutes and initial concentration of 60 ppm. The result of this research is expected to provide the scientific information about the potency in the use of oil palm kernel shells as