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KAEW SAETIAW: FUEL AND COMPOSITE PRODUCTS FROM THERMO CHEMICAL CONVERSION OF GLASS FIBER REINFORCED THERMOSET PLASTIC WASTE. ADVISOR : ASSOC. PROF. DUANGDAO AHT-ONG, Ph.D, CO-ADVISOR : ASST. PROF. VIBOON SRICHAROENCHAIKUL, Ph.D, DUANGDUEN ATONG, Ph.D, 125 pp.

Study on thermochemical conversion of unsaturated polyester and epoxy composite wastes reinforced with 30 and 60 wt% glass fiber by pyrolysis process was carried out in this research. Different types of resin matrix consisted of orthophthalic, isophthalic unsaturated polyester, vinyl ester and epoxy cured with amine (MDA) and anhydride (MTHPA). Thermal behavior and kinetic parameters of the composite wastes were first investigated by Thermo gravimetric Analyzer (TGA). Results showed that thermal behavior of composite wastes significantly depended on their chemical structure and glass fiber content. The activation energy (E_a) for decomposition of unsaturated polyester and epoxy composite wastes were in the range of 177-204 and 179-195 KJ/mol, respectively. Vinyl ester showed highest E_a and good thermal stability structure due to the presence of bisphenol A in main chain and methacrylate at the end of vinyl ester backbone. Higher glass fiber content resulted in the decrease in activation energy for decomposition of composite wastes. The composite wastes were then pyrolyzed in a fixed bed reactor at final temperature of 600, 700 and 800ºC under nitrogen atmosphere. Pyrolysis temperature of 600ºC and 800ºC resulted in the highest fraction of liquid and gaseous products, respectively. The maximum solid fraction was obtained from pyrolysis temperature of 600ºC and mainly composed of glass fiber which was used to recycle by new composite preparation. The liquid products were comprised of oxygenated compounds with high fraction of gasoline which can be further applied as crude oil. The gaseous products largely consisted of carbon dioxide (CO_2) and carbon monoxide (CO), and some amount of methane (CH_4) and hydrogen (H_2). The mechanical properties of composites prepared from recycled glass fiber at temperature of 600ºC indicated that it can be used as reinforcement to prepare new composite with no significant effect on impact and flexural strength up to 5 and 10 wt%, respectively.

Department : Material Science Student' Signature .....

Field of Study : Material Science Advisor's Signature .....

Academic Year : 2011 Co-advisor's Signature .....

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