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Prediction of Distillation Curve and Reid Vapor Pressure of Dual-Alcohol Gasoline Blends Using Artificial Neural Network for the Determination of Fuel Performance

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Abstract : The purpose of this paper is to study the predict the fuel performance parameters, which include drivability index (DI), vapor lock index (VLI), and vapor lock potential using distillation curve and Reid vapor pressure (RVP) of dual alcohol-gasoline fuel blends. Distillation curve and Reid vapor pressure were predicted using artificial neural networks (ANN) with macroscopic properties such as boiling points, RVP, and molecular weights as the input layers. The ANN consists of 5 hidden layers and was trained using Bayesian regularization. The training mean square error (MSE) and R-value for the ANN of RVP are 91.4113 and 0.9151, respectively, while the training MSE and R-value for the distillation curve are 33.4867 and 0.9927. Fuel performance analysis of the dual alcohol–gasoline blends indicated that highly volatile gasoline blended with dual alcohols results in non-compliant fuel blends with D4814 standard. Mixtures of low-volatile gasoline and 10% methanol or 10% ethanol can still be blended with up to 10% C3 and C4 alcohols. Intermediate volatile gasoline containing 10% methanol or 10% ethanol can still be blended with C3 and C4 alcohols that have low RVPs, such as 1-propanol, 1-butanol, 2-butanol, and i-butanol. Biography: Graduate School of Chemical, Biological, and Materials Engineering and Sciences, Mapua University, Muralla St., Intramuros, Manila, 1002, Philippines

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