

ABSTRACT

Diesel engines are the main choice for people who are used as a source of propulsion for transportation systems and stationary drives because they have advantages such as fuel efficiency, high performance, reliability, and durability. Therefore, there is an increase in the use of diesel engines from year to year. The high use of diesel engines causes problems in the form of decreasing availability of fossil fuels and exhaust emissions that are harmful to human health. One effort to overcome this problem is to substitute diesel oil with water emulsion fuel in diesel oil.

This type of research is an experimental study that aims to compare the composition of Pertamina Dexlite emulsion fuel which produces the best emulsion stability and analyze its effect on diesel engine exhaust emissions. The research carried out is to make emulsion fuel and analyze its stability and measure exhaust gas emissions in the form of nitrogen oxides (NO_x), carbon monoxide (CO), and hydrocarbons (HC). The fuel used is Pertamina Dexlite oil and Pertamina Dexlite emulsion fuel with variations in the percentage of water as much as 10, 15, and 20% (W/O). The surfactant used was Span 80 with a percentage of 4, 5, and 6% of the volume of water used. Exhaust emission testing is carried out at engine load variations of 0; 2.75; 5.73; and 9.25 kW using the E-Instruments Flue Gas Analyzer E4500.

The results of this study indicate that the composition of emulsion fuel (W/O) 10% produces the best emulsion stability among other emulsion fuel samples. The lowest emission of nitrogen oxides (NO_x) was obtained from 20% emulsion fuel (W/O) of 85.67 ppm. The emulsion fuels that produced the lowest emissions of carbon monoxide (CO) and hydrocarbons (HC) were (W/O) 10% at 442.33 ppm and (W/O) 15% at 0.0367%, respectively.

Keywords: Diesel Engine, Emulsion fuel, Exhaust emission

INTI SARI

Mesin diesel menjadi pilihan utama masyarakat yang digunakan sebagai sumber penggerak untuk sistem transportasi maupun penggerak stasioner karena memiliki keunggulan seperti efisiensi bahan bakar, unjuk kerja, keandalan dan daya tahan yang tinggi. Oleh karenanya, terjadi peningkatan penggunaan mesin diesel dari tahun ke tahun. Tingginya penggunaan mesin diesel menimbulkan permasalahan berupa semakin berkurangnya ketersediaan bahan bakar fosil dan emisi gas buang yang berbahaya bagi kesehatan manusia. Salah satu usaha untuk mengatasi masalah tersebut ialah dengan mensubstitusi minyak diesel dengan bahan bakar emulsi air di dalam minyak diesel.

Jenis penelitian ini adalah penelitian eksperimen yang bertujuan untuk mengetahui perbandingan komposisi bahan bakar emulsi Pertamina Dexlite yang menghasilkan kestabilan emulsi terbaik dan menganalisa pengaruhnya terhadap emisi gas buang mesin diesel. Penelitian yang dilakukan ialah membuat bahan bakar emulsi dan menganalisa stabilitasnya serta mengukur emisi gas buang berupa nitrogen oksida (NO_x), karbon monoksida (CO) dan hidrokarbon (HC). Bahan bakar yang digunakan berupa minyak Pertamina Dexlite dan bahan bakar emulsi Pertamina Dexlite dengan variasi persentase air sebanyak 10, 15 dan 20% (W/O). Surfaktan yang digunakan adalah Span 80 dengan persentase 4, 5, dan 6% dari volume air yang digunakan. Pengujian emisi gas buang dilakukan pada variasi beban mesin sebesar 0; 2,75; 5,73; dan 9,25 kW dengan menggunakan *E-Instruments Flue Gas Analyzer E4500*.

Hasil dari penelitian ini menunjukkan komposisi bahan bakar emulsi (W/O) 10% menghasilkan kestabilan emulsi terbaik diantara sampel bahan bakar emulsi lainnya. Emisi nitrogen oksida (NO_x) yang paling rendah diperoleh dari bahan bakar emulsi (W/O) 20% sebesar 85,67 ppm. Bahan bakar emulsi yang menghasilkan emisi karbon monoksida (CO) dan hidrokarbon (HC) paling rendah masing-masing ialah (W/O) 10% sebesar 442,33 ppm dan (W/O) 15% sebesar 0,0367%.

Kata kunci: Mesin Diesel, Bahan bakar emulsi, Emisi gas buang