Diesel engines are a major power source in the transport sector due to its increased torque and high thermal efficiency. But the emissions produced from these engines pose serious challenges, which has prompted the automotive researchers to search for alternatives. The addition of an ignition improver in the diesel fuel is one of the possible approaches to improve the engine performance and reduces the emissions. To identify the potential of ignition improvers, experiments have been performed in a diesel engine to study the engine performance and exhaust emissions.

The studies are carried out with three ignition improvers which include Diethylene Glycol Dimethyl ether (DGM), 2-Butoxy ethanol (2BE) and 2-Ethoxyethanol (2EE) on combustion, performance and emission in a four stroke single cylinder diesel engine. These ignition improvers are blended with diesel fuel in the proportions of 6% and 12% by volume. Combustion parameters such as in-cylinder pressure and heat release rate are studied. The exhaust emission characteristics such as carbon monoxide, unburnt hydrocarbons, nitrogen oxides and smoke are studied experimentally. The performance of ignition improvers on thermal efficiency and specific energy consumption are studied.
Blends of ignition improver to diesel fuel decreases the exhaust smoke and increases the thermal efficiency for a given power output. Significant improvements in performance and reduction of emissions are realized with the addition of 6% of 2-Ethoxy ethanol with diesel fuel.

There is a lack of thermodynamic models to analyze the performance characteristics of ignition improvers analytically. Hence in the present work, a simulation code for diesel engine, based on two zone combustion model is developed. The performance and emission characteristic of a diesel engine fuelled with ignition improver blend is studied. The combustion parameters and the chemical equilibrium composition are determined using two zone combustion model. Pressure, temperature and other required properties are computed numerically for selected crank angle steps. The heat release calculations of the model are based on Whitehouse-way’s method considering the premixed and diffusive combustion. The heat transfer computations are incorporated in the model using empirical equations. The ignition delay is also incorporated in the combustion model.

Simulated results are compared with experimental results for the validation of the simulation model. It was observed that there is a good agreement between simulated and experimental results and the proposed model requires low computational time.