

Figure 5. Variation of NOx level as a function of the crankshaft angle for the two fuels: gasoil and SME.

Figures 4 and 5 show the influence of the two fuels on the specific fuel consumption (SFC) and the nitrogen oxides (NOx) as a function of the injection time expressed as a function of the angle of rotation of the crankshaft ranging from 12 to 20 ° before the TDC. There is no significant change with the advancement of injection time on SFC. Therefore, the ignition delay period is longer.

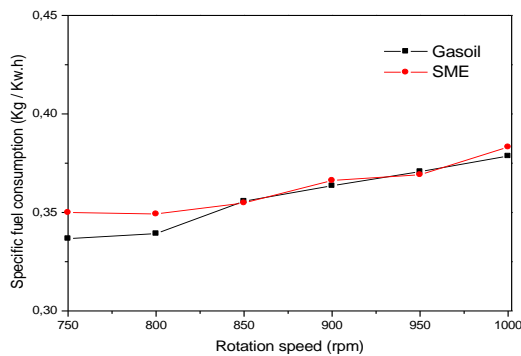


Figure 6. Variation of the specific fuel consumption as a function of the speed of rotation of the engine for the two fuels: gasoil and SME.

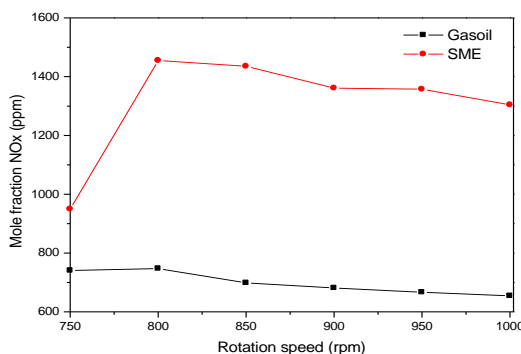


Figure 7. Variation of NOx as a function of the speed of rotation of the engine for the two fuels: gasoil and SME.

Figures 6 and 7 show the influence of the rotation speed of the engine on the fuel consumption and the NOx emissions for the two fuels studied.

For fuel consumption, the same tendency is observed for both types of fuel with a certain difference for the low rotational speeds.

With the increase in the speed of rotation of the engine, the consumption increases. On the other hand, in the case of NOx emissions, bio-fuel emits much more NOx than gasoil at the same speed.

3. CONCLUSION

To solve the problems of global air pollution due to the emission of pollutants from the combustion engine, it is necessary to understand the mechanisms of formation of the pollutants in the various combustion processes.

The main conclusions of this work:

- The use of SME bio-fuel has allowed obtaining a slightly faster combustion compared to gas oil.
- SME bio-fuel increases the formation of NOx more than gasoil, because bio-fuels are products containing a greater quantity of oxygen and their combustion is at a higher combustion temperature than that of gasoil.
- In general, the delay of the injection time is an effective way to reduce NOx emissions.

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NOMENCLATURE

- Q Quantity of heat [J]
 W Work provided [J]
 U Quantity of energy received [J]
 n Number of mole
 i Number of chemical species