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In Field Application of HHI96 as a Fuel Additive for Reduction of Air Pollution in Iranian Cities

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Abstract

To reduce NOx, CO, and HC emissions, improve acceleration, reduce engine octane requirement, eliminate hesitation, stop knocks and pings, and improve fuel mileage, the HHI96 was developed in the pilot scale. The initial emission testing was performed and the results are indicated the decreases fuel pollution. In this process, we designed and manufactured the reactors by the novel and affordable method with high efficiency. HHI96 was added by 5% weight to Euro 4 gasoline and 3% by weight to diesel fuel. The exhaust outlet was analyzed in the presence and absence of HHI96, in the car examination centers. Also, increased vehicle acceleration, by the driver was quite tangible after taking HHI96.

Introduction

Diesel engines are considered a major source of air pollution in urban areas because of their black smoke, HC, NOx, particulate matter, CO, CO_2, SOx emissions [1]. According to the report from the American Environmental Protection Agency, there are about ten thousands chemicals adhering to the surface of PM10, which were confirmed to cause mutation in a short-term medical test [2].

The main goal of this project is the design and manufacture of reactors to produce HHI96 to decrease fuel pollution with affordable primary materials. (Fig. 1)

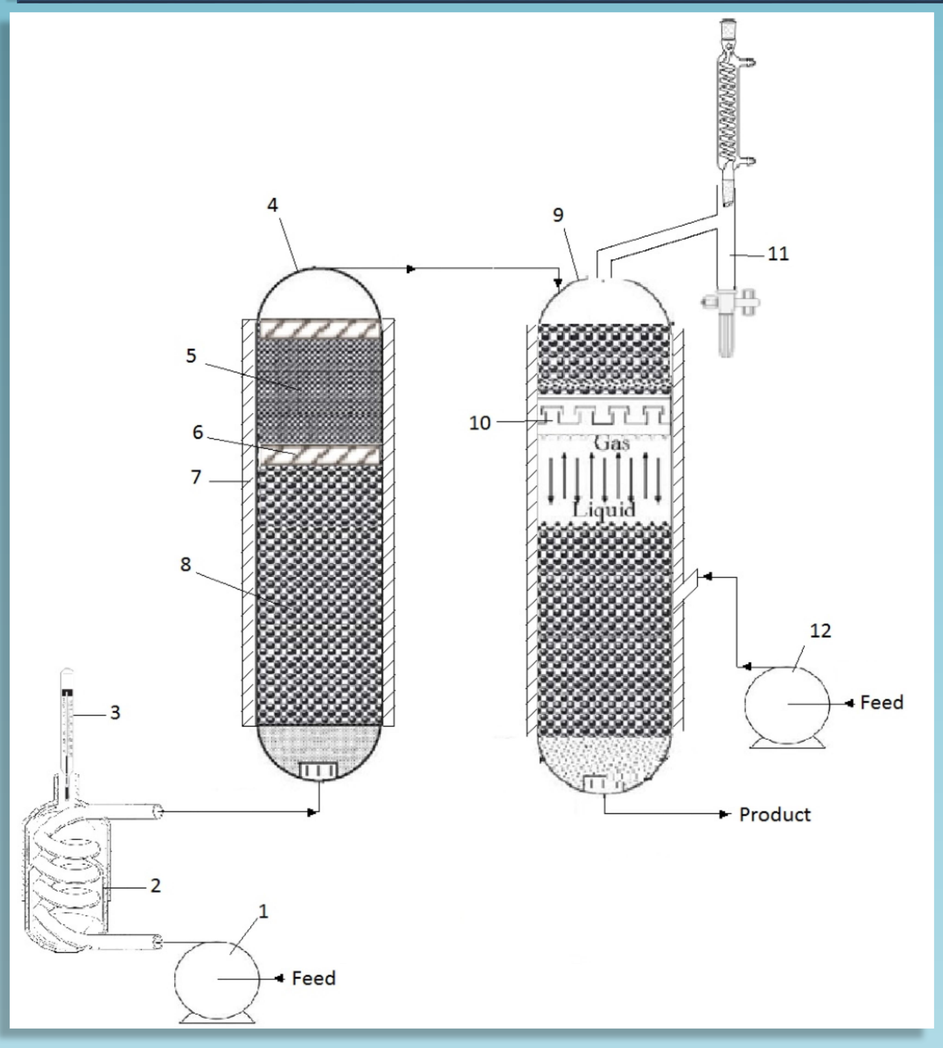


Fig. 1) Experimental setup and the components used for production of HHI96. 1 & 12 = Dosing Pumps, 2 = Preheating system, 3 = Thermometer, 4 & 9 = Reactors, 5 = Catalysts, 6 &10 = Catalyst holder, 7 = Heating Element, 8 = Packing, 11 = Dean-Stark Apparatus.

Results and discussion

The effect of HHI96 on gasoline Euro 4 and diesel fuel was investigated. For this purpose, the petrol and diesel vehicles were used. At first, 5 wt% and 3 wt% of HHI96 were added to petrol and diesel, respectively. Then, the amount of exhaust gas emissions was investigated by the technical inspection centers. At the 2nd step, the fuel of vehicles were replaced by new formulated fuel contain HHI96. Then, the exhaust gas was studied. The results are shown in Fig. 2-4.

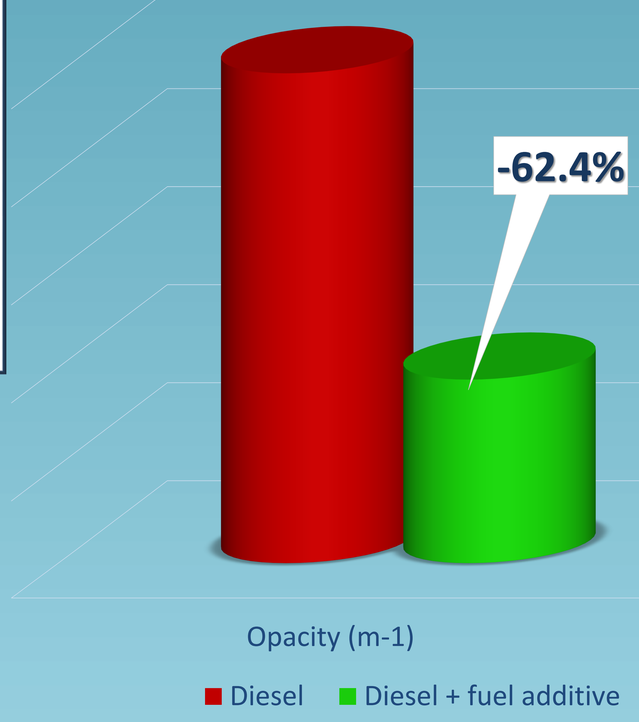


Fig. 2 The amount of reduction in opacity of diesel-engine exhaust gas after addition of the fuel additive to diesel.

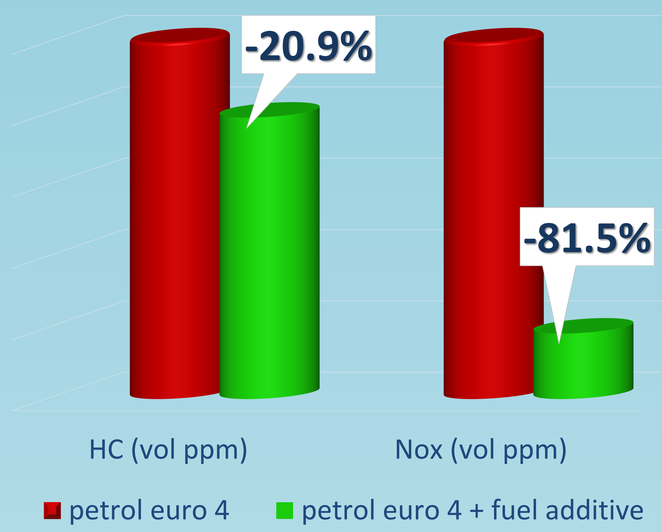


Fig. 3 The amount of reduction in HC, and NOx, after using the fuel additive in gasoline engine.

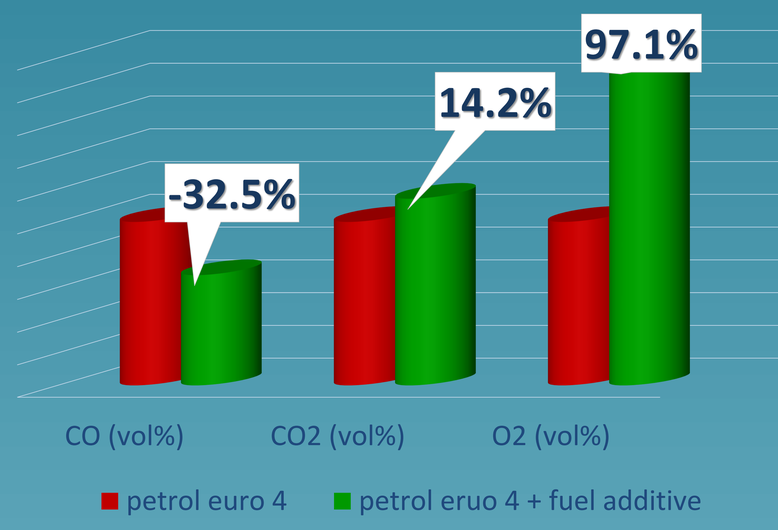
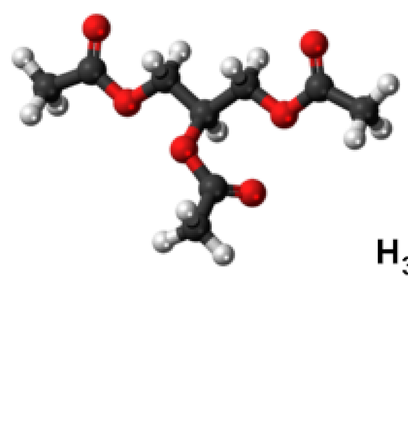


Fig. 4 The amount of reduction in CO, and increase in CO_2 and O_2 after using the fuel additive in gasoline engine.

As shown in the Fig. 1-3 the fuel pollution was decreased and according to these studies, the fuel consumption was reduced approximately 13%.

Conclusions

1) **The NOx, CO, and HC pollution was decreased by adding 5% of the fuel additive to gasoline.**
2) **By adding HHI96 as much as 3% to diesel fuel the opacity of exhausted gases was reduced as 62.4%.**
3) **The fuel consumption was reduced about 13%.**



References

[1] Lin, C.Y., Pan, J.Y., 2001, Ocean Eng. 28 (4), 347–360.

[2] Lin, C.Y., J.C. Huang, 2003, Ocean Eng. 30 (13), 1699-1715.