



Operaciones FFIMEX Fuel, S. de RL de C.V.

*According to your previous application, the **Emission Control Laboratory (LCE) of the Faculty of Engineering of the UNAM**, has made evaluations of the product called **MPG-CAPS™**, which is a catalyst for fuel, which is presented by the COMPANY **Operaciones FFIMEX Fuel, S. de R.L. de C.V. (FFi - Mexico)**.*

For this purpose were conducted pilot tests in two phases. The details and interpretations of the obtained results are described below:

FIRST PHASE

1. We used a vehicle testing Nissan Tsuru sedan model 2000, with 134366 km travelled, transmission standard, 4-cylinder in-line, a displacement of 1.6 litres, compression ratio of 9.3, an output of 105 hp at 6000 rpm, and a pair of 138 Nm at 4000 rpm.
2. That vehicle was mounted on the rollers of a chassis dynamometer, which measures Par, Power, speed, distance travelled by the vehicle, level of pollutant emissions (CO, HC, CO₂, NO_x, O₂) and engine speed. It is also capable of applying load path, which corresponds to the friction of tires with the pavement and drag in the wind during their displacement, as well as to simulate the inertia of the vehicle.
3. It was simulated a **driving cycle characteristic of the metropolitan area of the Valley of Mexico** (which is a compendium of 5 driving cycles developed in the north, centre and south of the Valley of Mexico) by applying inertial load and load path, in accordance with the standard **NMX-AA-011-1993-SCFI**, that indicates the requirements and test method for evaluating exhaust gas emissions in motor vehicles in new plant, using petrol as fuel.
4. The tests were conducted using commercial gasoline MAGNA and PREMIUM.



Vehicle on rollers dynamometer

RESULTS OF THE FIRST PHASE

Below are the results of the fuel performance WITH and WITHOUT the catalyst for fuel- MPG-CAPS™.

1. It was measured the consumption of fuel, and it can be seen that the use of **MPG-CAPS™** does have a significant influence.
2. According to the data we have seen, using **premium gasoline** without the product **MPG-CAPS™** estimated a yield of 15.15 km / liter, while using this product in the same type of gasoline yield increased to 17 km / liter which mean an **increase of 12%**.
3. On the other side, using **Magna gasoline** without the product MPG-CAPS™ the performance was calculated 14.87, and when using this product, yield rises to 16.93 km / liter, which means an **increase of 13.8%**.

SECOND PHASE

1. We used a taxi with enrollment plate number A-08-647 of the station 173 of Mexico City as a vehicle **for testing**. It is a Nissan Tsuru sedan model 2003, with 338804 km travelled, transmission standard, 4-cylinder in-line, a displacement of 1.6 litres, compression ratio of 9.3, an output of 105 hp at 6000 rpm, and a pair of 138 Nm at 4000 rpm.
2. This vehicle was conditioned for the purposes of evaluation, as follows: first it was practiced a minor tuning, that's mean, change of oil, gasoline filters, gasoline, oil and air to make a point engine. Under these conditions, the vehicle was mounted on the rollers of the chassis dynamometer described in the first stage.
3. It was applied a **test driving cycle, characteristic of the metropolitan area of the Valley of Mexico** with a duration of 1000 seconds, recording temperature of the oil, vehicle speed, fuel consumption and levels of concentration of the following gases: carbon monoxide (CO), carbon dioxide (CO₂), oxygen (O₂), unburned hydrocarbons (HC) and nitrogen oxides (NO_x).
4. **Set up of the vehicle engine**. According to information provided by the company, the product **MPG-CAPS™** was used in the fuel, so that the vehicle testing could consume approximately 500 liters of fuel. Thus, when the vehicle was submitted to the same tests that were conducted at baseline, and would ensure that the product **MPG-CAPS™** would affect the concentration of pollutant emissions and fuel consumption.



Taxi used as a vehicle for testing.

RESULTS OF THE SECOND PHASE

Below are the results of this second test where **the test vehicle traveled 4661 km and were loaded 498.89 liters of Magna gasoline**. There is a description of the behaviour of fuel WITH and WITHOUT the catalyst for fuel **MPG-CAPS™**.

1. In general we can see an increase in production rates of carbon dioxide (CO₂) compared to the baseline, but declines to decelerate sharply. It seems that the product **MPG-CAPS™** acts as a catalyst for oxidation reactions. The rate of CO₂ production with this product does not exceed a reasonable level, however increases respect to the baseline because it is very likely that rust products partially burned (CO).
2. The concentration levels of carbon monoxide (CO), are very much affected by the transient phenomena of acceleration and deceleration, however, the tests with **MPG-CAPS™** show a **significant decrease in CO, which means an improvement in the combustion process**. Despite the fact that levels in the baseline are low, it is clear that reduction over the cycle. These observations are complemented by CO₂ levels that were discussed in the preceding paragraph, that is, if the CO is reduced, it is very likely that the CO₂ increase by this fact.
3. The concentration of hydrocarbons (HC) that were not oxidized in the combustion chamber nor the catalyst, **is lower than the baseline when the product MPG-CAPS™** is used. This situation also explains the increase in CO₂ concentration, and **can be inferred that the combustion has been improved with the use of the product**.
4. The concentration of oxygen in the exhaust system, when the product **MPG-CAPS™** was used, shows a decrease compared with the baseline, but not constant because the generation of the measured species has been very "sensitive" to changes in the engine operation.
5. Finally, the concentration level of nitrogen oxides (NO_x) shows a decrease. There is again a variation which is subject to changes in vehicle speed and thus the engine. However, it is clear that the average levels of this gas is below the baseline, more clear, the product **MPG-CAPS™** in the fuel has led to lower levels of NO_x.

The results have been totally objective, and the Emission Control Laboratory of the Faculty of Engineering of the UNAM, states have no inclinations or tendencies of any kind in this regard.

Signature in accordance with every page. University City, Mexico City, on February 20th, 2008.

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