Emulsions of water in heavy fuel oil with water content of 10 and 20 wt. % were prepared by mechanical procedure without using any chemical surfactant. Emulsions were characterized by using differential scanning calorimetry (DSC), thermogravimetric analysis (TGA), rheology tests and microscopy. Stability of heated emulsions was dependent on water content, heated temperature, mixing regime and time of storage. However, it was satisfactory for a period of at least ten days, for both prepared emulsions. It was found that the best technique for accurate, precise and fast determination of water content in emulsion was DSC. Size of water droplets in oil and their agglomeration with time was followed with optical microscopy.

The experiments of use of emulsified fuel for burning in an industrial boiler under normal operating conditions showed significantly improved boiler efficiency (up to 4 %) with additional reduction of NO\textsubscript{x} emissions.