

# FIRP LABORATORY

FORMULATION, INTERFACES, RHEOLOGY & PROCESSES

School of Chemical Engineering,  
Universidad de Los Andes  
Mérida - Venezuela

## Electrostatic Lab. Dehydrator DE-110-M3

Dehydration of crude oil (removal of emulsified water) is a critical step in petroleum production and one of the main issues as far as specifications are concerned. Desalting of refinery streams is a related subject matter.

The formulation of demulsifying chemical products is often a time-consuming trial and error procedure. There are two reasons for that: first, the formulation adjustment of these products is complex and has to be accurate, and then, the (bottle) tests are sometimes quite long experiments, e.g. hours.

FIRP Lab. researchers have been working on the fundamental physical-chemistry of demulsification in the past 15 years, particularly on the demulsifier formulation. These investigations corroborated that the tests must be numerous and ought to involve different parameters (demulsifier type and HLB, salinity and temperature) and that they require a lot of time, particularly with viscous crudes.

The development of a laboratory dehydrator equipment was motivated by the need for a quick demulsifier evaluation in minutes instead of hours, so that a large number of degrees of freedom could be screened in a couple of days.

This equipment was developed in Mérida within a partnership between two Universidad de Los Andes facilities: The Laboratory for Formulation, Interfaces, Rheology and Processes (FIRP-ULA) and the Center for Technological Innovation (CITEC-ULA), with the backing of the *Agenda Petróleo* program from the Venezuelan Ministry of Science and Technology.

## TECHNICAL SPECIFICATIONS

**Fields of use:** Petroleum production, dehydration of crude oil, desalting of refinery streams, treatments of effluents and oil wastes, treatment of sludges in tank bottom and ponds.

**Applications:** Bottle and other tests, quality control of demulsifying and desalting formulations in the oil field and refinery.

**Users:** Specialists dealing with the treatment of water/oil emulsions, formulators and operators in the field and refinery.

### Technological characteristics:

The first prototype for research purposes had various AC/DC wiring options with full or half wave rectification. It allowed to set up the optimum conditions for a laboratory equipment.

The current 3rd generation equipment uses a DC half-wave with a maximum of 1,000 Volts. It features a security system that reduces the voltage when the intensity increases beyond a threshold. Voltage and intensity analog dials (VU meters) allow a continuous monitoring of the process. The equipment usually gives a good estimate of the formulation performance within 15 minutes.



COMMERCIAL MODEL M3 WITHOUT PROTECTOR.

Optional versions (built on demand) could be connected to a Wintel PC fitted with a data acquisition card to carry the operation and processing through a Labview® program.



DE-110-M3 WITH HIGH VOLTAGE PROTECTOR

### Advantages of this equipment :

When it is compared with other dehydrators which are commercially available, this apparatus: (1) does not produce sparks, (2) does not overheat or toast the sample, (3) has a lower rated voltage, and (4) is available at an attractive price.

### AVAILABLE NOW !

CITEC is currently manufacturing short series of model DE-110-M3, which is a portable (weights less than 10 lbs) and simplified version of the 3<sup>rd</sup> generation equipment, and is fitted with a plexiglass security protector. DE-110-M3 is available for FIRP Lab. industrial partners as a combo training/equipment offer.



UNIVERSIDAD  
DE LOS ANDES  
VENEZUELA

## INFORMATION & CONTACTS

Tel: 58(0)\*274-2402954/2402815

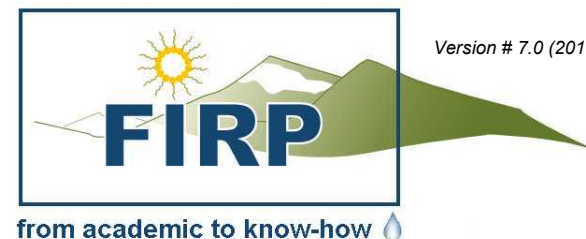
Fax 58(0)\*274-2402957

*\*Do not dial (0) if calling from abroad*

Web page <http://www.firp.ula.ve>

Secretary office [firp@ula.ve](mailto:firp@ula.ve)

Johnny Bullon, Director ([jbullon@ula.ve](mailto:jbullon@ula.ve))  
Ana Forgiarini, Deputy Director ([anafor@ula.ve](mailto:anafor@ula.ve))



Version # 7.0 (2011)