

## Rock Core Extraction *UniversalExtractor E-800, Recirculating Chiller F-308: Rock Core Extraction*

Rock cores provide essential data for the exploration, evaluation, and production of oil and gas reservoirs. Through measurement and analysis of porosity, permeability and fluid saturation from core samples, operators are better able to characterize pore systems in the rock and accurately model reservoir behavior to optimize production. In addition to rock matrix, core samples contain formation fluids. These formation fluids will typically contain a mixture of hydrocarbons and brine which must be completely removed from the pore spaces of the rock for analysis [1]. Soxhlet is the standard method used for rock core cleaning [2]. Alternatively, the rock cores can also be cleaned using Pressurized Solvent Extraction [3].

### 1. Introduction

For this Short Note a rock core sample was extracted using the UniversalExtractor E-800 with a Soxhlet warm method with sequential extractions using toluene, methanol and again toluene to extract all petroleum components while leaving the core intact. The remaining intact core can then be analyzed for characteristics such as porosity and permeability, the extracted petroleum is not of interest.

### 2. Experimental

Equipment: UniversalExtractor E-800 with chamber heater and universal chamber, Recirculating Chiller F-308.

Samples: Rock core sample (1.5" x 3"), Spiked with petroleum, the sample was supplied by an oil company.

Determination: The rock core sample was added into a tea bag (see Figure 1).



Figure 1: Rock core sample and rock core in tea bag

The tea bag containing the rock core was placed into the extraction chamber of the UniversalExtractor E-800 (see Figure 2) and the optical sensor was adjusted to the height of the rock core. The rock core was extracted with sequential extractions using the parameters shown in Table 1.



Figure 2: UniversalExtractor E-800

Table 1: Parameters for the extractions with the UniversalExtractor E-800

Extraction	1	2	3
Extraction method	Soxhlet warm	Soxhlet warm	Soxhlet warm
Solvent	Toluene	Methanol	Toluene
Extraction step	24 h	24 h	24 h
Heating level:			
Extraction heating	17	19	17
Chamber heating	6	4	6
Rinse step	-	-	-
Heating level	-	-	-
Drying 1	<input type="checkbox"/> AP 0 min	<input type="checkbox"/> AP 0 min	<input type="checkbox"/> AP 0 min
Heating level	-	-	-
Total number of extraction cycles	About 1000	About 1000	About 1000
Solvent volume	100 mL	100 mL	100 mL

After each extraction the tea bag containing the rock core sample will be dried in vacuum drying oven for 24 h at 45 °C and 25 mbar.

### 3. Results

After sequential extractions the rock core is intact and clean. (see Figure 3).



Figure 3: Rock core sample after sequential extractions

### 4. Conclusion

The removal of hydrocarbons and brine from rock core samples can be done with the UniversalExtractor E-800 with sequential extractions.

### 5. References

- [1] Mark A. Andersen, Brent Duncan, Ryan McLin, Schlumberger Houston, Texas, Oilfield Review Summer 2013: 25, no. 2.
- [2] American Petroleum Institute, Recommended practices for core analysis, rp40, Second edition, September 1996
- [3] BUCHI Whitepaper - Rock core extraction-Core cleaning and fluid extraction techniques, [www.buchi.com](http://www.buchi.com)

For more detailed information and safety considerations please refer to the Application Note No. 403/2020.