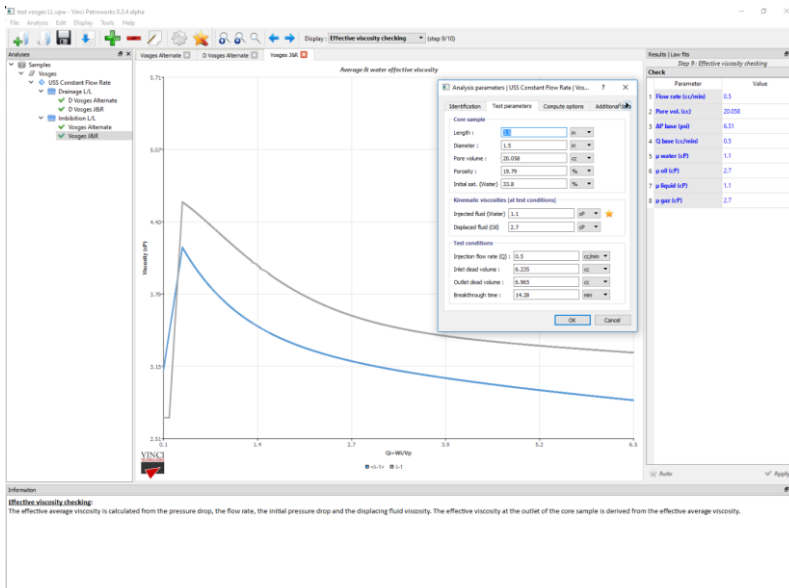# Petrophysical calculation software

PETROWORKS

General overview of Petroworks®

With years of special core analysis and software engineering experience, Vinci Technologies has developed the most efficient and ergonomic program to analyze SCAL experimental data: Petroworks®. Laboratory experimental data are inputted into the powerful software which will derive the critical SCAL parameters such as relative permeability and generate a fully comprehensive report for petroleum engineers. Advanced users are granted the freedom to dictate the data processing protocol (model selection, fit selection etc.). Multiple modules are available; each being dedicated to a specific type of experiment, e.g. unsteady state liquid/liquid and liquid/gas, relative permeabilities tests. Petroworks® has been designed for experimental core analysts, to replace the cumbersome and error-prone calculations on platforms such as Microsoft Excel having limited statistical flexibility. It is a Windows based program built to compute the relevant parameters of core flooding studies based on user input and Special Core Analysis Laboratory (SCAL) experimental data.
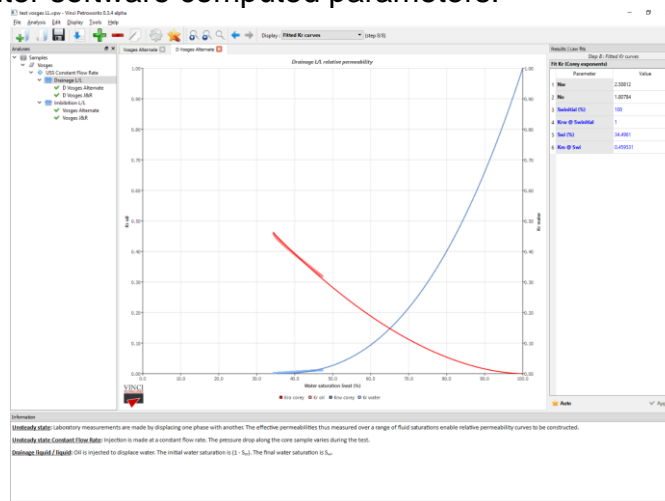
Benefits:

Petroworks® covers an ample range of core flooding experiments such as:
- ❖ Drainage and imbibition
- ❖ Constant pressure drop and constant flow rate injections
- ❖ Liquid / liquid and liquid / gas displacements
- ❖ Atmospheric pressure tests and high pressure tests

Petroworks® comprises a core module which can be combined with a variety of interpretation and analysis modules dedicated to the treatment of real experimental data. Special attention has been given to raw data corrections (inlet dead volume, outlet dead volume, gas expansion, etc.).

UNSTEADY STATE LIQUID / LIQUID RELATIVE PERMEABILITIES MODULE

This module allows unsteady state liquid/liquid relative permeability calculations using raw data obtained during core flood experiments. The user inputs the sample's geometry, dynamic viscosities of the test fluids and experimental conditions (constant pressure or constant flow rate, confining pressure and temperature). If a brine of unknown viscosity is utilized, the software can estimate this quantity based on density and salinity. Petroworks® will then plot the experimental data (injection & production flow rates and differential pressure) and automatically apply a dead volume correction. Subsequently, the end point relative permeabilities, absolute permeability, average and local saturations and effective average viscosities. The architecture warrants easy data upload and fast data treatment. The last step before obtaining the results consists of selecting one of the numerous available models, e.g. the "alternate" method, "JBN" (Johnson, Bossler & Naumann) method, "Jones & Rozelle" method, etc. The user can easily select alternate models and compare the differences in results. The program will then automatically select the best fit for the data (bi-exponential, polynomial…), however the user can override this selection and also manually enter software computed parameters.

UNSTEADY STATE GAS / LIQUID RELATIVE PERMEABILITIES MODULE

This module allows unsteady state gas/liquid relative permeability calculations using raw data obtained during core flood experiments. The user inputs the sample's geometry, dynamic viscosities of the test fluids and experimental conditions (constant pressure or constant flow rate, confining pressure and temperature). If a brine of unknown viscosity is utilized, the software can estimate this quantity based on density and salinity. Petroworks® will then plot the experimental data (injection & production flow rates and differential pressure) and automatically apply a dead volume correction. Subsequently, the end point relative permeabilities, absolute permeability, average and local saturations and effective average viscosities. The last step before obtaining the results consists of selecting one of the numerous available models, e.g. the "alternate" method, "JBN" (Johnson, Bossler & Naumann) method, "Jones & Rozelle" method, etc. The user can easily select alternate models and compare the differences in results. The program will then automatically select the best fit for the data (bi-exponential, polynomial…), however the user can override this selection and also manually enter software-computed parameters. In gas/liquid relative permeability experiments, Petroworks® will automatically calculate the gas's compressibility factor (z).