**Info sheet**: A3020 / rev_01/0712

# MultiScale™

MultiScale is a simulation software developed to help with calculations on the mineral scaling potential all the way through the production system, from reservoir to top side. It is possible to run simulations up to 1000 bar and 300°C in salt saturated systems due to MultiScale's powerful underlying thermodynamic model.

- Accurate model for water equilibria
- Complete PVT-model which can calculate bubble point and phase distribution
- Especially developed to meet the challenges related to the pH dependent carbonate scaling (HPHT wells, injection of produce water, reinjection of $CO_2$)
- Very accurate model for calculating evaporation of water at various conditions

# Expro Petrotech® Analysis Services

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## MultiScale™


### What is MultiScale?

Water chemistry and mineral sc aling prediction program

### Input

- Water analysis
- Oil/gas analysis
- Pressure/temperature

### Output

- 3-phase equilibrium, phase compositions of oil, gas and water
- pH, ion concentrations etc.
- Scale potential and amount of salt precipitated
- Phase properties

### Overview

- MultiScale can be used to predict the scaling tendency of the following minerals:

- NaCl, KCl
- $BaSO_4$ , $SrSO_4$ , $CaSO_4$ (a, g, h)
- FeS
- $CaCO_3$ (c, a, v) , $FeCO_3$, $BaCO_3$, $SrCO_3$, $NaHCO_3$, $KHCO_3$, $Na_2CO_3$ (a, d, m), $K_2CO_2$ (h, a)
- NaAc (t, a)
- $Mg(OH)_2$

- Single point and simplified pH calculations
- Automatic tuning of water; alkalinity, $CO_2$ and correction for water evaporation
- SR can be choosen (<>1 or in %) and you can select if precipitated salts shall be taken into the next calculation level or not
- Very good handling of water evaporation also for gas/ condensate systems with very little water
- Organic acid can be entrered as separate acids (Methanoic, Acetic, Propanoic, Butanoic)
- Organic acid distribution in gas and oil phase
- pH predictions have been verified with actual measurements at high temperatures and pressures
- Program parameters are updated with latest available data from reliable sources

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## MultiScale™


### User interface

- Excel format on report data
- Loading/storing of ongoing projects
- Integrated manual as web pages as well as in pdf format
- Direct link to external web pages
- Tree view
- Direct access to windows - faster calculations
- 6 waters, 6 oils and 6 gases

### Stream calculations

- Waters, oils and gases are combined to streams
- A stream can contain water and/or oil and/or gas
- Streams can be saved, used later and may be combined with any other stream
- Streams can be used in process simulations
- (see brochure “MultiScale™ Process Simulation Module”)

### PVT model

- - Similar to standard PVT packages
- - 16 components + 9 pseudo components (+ fraction)
- - SRK or PR with Peneloux and Huron-Vidal mixing rule
- - Accurate volumetric and phase distribution

### Save results for later use

- - Water phase, oil phase, gas phase and oil+gas phase are saved as analyses that can be opened in later calculations
- - Results are also saved as streams
- - Process calculations much easier
- - Ongoing project calculations can be saved/reloaded

### Options

- - MEG module for simulation in systems treated with MEG
- - $H_2S$ scavenger module
- - Process simulation module
- - .dll file for use in other programs

## Specification

- Working range: 300°C and 1000 Bar
- Mixing of up to 6 waters, 6 oils and 6 gases
- Stream calculations
- PVT model, similar to standard PVT packages
- Automatic tuning of water; alkalinity, CO and correction for water evaporation
- Prediction of the water chemistry and the scaling tendency for the following minerals:

- NaCl, KCl
- $BaSO_4$ , $SrSO_4$ , $CaSO_4$ (a, g, h)
- FeS
- $CaCO_3$ (c, a, v) , $FeCO_3$, $BaCO_3$, $SrCO_3$, $NaHCO_3$, $KHCO_3$, $Na_2CO_3$ (a, d, m), $K_2CO_3$ (h, a)
- NaAc (t, a)
- $Mg(OH)_2$

## Contact information, software and courses:

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*System requirements:*
*Windows XP, Windows Vista or Windows 7*

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