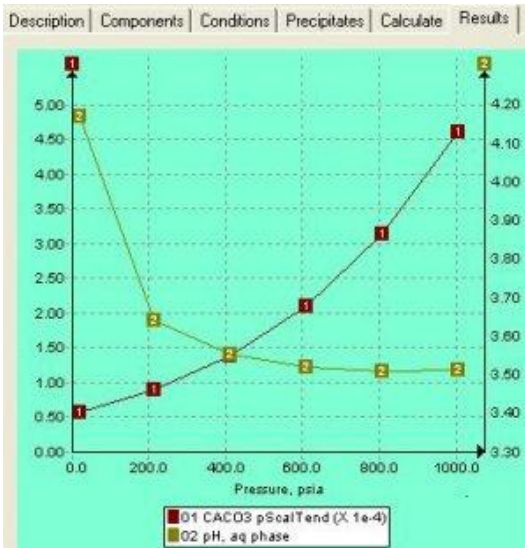
PRODUCT DESCRIPTION

OLI ScaleChem



ScaleChem is simulation software for the assessment of scaling problems in oil and gas production. ScaleChem is synonymous with accurate oilfield scaling prediction.

ScaleChem calculates the phase separation and scaling tendencies of brines at the extreme, HTHP conditions characteristic of today's well conditions.

ScaleChem has standard scales that include:

anhydrite $CaSO_4$	iron sulfide FeS
barite $BaSO_4$	halite NaCl
calcite $CaCO_3$	celestite $SrSO_4$
gypsum $CaSO_4.2H2O$	dolomite $CaMg(CO_3)_2$
siderite $FeCO_3$	

and over 70+ less common scales

Scaling tendencies for every solid with a scaling index > 1.0E-05 will be reported for a calculation request which uses expanded solids.

FEATURES

- **Well Profiles** — ScaleChem can be used to calculate scaling tendencies at user specified temperatures and pressures. Detailed phase reports and solids formation is given at each point.
- **Mixing Compatible Waters** — Check the compatibility of different waters at user specified ratios, in order to find safe ratios (no solids formation) for injection and disposal operations.
- **Saturation at Reservoir Conditions** — Saturate a water with respect to one or more solids to simulate reservoir conditions.
- **Facilities Calculations** — Simulate the filtering, mixing and separating of waters in post-processing, surface operations.

PRODUCT DESCRIPTION

SCALECHEM

CHEMISTRY

Cations (17 total)	H^+, NH_4^+, Na^+, Mg^{2+}, K^+, Ca^{2+}, Sr^{2+}, Ba^{2+}, Fe^{2+} Al^{3+}, Cs^+, Cu^+, Cu^{2+}, Fe^{3+}, Ni^{2+}, Pb^{2+}, Zn^{2+}
Anions (19 total)	OH^-, Cl^-, SO_4^{2-}, HCO_3^-, CO_3^{2-}, SO_3^{2-}, F^-, Br^-, NO_3^-, NO_2^-, $B(OH)_4^-$, $H_3SiO_4^-$, HSO_3^-, HSO_4^-, S^{-2}, $COOH^-$, CH_3COO^-, $C_2H_5COO^-$
Solids (70+ total)	$CaCO_3$, $FeCO_3$, $CaSO_4$, $CaSO_4.H_2O$, $BaSO_4$, $SrSO_4$, & NaCl plus the scales of F^-, O^{-2}, OH^-, Cl^-, Br^-, S^{-2}, S^o, and organic Acids
Soluble Organics	CO_2, H_2S, CH_4, MeOH, EtOH, MEG, H_3BO_3, HNO_3, HCl, H_2SO_4, NH_3, SiO_2, Organic Acids from C1 to C4
Gases	H_2S, CO_2, CH_4, C_2H_6, C_3H_8, n-C_4H_{10}, i-C_4H_{10}, n-C_5H_{12}, i-C_5H_{12}, C_6H_{14}
Hydro-carbons	Pure Components – C1-C20, Pseudocomponents per PVT or client data

Using OLI AQ thermodynamic model:

Complete speciation	Model predicts & considers all of the true species in solution in the range of -50 to 300^o C, 0 to 1500 bar, & 0 to 30 molal ionic strength.
Robust standard state framework	Based on the Helgeson equation of state, parameter regression and proprietary estimation techniques
Activity Coefficients	Based on the combined work of Bromley, Zeimaitis, Meisnner, Pitzer and OLI technologists
Thermo-physical properties	Unique chemical /physical based models to compute thermodynamic and transport properties for complex aqueous mixtures

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• Hydrocarbon phase	Available for all calculations and defined in one of three ways as: Characteristic C1 - C20, Pseudocomponents, or Petroleum fractions. For petroleum fractions, ASTM D86, D1160, D2887 or TBP curves supported
• High-calcium brine predictions	Updated literature searches and updated data regressions
• Gas hydrate effects on brine chemistry	Methanol, ethanol and propylene glycol were added as components - These components used in gas hydrate treatment can have an effect on brine chemistry by influencing the water activity. Concentrations valid to 70% weight
• Databanks consistent with Analyzer V3.1 / ESP 8.2	Updated 8/2010

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