

Portable Filtration and Injectivity Performance for Produced Water

PURPOSE

The purpose of the Portable ScavSol™ Injectivity Performance Stimulation is to have a quantitative, predictive, and portable method to determine particle size, compositional make-up, and volume through-put performance for aqueous fluids being injected into a reservoir.

OVERVIEW

Utilizing a filtration process, ScavSol™ can be evaluated for injectivity. The resulting filtered liquor can be used to demonstrate iron solubility in a FIPT (Force Ion Precipitation Test) with bleach (preferred) or Sodium Hydroxide (although at lower stoichiometric value of ScavSol™, calcite may be visible). FIPT can also be done before filtration if the conditions exist where oxidizers are utilized in the client's process.

BACKGROUND INFORMATION

A filtration technique is often employed to differentiate between suspension and colloidal mixtures. The quantitative measurement allows the technician to understand if precipitation and potential fouling onset is occurring. **Table 1** displays the properties and characteristics of solutions, colloids, and suspensions.

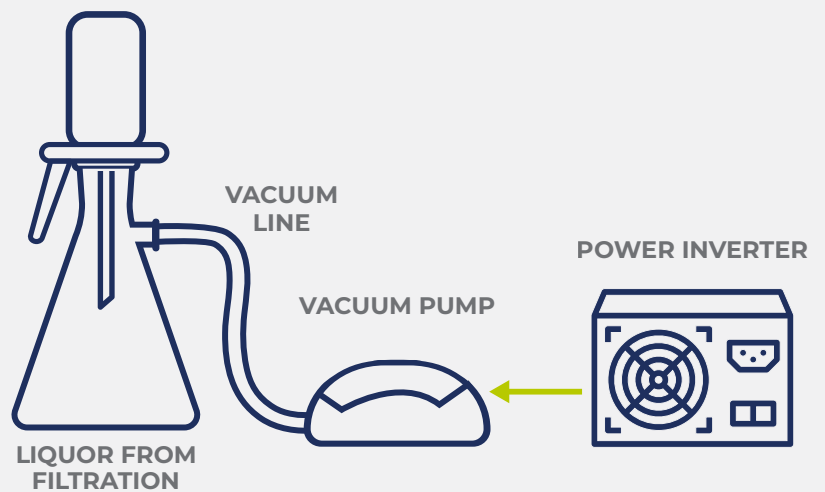


Figure 1. Portable ScavSol™ Injectivity Performance Stimulation (IP² Predictive Method)

Table 1. Properties of Solutions, Colloids, and Suspensions

SOLUTION	COLLOIDS	SUSPENSIONS
Homogeneous	Heterogeneous	Heterogeneous
Particle size: 0.01-1nm. atoms, ions, or molecules	Particle size: 11-1000nm, dispersed, large molecules or aggregates	Particle size: over 1000nm, suspended: large particles or aggregates
Do not separate on standing	Do not separate on standing	Particles settle out
Cannot be separated by filtration	Cannot be separated by filtration	Can be separated by filtration
Do not scatter light	Scatter light (Tyndall effect)	May either scatter light or be opaque

EXAMPLE OF LABORATORY SIMULATION

The lab test example consisted of produced water obtained from a produced water operator in the Delaware Basin. The information below illustrates the variance of particle size on through-put predictions. The volume variances are dependent on water make-up and chemical additions.

The water tested in **Table 2** contained <10 ppm iron and >50 ppm calcium from divalent analysis. A higher than normal dose rate was utilized to differentiate between scale and chemical effects on the 0.45-micron filter.

EASE AND SPEED OF DEPLOYMENT

Solugen’s IP² predictive injectivity performance simulator allows for rapid field evaluation of injection waters with regards to particle size and reactivity (pH and oxidation).

Table 2. Portable ScavSol™ Injectivity Performance Stimulation (IP² Predictive Method)

PRODUCT TESTED	CONCENTRATION	FILTER SIZE	VOLUME OF WATER FILTERED AT 3 MIN (MLS)
Blank	NA	0.45 Micro	30
ScavSol™ 60	2,000 ppm	0.45 Micron	70 (Scale Inhibitor / Chelant)
HP 34	2,000 ppm	0.45 Micron	30 (Oxidizer)
SG8HP25	2,000 ppm	0.45 Micron	60 (Oxidizer + Scale Inhibitor / Chelant)



Figure 2. Portable ScavSol™ Injectivity Performance Stimulation (IP² Predictive Method)

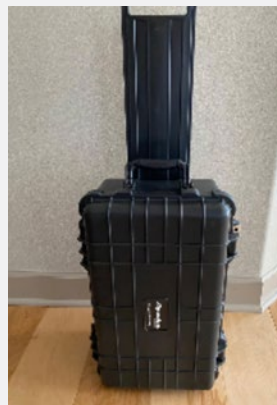


Figure 3. Portable ScavSol™ Injectivity Performance Stimulation (IP² Predictive Method); filtration equipment, power inverter for tailgate testing