



PRO-800 and PRO-802  
Autoclave Corrosion Inhibitor Testing  
August 2014

## **Introduction**

Mitigation of corrosion in the production and field treatment of crude oil & natural gas is of major importance to the oil industry to avoid the consequences of pipeline and equipment failure. Apart from the choice of materials of adequate resistance, corrosion inhibitors represent one of the best ways of providing effective protection and thus minimizing operating costs.

To investigate the performance of ProChem PRO-800 & PRO-802 corrosion inhibitor products using autoclave weight loss corrosion test method for batch inhibitor and continuous corrosion inhibitor applications.

## **Testing Procedure**

ASTM G170: Standard Guide for Evaluating and Qualifying Oilfield and Refinery Corrosion Inhibitors in the Laboratory.

## **Materials**

Coupons: CS1018 Carbon Steel (2" X 7/8" X 1/8")

Synthetic brine based on water analysis

Products: PRO-800 [Batch Corrosion Inhibitor] & PRO-802 [Continuous Corrosion Inhibitor]

### Autoclave Apparatus

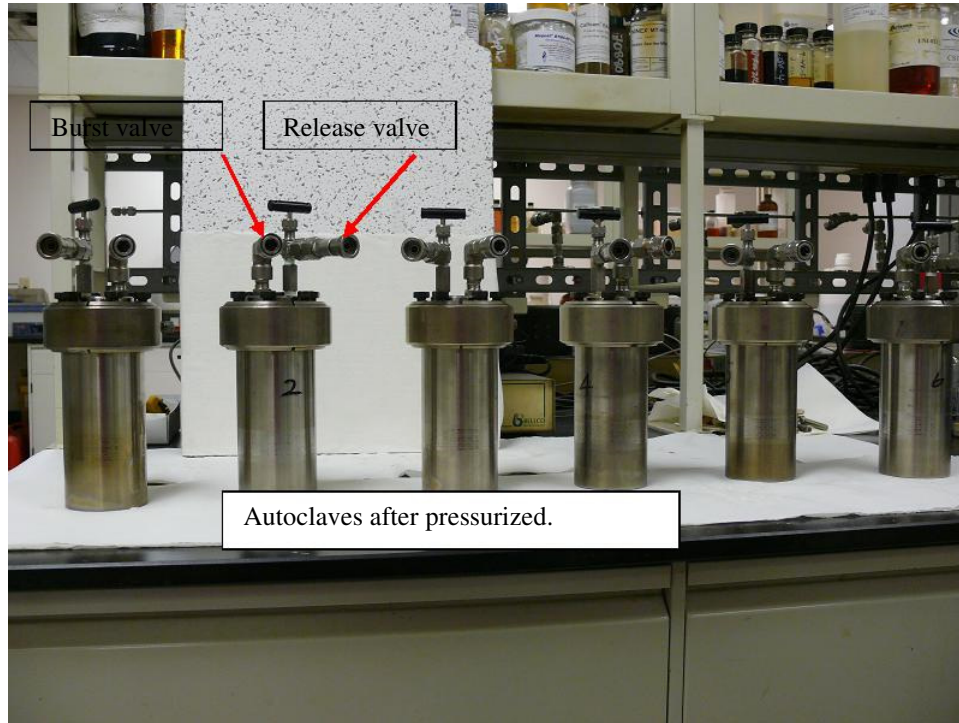


Figure.1 Autoclaves

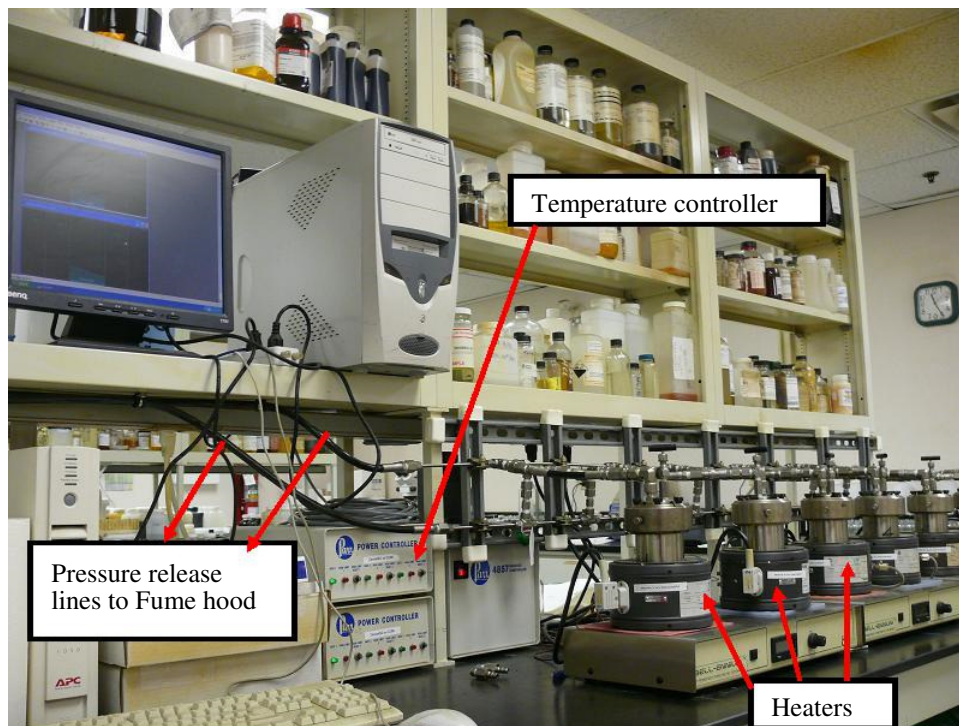


Figure.2 Autoclaves

### **Autoclave Standard Procedure**

Parts are numbered, keep numbered parts together.

Fill cell with appropriate amount of fluid applicable to the field testing.

Hang coupons on coupon holder using appropriate hardware and Teflon spacers opposite to each other on top and bottom.

Tighten hardware on using the 7/16" wrench. Screw coupon holder into center port on the underside of the lid, tighten using the 7/16" wrench.

Add chemical.

Place lid on cell body.

Tighten bolts hand tight. Tighten bolts to 25 ft-lbs using a crisscross pattern. After 5 minutes tighten the bolts again to 25 ft-lbs using a crisscross pattern.

Pressurize the bombs with CO<sub>2</sub>, H<sub>2</sub>S and N<sub>2</sub> as per testing requirements and place them in heated jacket to carry out the test at required temperature.

### **Coupon Cleaning Procedure**

IPA/Xylene 50:50 mix – scrub with brush in IPA/Xylene mix.

15% Hydrochloric Inhibited Acid – Dip into acid briefly – scrub with brush.

Methanol – Rinse to dry.

Zero balance and weigh.

Do calculations and observations.

### Tests Parameters

<b>Total Pressure (psi)</b>	500	<b>Coupon Material</b>	CS 1018
<b>H<sub>2</sub>S (psi)</b>	30.0	<b>Coupons Precorroded?</b>	Yes
<b>CO<sub>2</sub> (psi)</b>	10.0	<b>Precorrode Solution</b>	Brine
<b>N<sub>2</sub> (psi)</b>	460.0	<b>Length of Precorrode</b>	24 hrs
<b>Temperature (°C)</b>	Room (20~22)	<b>Speed (rpm)</b>	30*

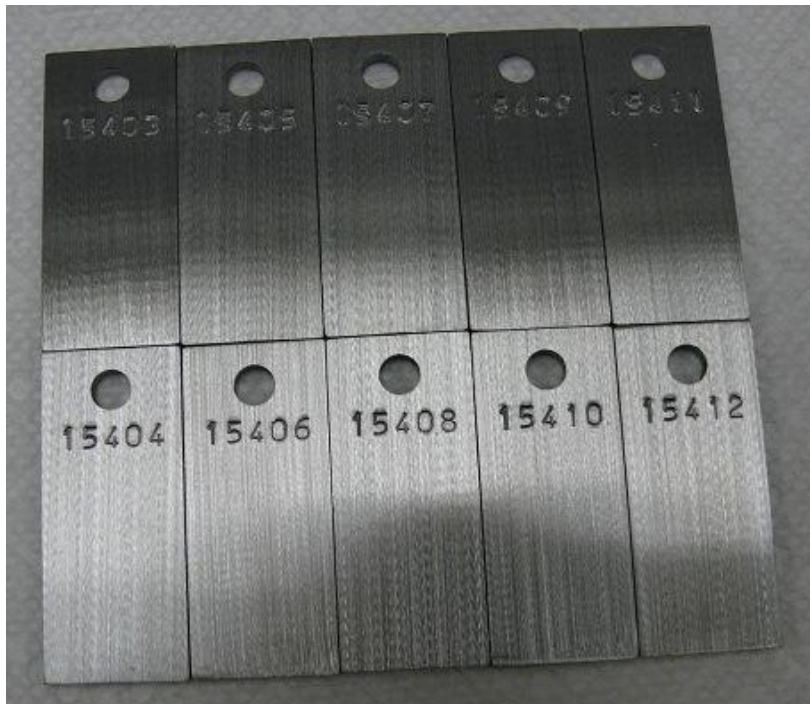
\*30 RPM ~ 8m/s

### Synthetic Brine

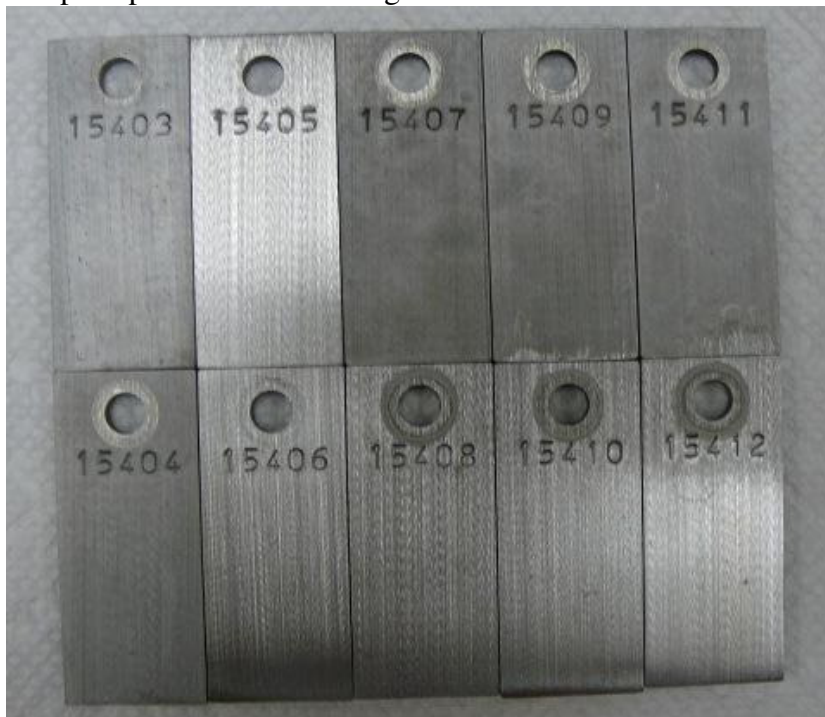
Ion	Cl <sup>-</sup>	HCO <sub>3</sub> <sup>-</sup>	SO <sub>4</sub> <sup>2-</sup>	Ba <sup>2+</sup>	Sr <sup>2+</sup>	Mg <sup>2+</sup>	Ca <sup>2+</sup>
ppm	2403	290	1	59.8	24.4	12.3	67.3

### Test results (Corrosion inhibitor used – Pro-800 & Pro-802)

Products tested	Concentration (ppm)	Phase	Corrosion Rate (mpy)	Coupon Observation
Blank	NA	Gas	21.27	General etching and no pits (15403)
		Water	15.11	General etching and no pits (15404)
PRO-800	Dipped	Gas	0.76	General etching and no pits (15405)
		Water	0.87	General etching and no pits (15406)
PRO-802	25	Gas	22.52	General etching and no pits (15407)
		Water	1.41	General etching and no pits (15408)
PRO-802	100	Gas	19.21	General etching and no pits (15409)
		Water	1.59	General etching and no pits (15410)
PRO-802	250	Gas	16.36	General etching and no pits (15411)
		Water	1.19	General etching and no pits (15412)



Coupons picture before testing



Coupons picture after testing



## Conclusion

Based on the above tests' results, PRO-800 batch product provides good batch corrosion inhibition protection [94.2%] when tested under the above test conditions. PRO-802 continuous injection above 25 ppm can provide good corrosion inhibition protection [90.7%] and at 250 ppm provided good corrosion inhibitor protection [92.1%] when tested under the above conditions.