



## Corrosion Coupons

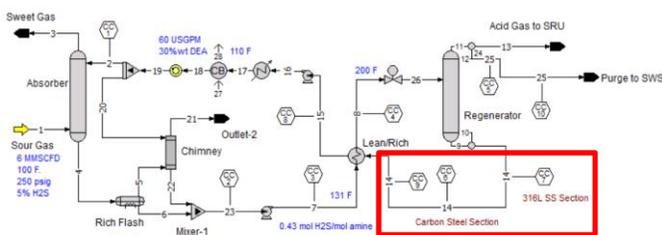
In ProTreat®, Corrosion Coupons can be attached to a material stream to calculate wet acid gas corrosion and predict constant condition corrosion rates. This can be used in a wide variety of ways including predicting corrosion rates for hot and cool rich and lean amine solutions, regenerator overhead condensate, pump around loops, sour and stripped water, and many more.

The corrosion coupon was first developed and released in 2014 with ProTreat version 5.3 and was then expanded to include specific two-phase flow regimes in 2015 with version 5.4. The corrosion coupon can be found in the top object pallet, as shown in Figure 1, and is a hexagon with “CC” in the center.



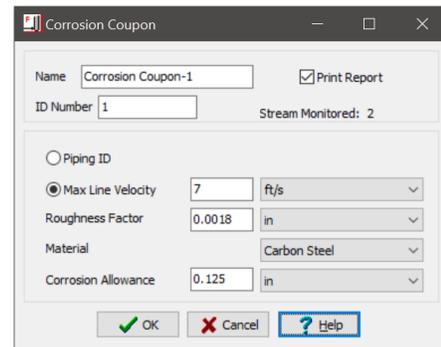
**Figure 1. Object Pallet with Corrosion Coupon**

This icon can be placed on any liquid, or mostly liquid, material stream as shown in Figure 2. You can also connect more than one Corrosion Coupon to a single stream, but only one coupon may be placed on an individual stream segment. Figure 2 also illustrates multiple Corrosion Coupons on a single material stream. Multiple coupons are useful for material studies, pipe size and velocity studies, and others. Once the coupon icon has been placed on the material stream, double click on it to open the dialog box shown in Figure 3.



**Figure 2. Amine Unit with Corrosion Coupons**

Pipe size or pipe velocity are needed to calculate the shear stress at the pipe wall. Next, a roughness factor is specified as well as the pipe material and a corrosion allowance. The corrosion allowance is used to calculate the expected service life of the pipe while the other specifications are used along with the ionic speciation data for the material stream to calculate a corrosion rate.



**Figure 3. Corrosion Coupon Dialog Box**

Once all the pertinent information has been entered and the simulation has been converged, the results of each Corrosion Coupon are available. Similar to viewing the results of a unit operation block, double clicking on the icon will open the detailed results for a Corrosion Coupon (Figure 4).

Corrosion Coupon-1 [Corrosion Coupon Block]		
Stream Monitored	2	
Piping ID*	1.775	in
Velocity	7	ft/s
Roughness Factor	0.0018	in
Material	Carbon Steel	
Corrosion Allowance	0.125	in
Flow Regime	Liquid only	
Reynolds Number	56263.064	
Piping Configuration	Corrosion Rate (mpy)	Service Life (Years)
Straight Pipe	3.581	34.906
3-D Bend	3.745	33.380
90° Elbow	4.179	29.910
Weld protrusion	4.451	28.083

**Figure 4. Corrosion Coupon Results**

The results will echo back various inputs as well as display the calculated results. There are four main pipe configurations that are calculated; Straight Pipe, 3-D Bend, 90° Elbow, and a Weld Protrusion. Each of these has a different corrosion rate and service life.

**PROTIP:** Place Corrosion Coupons all around your simulation, as seen in Figure 2, to help monitor whether certain design parameters should be manipulated in order to help reduce the corrosion rates or whether upgraded metallurgy should be considered.

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