1-9. A carbon steel test specimen of dimensions 2-inch by 3-inch by 0.125-inch with a 0.25-inch diameter hole for suspending in solution is exposed for 120 hours in an acid solution and loses 150 milligrams in weight. Calculate the corrosion rate in mpy and in microns/hour.

\[ A_s = 2(2*3) + 2(2*0.125) + 2(3*0.125) - 2(\pi*0.25^2/4) + \pi*0.25*0.125 \]
\[ = 13.25 \text{ in}^2 * (2.54 \text{ cm/inch})^2 = 85.5 \text{ cm}^2 \]

\[ CR = \frac{150/1000}{7.87\text{ g/cm}^3/85.5\text{ cm}^2} = \frac{2.23\times10^{-4}\text{ cm/hr}}{2.54\text{ cm/in}\times1000\text{ mil/inch}\times24\text{ hr/day}} \times 365\text{ day/year} = 6.40 \text{ mpy} \]

1-11. Three more identical test specimens are included with the one from problem 2 in a planned interval testing program. One is exposed for 12 hours and loses 25 mg. A second is exposed for 108 hours and loses 130 mg. The third is inserted into the solution when the second is removed and shows a weight loss of 15 mg after removal with the specimen of problem 2. What is the effect of time on the solution corrosiveness and on the specimen corrodability?

\[ \text{comparing } 25 \text{ mg loss [at start] with } 15 \text{ mg [at end], [B<A]} \] 
\[ \text{corrosiveness is decreasing} \]

\[ \text{comparing } 150-130 = 20 \text{ with } 15 \text{ [A>B], corrodability is increasing} \]