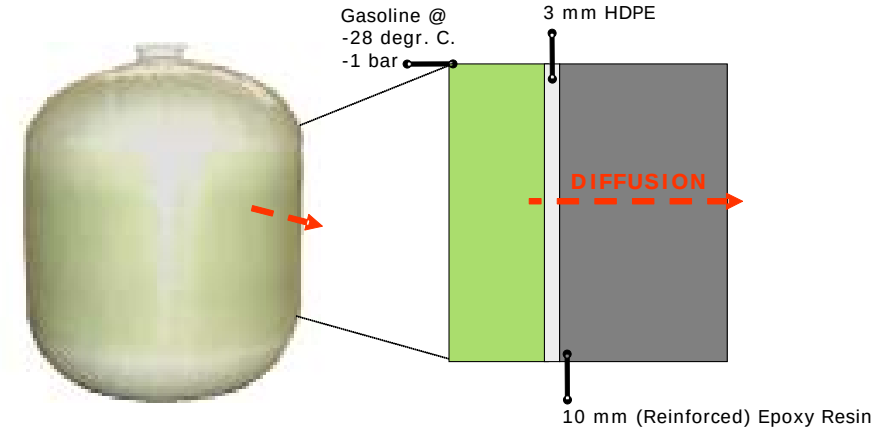
Gasoline in multilayer tank

Case Description

Gasoline is stored in a multilayer tank. The wall of the tank consists of two polymers in series: a high density Polyethylene liner of 3 mm and a structural part of 10 mm Epoxy resin. A picture of the tank and cross section of the wall is shown below.



The question related to this tank for Gasoline is the following:

What is the diffusion and chemical resistance with regard to Gasoline?

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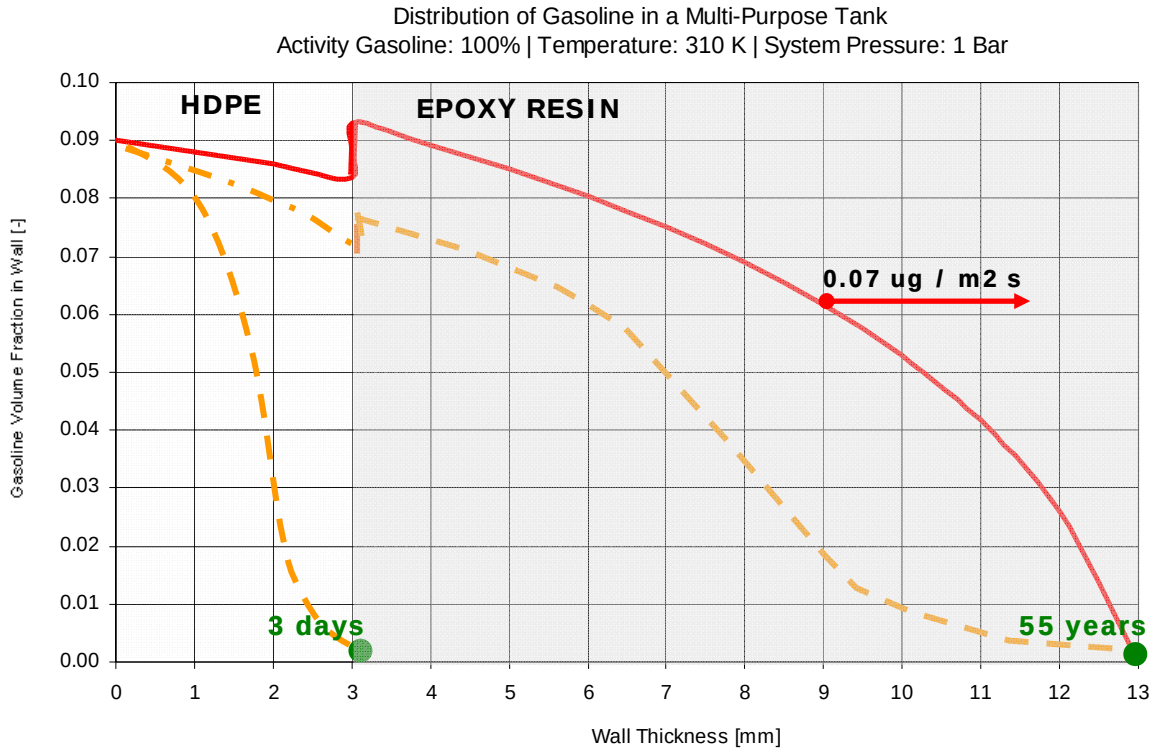
Results

Below we depict the simulation results:



The lines in orange color show subsequently: the distribution when the first measurable amount of molecules of Gasoline reach the interface between the liner and the Epoxy resin, and the moment that Gasoline reaches the outside environment of the pipeline. The time lag is shown in green font. The red line visualizes the steady state distribution. The mass transfer per square meter wall for this state is included.

What becomes clear from this case is that pollution of the environment is not the major concern. After 55 years the mass transfer per square meter wall increases until the steady state flux of 0.07 micro gram per square meter second is reached after around 100 years.

However, the case demonstrates the importance of the binding between the two polymers. The Gasoline reaches the interface quickly, after 3 days. When the interface is not perfectly tight, the gasoline will accumulate here.