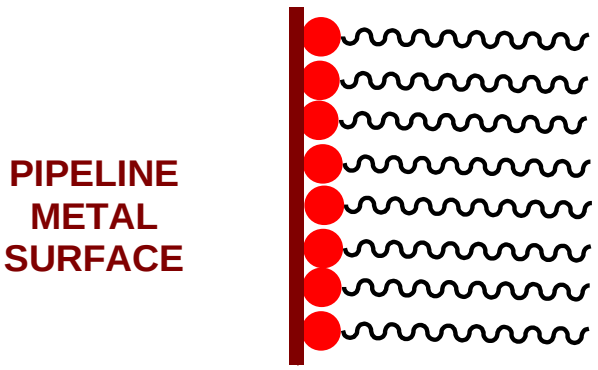
HPCORRMIT

A Novel Cost Effective Corrosion Inhibitor for LPG pipelines

Pipeline transportation is a cost effective and safe mode for long distance transportation of petroleum products. Corrosion is one of the major problem in pipeline transportation, which leads to leakage of gases, fuels and may lead to accidents. In the recent past, leakages in hydrocarbon pipelines occurred due to corrosion. The presence of carbon dioxide (CO2), hydrogen sulphide (H2S) and free water can cause corrosion problems in oil and gas pipelines. To mitigate the problem, the corrosion inhibitors (CI) are injected into pipelines at very low dosage level (ppm). The corrosion inhibitor forms a protective film on the metal surfaces and thereby inhibits corrosion caused by acidic moieties petroleum products in the pipeline. At present very few commercials additives available for LPG pipelines.

HPCL has carried out the research on development of novel cost effective corrosion inhibition formulations for transporting liquefied petroleum gas (LPG.) A novel accelerated corrosion evaluation method is developed based on rotating cage experiment compliance to ASTM G-209 and validated by standard commercial CI sample. Different formulations were synthesized and evaluated by using rotating cage and electrochemical methods. The corrosion rates are measured for the coupons in the presence of developed CI formulations. During the accelerated corrosion evaluation test, it has been found that the corrosion rates for different MOCs, such as, Carbon steel, SS316 was found to be <1mpy for a period of one year, which is meeting the technical specifications.

Corrosion inhibitor binding mechanism:



In order to carry out the demonstration trial at MHBPL (Mangalore Hassan Bangalore pipeline), the optimized formulations have been scaled-up to tonnage level and produced 45MT for demo trial. The cost of the in-house developed CI formulations approximately 50 % of imported product price. Subsequently, demo trial is being carried out during October 2017 to till date. It was observed that the corrosion rate is low

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throughout (0.3 to 0.4 mpy) the pipeline in comparison with the benchmark 0.5 to 0.7mpy.

Table 1: The corrosion Inhibitor data from rotating cage experiment.

S.NO	Sample	Corrosion Rate (mpy)	Inhibitor Efficiency (%)
1	BLANK	1.0997	NA
2	REF	0.2388	78.29
3	HP-CI4	0.0411	96.27
4	HP-CI10	0.0574	94.78
5	HP-CI11	0.0319	97.1
6	HP-CI12	0.0376	96.59

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