

Studi pengaruh waktu terhadap korosi mikrobiologi baja karbon API 5L Grade B pada lingkungan air formasi = Study of time effect to microbiology influenced corrosion for API 5L grade B carbon steel in formation water

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Abstrak

[ABSTRAK

Penelitian ini bertujuan untuk mempelajari pengaruh waktu terhadap korosi mikrobiologi yang diaplikasikan pada material baja karbon API 5L grade B. Media lingkungan yang digunakan dalam penelitian ini adalah air formasi yang berasal dari sistem injeksi salah satu perusahaan minyak dan gas di Indonesia. Air formasi itu sendiri adalah produk buangan yang berasal dari proses pengolahan minyak dan gas yang kemudian diinjeksikan kembali ke dalam tanah melalui sumur yang tidak lagi aktif berproduksi. Penelitian dilakukan melalui metode uji celup korosi dengan lima periode waktu yang berbeda yaitu 3, 6, 9, 12, dan 15 hari. Hasil penelitian menunjukkan bahwa waktu memiliki pengaruh terhadap korosi mikrobiologi yang terjadi. Laju korosi yang dihitung dengan metode kehilangan berat menunjukkan nilai yang terus mengalami penurunan dengan adanya pertambahan waktu dimana periode waktu tiga hari memiliki laju korosi terbesar yaitu 5.080 mpy dan laju korosi terkecil terjadi pada periode pencelupan selama lima belas hari dengan nilai sebesar 1.874 mpy. Fenomena ini memiliki kesesuaian dengan jumlah koloni bakteri yang juga mengalami penurunan seiring dengan bertambahnya waktu dengan jumlah koloni terbesar pada periode pencelupan selama tiga hari yaitu sebesar 329000 cfu dan terus menurun hingga mencapai titik terkecilnya pada periode uji selama lima belas hari yaitu sebanyak 61000 cfu. Berdasarkan pengamatan terhadap morfologi kerusakan, penelitian ini menunjukkan adanya korosi seragam dengan adanya pembentukan tubercle yang disebabkan oleh bakteri aerob dan korosi sumuran yang disebabkan oleh bakteri pereduksi sulfat.

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ABSTRACT

The purpose of this research is to study the effect of time to microbiology influenced corrosion which applied to API 5L grade B carbon steel. Medium which used in this research is produced water disposal from one of oil and gas company's water well injection system in Indonesia. Produced water disposal itself is by-product from oil and gas processing which re-injected to the earth through injection well which is no longer active in production. The research was conducted using immersion corrosion test method in five different time period i.e. 3, 6, 9, 12, and 15 days. Result of this research shows that time really has an effect to microbiology influenced corrosion which occurred when the test conducted. Corrosion rate which counted using weight loss method shows gradually decreasing value to the increasing time period where three days period of immersing specimen has the highest corrosion rate in the amount of 5.080 mpy and fifteen days period has the lowest corrosion rate with the amount of 1.874 mpy. This phenomenon has consistency to the colony form unit which reduced to the increasing time which the most number of colonies is in three days period as many as 329000 cfu and gradually decrease to its fewest number of colonies in fifteen days period which has 61000 cfu. Based on specimen's failure morphology, this research shows the developing corrosion is uniform corrosion through the establishment of tubercle which caused by aerobic bacteria and

pitting corrosion which caused by sulfate reducing bacteria (SRB)., The purpose of this research is to study the effect of time to microbiology influenced corrosion which applied to API 5L grade B carbon steel. Medium which used in this research is produced water disposal from one of oil and gas company's water well injection system in Indonesia. Produced water disposal itself is by-product from oil and gas processing which re-injected to the earth through injection well which is no longer active in production. The research was conducted using immersion corrosion test method in five different time period i.e. 3, 6, 9, 12, and 15 days. Result of this research shows that time really has an effect to microbiology influenced corrosion which occurred when the test conducted. Corrosion rate which counted using weight loss method shows gradually decreasing value to the increasing time period where three days period of immersing specimen has the highest corrosion rate in the amount of 5.080 mpy and fifteen days period has the lowest corrosion rate with the amount of 1.874 mpy. This phenomenon has consistency to the colony form unit which reduced to the increasing time which the most number of colonies is in three days period as many as 329000 cfu and gradually decrease to its fewest number of colonies in fifteen days period which has 61000 cfu. Based on specimen's failure morphology, this research shows the developing corrosion is uniform corrosion through the establishment of tubercle which caused by aerobic bacteria and pitting corrosion which caused by sulfate reducing bacteria (SRB).]