ABSTRAK

Proses korosi yang terjadi pada unit penukar panas (*Heat Exchanger)* sangat komplek dan sering kali sulit terdeteksi sampai kebocoran pipa penukar panas terjadi. Tingkat korosi tergantung pada kualitas air pendingin (kandungan konstituen-konstituen agresif seperti ion-ion Cl-, $SO4^{=}$,gas terlarut O_2, C_{12}, CO_2 dan H_2S, padatan terlarut dan kesadahan), jenis material konstruksi, kondisi operasi seperti laju alir, temperatur dan pH. Pembentukkan kerak pada unit penukar panas *(Heat Exchanger)* dipengaruhi oleh kesadahan kalsium (Ca), padatan terlarut total, alkalinitas total (m-alkalinitas), pH dan temperatur air pendingin. Kerak atau biofouling yang terbentuk pada permukaan pipa penukar panas dapat menyebabkan korosi sekunder yaitu korosi sumuran dikarenakan pembentukkan sel perbedaan aerasi oksigen dan mempercepat serangan lokal di bawah endapan atau biofouling tersebut. Kerugian akibat korosi pada penukar panas diantaranya meliputi : penurunan efisiensi transfer panas, kontaminasi produk, pergantian material logam. Pada pengujian metode elektrokimia ini menggunakan pengujian polarisasi potensiodinamik, spesimen logam Monel 400 tanpa pelapisan coating akan diuji elektrokimia untuk mengetahui kemampuan passivasi dan menentukan laju korosi yang terjadi pada logam Monel. Pada proses elektrokimia polarisasi potensiodinamik memanfaatkan arus listrik yang mengalir dari material yang bermuatan positif yaitu platina ke logam yang bermuatan negatif yaitu logam Monel 400. Pengujian polarisasi potensiodinamik ini menggunakan potensiostat CS 350 dengan media air laut dan potensial arus sebesar -1 V hingga 1 V dengan nilai scan rate sebesar 5 mV/s.

Kata Kunci : Elektrokimia, *Heat Exchanger*, Monel 400, Potensiodinamik,

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ANALYSIS OF THE CORROSION RATE OF MONEL MATERIAL USING ELECTROCHEMICAL METHODS

ABSTRACK

The corrosion process that occurs in heat exchanger units is very complex and is often difficult to detect until a heat exchanger pipe leak occurs. The degree of corrosion depends on the quality of the cooling water (content of aggressive constituents such as Cl- ions, SO4 =, dissolved gases O_2, C_{12}, CO_2 and H_2S, dissolved solids and hardness), type of construction material, operating conditions such as flow rate, temperature and pH. Scale formation on the heat exchanger unit is influenced by calcium hardness (Ca), total dissolved solids, total alkalinity (m-alkalinity), pH and cooling water temperature. Scale or biofouling that forms on the surface of heat exchanger pipes can cause secondary corrosion, namely pitting corrosion due to the formation of oxygen aeration differences cells and accelerate local attack under the deposits or biofouling. Losses due to corrosion in heat exchangers include : decreased heat transfer efficiency, product contamination, replacement of metal materials. In testing this electrochemical method using potentiodynamic polarization testing, Monel 400 metal specimens without coating will be electrochemically tested to determine the passivation ability and determine the rate of corrosion that occurs in Monel metal. In the electrochemical process, potentiodynamic polarization utilizes an electric current that flows from a positively charged material, namely platinum, to a negatively charged metal, namely Monel 400 metal. This potentiodynamic polarization test uses a CS 350 potentiostat with sea water as a medium and a current potential of -1 V to 1 V with The scan rate value is 5 mV/s.

Keywords : *Electrochemistry, Heat Exchanger, Monel 400, Potentiodynamics,*

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