SYNERGETIC EFFECT OF CORROSION INHIBITOR FOR PROTECTION OF MILD STEEL USED IN COOLING WATER SYSTEM

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ABSTRACT

Cooling system in refining and petrochemical plants suffer from aqueous corrosion due to the direct contact between the metal and the aqueous solution which can be controlled by many customs. Corrosion inhibitors are the most used water treatments which are found in various types and added depending on the cooling system conditions; e.g. the presence of aggressive ions, working temperature, water movement, etc. Due to the high toxicity of chromate as anodic corrosion inhibitors they have been replaced by more friendly corrosion inhibitors such as molybdate which are considered relatively expensive and inhibition is achieved at high concentrations, thus another inhibitor must be added (e.g. polyphosphate and/or zinc phosphonate) to afford the required inhibition with low concentrations of molybdates. In this study two different inhibitors were used (sodium molybdate and zinc-phosphonate) individually and together in different concentration. Sodium molybdate, Na2MoO4, a non-toxic anodic, environment-friendly corrosion inhibitor and zinc phosphonate is a cathodic inhibitor which is also environment-friendly corrosion. The best performed inhibitor concentration with the use of sodium molybdate was 4000 ppm and 20 ppm with the use of zinc-phosphonate. When both inhibitors were used and in different concentration the best inhibitor efficiency on the mild steel surface was achieved with 50 ppm Zn- phosphonate with 300 ppm sodium molybdate where it reached 96%.

Keywords: corrosion inhibitor, sodium molybdate, zinc phosphonate, carbon steel