EFFECT OF ION CALCIUM TO BACTERIA
Desulfovibrio desulfuricans ACTIVITY FOR SULFATE REDUCTION IN PRODUCED WATER

Name of student/NRP : 1. Rully Darmawan / 2305 100 075
2. Hidayat Firdaus / 2305 100 136

Major : Chemical Engineering FTI-ITS
Advisor : 1. Ir. Farid Effendi, M.Eng
2. Ir. Dyah Winarni Rahaju, MT

ABSTRAK

Produced water is the highest waste stream from petroleum industry always contain sulfate and heavy metals high enough that become primary problem in wastewater treatment. The process used so complicate in case separation of heavy metals and sulfate content reduction from liquor wastewater. One alternative that can be use is with process selective precipitation of metal sulfide using H2S produced by metabolism process of sulfate reducing bacteria (SRB), i.e. Desulfovibrio desulfuricans at time to sulfate reduction had result high density of sludge, low sludge volume and low solubility product.

The purpose of this experiment are to study ion Ca\(^{2+}\) effect to bacteria Desulfovibrio desulfuricans activity for sulfate reduction that will be precipitated to metal sulfide.

This experiment had done use synthetic produced water with treatment time 15 days (batch system). Initial bacteria cells count added is 2,33\(\times\)10\(^8\) – 2,47\(\times\)10\(^8\) cells/ml in ambient temperature. Initial treatment pH adjust at 7,3 – 8. The effect of ion Ca\(^{2+}\) do with adding CaCl\(_2\). From this experiment, use analitical parameter i.e, cells count, Chemical Oxygen Demand, pH, sulfate residue content and disslove metal content analytic.

The result show that sulfate reduction without add carbon source is 17,03% ; with formic acid is 34,27%; lactic acid 56,64% and ethanol is 68%. Then calcium ion injection in form CaCl\(_2\) take
effect to activity of *Desulfovibrio desulfuricans* to sulfate reduction with percentage 68.27% for injection ion calcium 200 mg/liter; 74.93% for injection ion calcium 900 mg/liter and 77.68% for injection ion calcium 1500 mg/liter. In other hand, for injection ion calcium 200 mg/liter can reduce Ferrum metal (Fe) 65.10%; Zinc (Zn) 56.19%; Cadmium (Cd) 43.48%; Cuprum (Cu) 57.95%. For injection ion calcium 900 mg/liter can reduce Ferrum metal (Fe) 78.03%; Zinc (Zn) 65.71%; Cadmium (Cd) 60.87%; Cuprum (Cu) 72.73%. For injection calcium 1500 mg/liter can reduce Ferrum metal (Fe) 85.01%; Zinc (Zn) 80.00%; Cadmium (Cd) 76.09%; Cuprum (Cu) 81.82%.

Keyword: *Produced water, sulfate reducing bacteria, calcium, Desulfovibrio desulfuricans, metal precipitation, metal sulfide.*