CHAPTER V
CONCLUSION AND RECOMMENDATION

5.1 Conclusion

In the absence of extractant, the extraction of HSS by the diluents alone increases with decreasing of carbon number in chain length of alcohol diluent. The short chain alcohol diluent (i.e. 1-pentanol) has higher extraction efficiency than the long chain alcohol diluent (i.e. 1-octanol) due to lower viscosity which leads to higher mass transfer at phase boundary between organic and aqueous phase. In the presence of extractant, but absence of MEA solution, all of HSS extraction efficiency results were higher than 83 wt%, especially oxalate achieved more than 99 wt%. The extraction efficiency slightly decreased with decreasing carbon numbers from C8 to C5 alcohol diluents for formate, acetate, and glycolate. For the diluents alone, they appear to have ability in HSS extraction but the results of extraction efficiency in a presence of extractant do not accord to the results from the extraction by diluents alone. In the presence of the extractant, it showed that the extractant is a dominant factor in HSS extraction because it has a basic property, which can react with the HSS by acid – base reaction, which achieved high extraction efficiency. This trend can explain that the diluents alone have ability only in physical extraction and did not affect to overall extraction efficiency when there is a presence of extractant.

In the presence of 30 wt% MEA solution, an average extraction efficiency of formate and glycolate with all diluents at room temperature (30 ^{o}C) decreased from 95.09±0.95 % and 86.88±2.48 % (results from HSS extraction without MEA solution) to 68.11±5.13 % and 73.77±1.07 %. The extraction efficiency was independent of carbon numbers of alcohol diluents, with only 5.63 %, 1.07 %, and 0.06 % variation in all diluents for formate, glycolate, and oxalate; respectively. The trend of extraction efficiency of HSS at elevated temperature does not increased as the extraction temperature increased from room temperature (30 ^{o}C) to 45 ^{o}C and then 60 ^{o}C. For the regeneration, the regeneration efficiency was more than 100 wt%.

5.2 Recommendation

For the future works, the heat stable salt such as inorganic salt (SO_3^{2-}, SO_4^{2}), organic salt (propionate, succinate, and butyrate), and the MEA degraded products such as neutral species (oxazolidone, imidazole), should also be studied. Study the extraction efficiency of these degraded products by extractant B in various diluents. Moreover, to simulate the real condition in industry, we should include in the study MEA solution with CO_2 dissolution. CO_2 can dissolve in aqueous solution and affect to extraction efficiency of extractant B.

The C18 5u, 150mm x 4.6mm (Alltech, Apollo) column has a problem with separation of acetate from MEA and formate from glycolate, and every HSS peak in the MEA solution was difficult to analyze due to the close retention time of each peak. The column should be replaced with the ion-exchange column type.

The MEA was degraded very fast after open it for a couple months, which was create noise in the chromatogram background, and some of the degraded products interfere with the HSS peak, which make it even harder to analyze. To prepare the HSS in MEA solution, the MEA must be fresh. It should be ordered in a small volume instead a large volume so after depleted, we can get a fresh new MEA without wasting the budget.