CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Calcium carbonate sand was finely ground by a ball mill to small particles; high purity was successfully prepared by thermal treatment at 600 °C for 5 h. The synthesized of PVA-$CaCO_3$ hybrid composite material via sol-gel process and ambient drying. The porous hybrid materials were also successfully prepared from calcium carbonate and polyvinyl alcohol, having high porosity and light weight like foam structure. The optimum ratio of PVA and $CaCO_3$ for porous hybrid material was 50:50 in 5% wt PVA in water by weight and 1.0 mL of 1M boric acid solution. The effect of PVA weight percent from 3 to 7% wt in water was found that an increase of the PVA content led to an increase of the density, and the volume shrinkage, but a decrease of porosity. FTIR analysis indicated that the interaction between PVA and $CaCO_3$ was occurred and boric acid was crosslinked with PVA via hydroxyl group.

PVA-$CaCO_3$ porous hybrid material was contained dimethylglyoxime (DMG) for serving as an optical sensor for nickel (II) which was prepared for the first time. All DMG/ PVA-$CaCO_3$ porous hybrid material were mixed together at optimum ratio of 2% DMG in ethanol by weight. With the increasing content of DMG, the effect of added DMG content on the material has more visibleness by naked-eye on formation of a red-pink complex of nickel (II) ions and DMG. Spectrophotometric measurements were also performed. FTIR analysis indicated that the interaction between PCL and DMG was occurred. The prepared material contained with DMG could be used as sensor for nickel (II) ions in the concentration as low as 1 ppm with a good linear response between 1 and 10 ppm.

Recommendations

1. The other temperatures that used in freeze/thaw process should be studied.
2. The automatic mechanical stirrer should be used for crosslinked PVA-$CaCO_3$ by boric acid.