CHAPTER 4

CONCLUSIONS

4.1 Conclusions

Pure CeO_2 nanoparticles and Ag-doped CeO_2 nanoparticles were successfully synthesized by the homogeneous precipitation method and the impregnation method, respectively. Calcination temperature of cerium hydroxide nanopowders was obtained from TG/DSC study. The resulting nanoparticles were characterized by XRD, SEM, EDS, BET, and TEM. The XRD patterns showed that the particles corresponded to the cubic phase of CeO_2 nanoparticles and it was observed that the XRD patterns showed no signals originated the presence of doped metal sample because the low dosage of silver content. The EDS analysis and SEM micrograph showed that the surface morphology and chemical compositions of nanoparticles, respectively. The nanoparticles size was about 20 nm in diameter. The EDS elemental mapping confirmed silver metal was actually in Ag-doped CeO_2. TEM micrograph showed accurate particle sizes of pure CeO_2 nanoparticles and Ag-doped CeO_2 nanoparticles, the crystallite size of pure CeO_2 nanoparticles was about 5–6 nm, while the crystallite size of Ag-doped CeO_2 nanoparticles was about 7–8 nm. The particle size was found to become bigger in the presence of silver metal. The sizes of pure CeO_2 nanoparticles and Ag-doped CeO_2 nanoparticles were calculated from the results of SSA by BET found to be in the range of 6-10 nm.

The photocatalytic activity of pure CeO_2 nanoparticles and Ag-doped CeO_2 nanoparticles were investigated for the degradation of oxalic acid and formic acid under UVA-light irradiation. It was found that pure CeO_2 nanoparticles was more

active than Ag-doped CeO_2 nanoparticles. The photocatalytic activity of Ag-doped CeO_2 nanoparticles for mineralizing of oxalic acid performed better than that of formic acid. The mineralization of oxalic acid with 0.50 mol% of Ag-doped CeO_2 nanoparticles showed the highest activity under UVA-light irradiation. The 0.75 mol% of Ag-doped CeO_2 nanoparticles showed the highest activity to mineralize formic acid under UVA-light irradiation. It can be concluded that Ag-doped CeO_2 nanoparticles have no effect in improving on photocatalytic activity of pure CeO_2 nanoparticles.

4.2 Suggestion for future work

The photocatalytic activity of pure CeO_2 and Ag-doped CeO_2 for other organic compounds under UVA-light irradiation such as methanol, glucose, sucrose will be further investigated.