

CHAPTER V

CONCLUSION AND SUGGESTION

5.1 Conclusion

Based on the result and analyses, the following conclusions can be drawn :

1. Functional groups of RIPT-TiO₂ experienced changes during immobilization, photocatalysis, and desorption. Each desorption agent caused peak shifts, changes in absorption intensity, and the appearance of new peaks characteristic of the solution used. In 0.1 M citric acid, C-O bonds associated with carboxylate groups appeared, while in 0.1 M sulfuric acid, S=O bonds related to sulfate ions were observed. Despite repeated photocatalysis and desorption cycles, RIPT-TiO₂ retained its core functional groups, indicating structural stability. SEM analysis revealed changes in the material's morphology, with significant alterations observed after desorption with 0.1 M citric acid and 0.1 M sulfuric acid. The acidic pH of these solutions caused cracking in the material's surface.
2. The highest chromium release capacity was achieved with 0.1 M sulfuric acid, reaching 3.6480 mg/g in the first desorption cycle for RIPT-TiO₂, compared to 0.1 M citric acid with desorption capacity only 0.2093 mg/g and deionized water 0.000 mg/g.
3. Both Cr(VI) and Cr(III) species were released during the desorption process. The transfer of Cr(III) and Cr(VI) from the material to the desorption solution decreased with increasing cycles, indicating the accumulation of chromium on the material surface. The highest release of chromium occurred during desorption of RIPT-TiO₂ using 0.1 M sulfuric acid, where concentrations of 53.58 mg/L Cr(III) and 1.14 mg/L Cr(VI) were observed in the first cycle, decreasing to 1.71 mg/L Cr(III) and 2.50 mg/L Cr(VI) in the sixth cycles.

5.2 Suggestion

Based on the result of this study, several recommendations for future research can be proposed :

1. Future studies should investigate the regeneration and reusability of RIPT–TiO₂ in degrading Cr(VI) using desorption solutions with alkaline pH values.
2. Future research may consider shifting from a batch system to a continuous system, or combining continuous photocatalysis with batch regeneration, to evaluate the cyclic performance of the material under such conditions.
3. XRF analysis should be conducted in subsequent studies to specifically determine the concentration of chromium species present in the material.