A Novel Metal-Ligand Complex System Based on Uric Acid Ligands and Its Application on Gout Early Detection

Kang, Yeonsu (School: Cheongshim International Academy)
Kim, Min Jae (School: Cheongshim International Academy)

This study reports two new complex compounds, Fe(H2O)4(UA) and Fe(UA)3 (UA=Uric Acid), with Fe as the central metal and uric acid or water as ligands. Both crystals were synthesized by the solvothermal method, using DMSO and water mixture as a solvent and maintaining 120℃ for 24 hours. Fe(H2O)4(UA) complex crystal was obtained by water : DMSO = 1 : 0.5 mixture, whereas Fe(H2O)4(UA) complex crystal was obtained by water : DMSO = 1 : 1.5. Both crystals' structure was determined through TGA and elemental analysis (EA). The two new complex compounds had different optical properties, where Fe(H2O)4(UA) had yellow color and Fe(UA)3 was colorless. Utilizing the color difference, the concentration of uric acid was able to be semi-quantitatively measured to diagnose hyperuricemia and for early diagnosis of gout. In 8.5 ~ 9.4 (μg/dl) ranged (9.0 (μg/dl) as the critical point of hyperuricemia determination) sample with a size of n=200, the test showed 99% power, which is directly applicable for gout diagnosis. The calculated cost for each test by this procedure is 3.5 ($), which decreases 96.5% of the average diagnosis cost of gout in USA (100 ($)).