

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

Kim, Min Jae (School: Cheongshim International Academy)

Kang, Yeonsu (School: Cheongshim International Academy)

This study reports two new complex compounds, $\text{Fe}(\text{H}_2\text{O})_4(\text{UA})$ and $\text{Fe}(\text{UA})_3$ (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°C for 24 hours. $\text{Fe}(\text{H}_2\text{O})_4(\text{UA})$ complex crystal was obtained by water : DMSO = 1 : 0.5 mixture, whereas $\text{Fe}(\text{H}_2\text{O})_4(\text{UA})$ 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 $\text{Fe}(\text{H}_2\text{O})_4(\text{UA})$ had yellow color and $\text{Fe}(\text{UA})_3$ 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 ($\mu\text{g}/\text{dl}$) ranged (9.0 ($\mu\text{g}/\text{dl}$) 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 (\$)).

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