Study of DNA binding mechanism and in vitro activity against cancer cells of iron(III) and aluminum(III) Kojic acid derivatives complexes.

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1. Synthesis

(S2): 2,2'-[ethane-1,2-diylbis(iminomethanediyl)]bis(5-hydroxy-4H-pyran-4-one)

1.0 g (7 mmol) of KA was dissolved in 20 mL of ethanol (96%) and 230 µl (3.5 mmol) of ethylenediamine were added. After stirring the reaction mixture at room temperature for 1 h, the precipitate was filtered and washed with ethyl acetate. Sample identity and purity were confirmed by NMR analysis. Yield 98%, Melting Point 138–139 °C, Elemental Analysis: $C_{14}H_{16}N_2O_6$ (MW 308,29) calculated C, 54.54%; H, 5.23%; N, 9.09, found C, 54.93%; H, 5.52%; N, 8.99%. ^{1}H NMR (400 MHz, H_2O-D2O, 90%–10%, pH 6.2), δ (ppm): 7.923 (s, 2H), 6.525 (s, 2H), 4.496 (s, 4H), 3.026 (s, 4H). ^{13}C NMR (100 MHz, D_2O, pD~8.2), δ (ppm): 179.51, 166.65, 149.23, 142.24, 110.25, 60.05, 39.37.

2. Hyss software theoretical calculations

Various computer programs have been developed to produce distribution diagrams for the species formed in solution, such as HYSS[1]. Species distribution curves represent the percentages (or partial mole fractions) or equilibrium concentrations of the different chemical species present in a solution under given conditions in a representative manner. Concentration distribution curves are generally presented as a function of a single variable, such as pH, where the fixed values of the components (reagents) uniquely determine the molar ratios of the species formed.

The theoretical competition studies were calculated on the base of S2 ligand and pyrophosphate anion protonation constants[2], S2/pyrophosphate anion[2] and Al(III)/pyrophosphate anion[3] complex formation constants, and aluminium hydroxide species[4] [ref]. The obtained Species distribution diagram is shown in Figure S1.

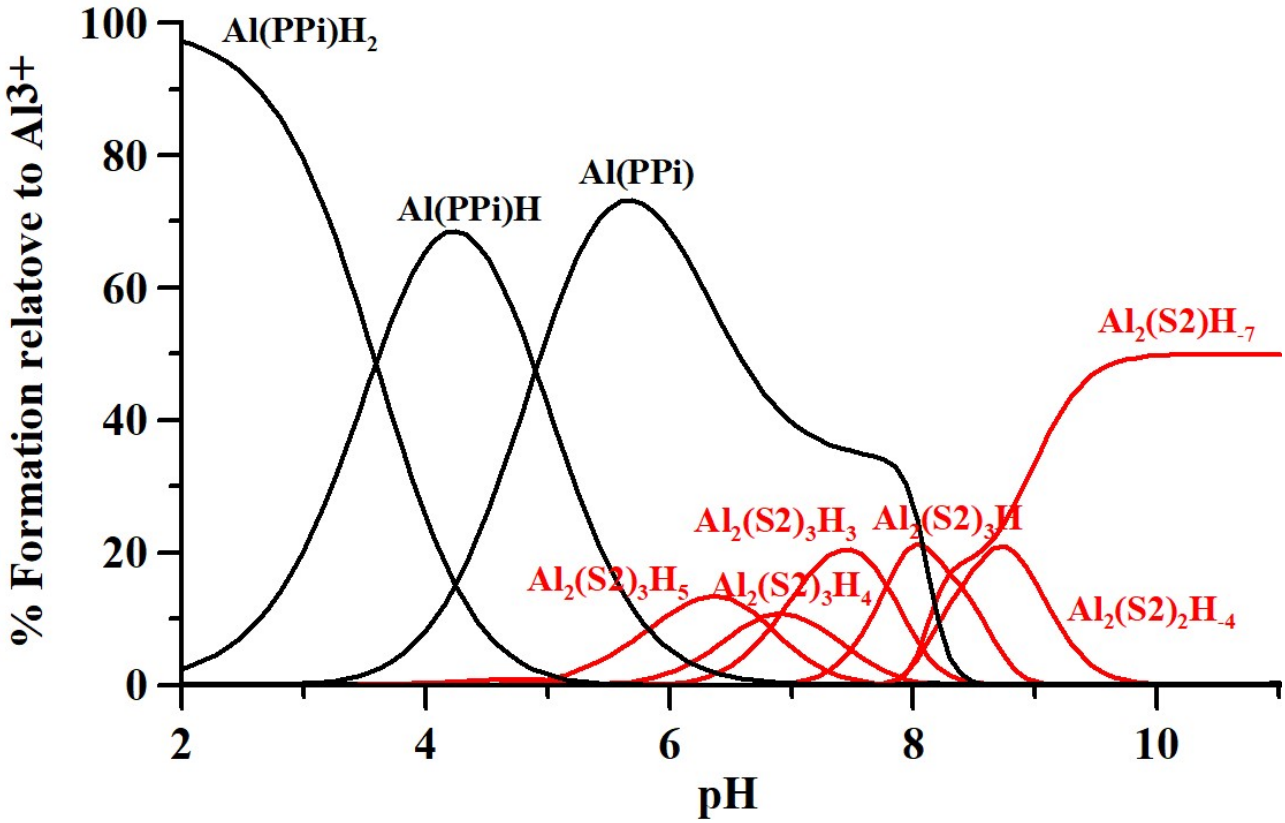

Figure S1. Theoretical competition studies between Al(III), pyrophosphate (PPi) and S2 ligand, calculated on the base of the ligand and anion protonation constants; and complex formation constants (logβ) of S2 with pyrophosphate ion, S2 with Al(III) ions and aluminium with (PPi) ion. Concentrations were as follows: [S2]=[PPi]=[Al]=1.00×10^{-3} [M]. Al(III)-S2-PPi ternary complexes are not present due to the lack of the potentiometric data.

References

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