

## 2,6-Piridindikarboksilik asit türevlerinin Cr (III) kompleksleri

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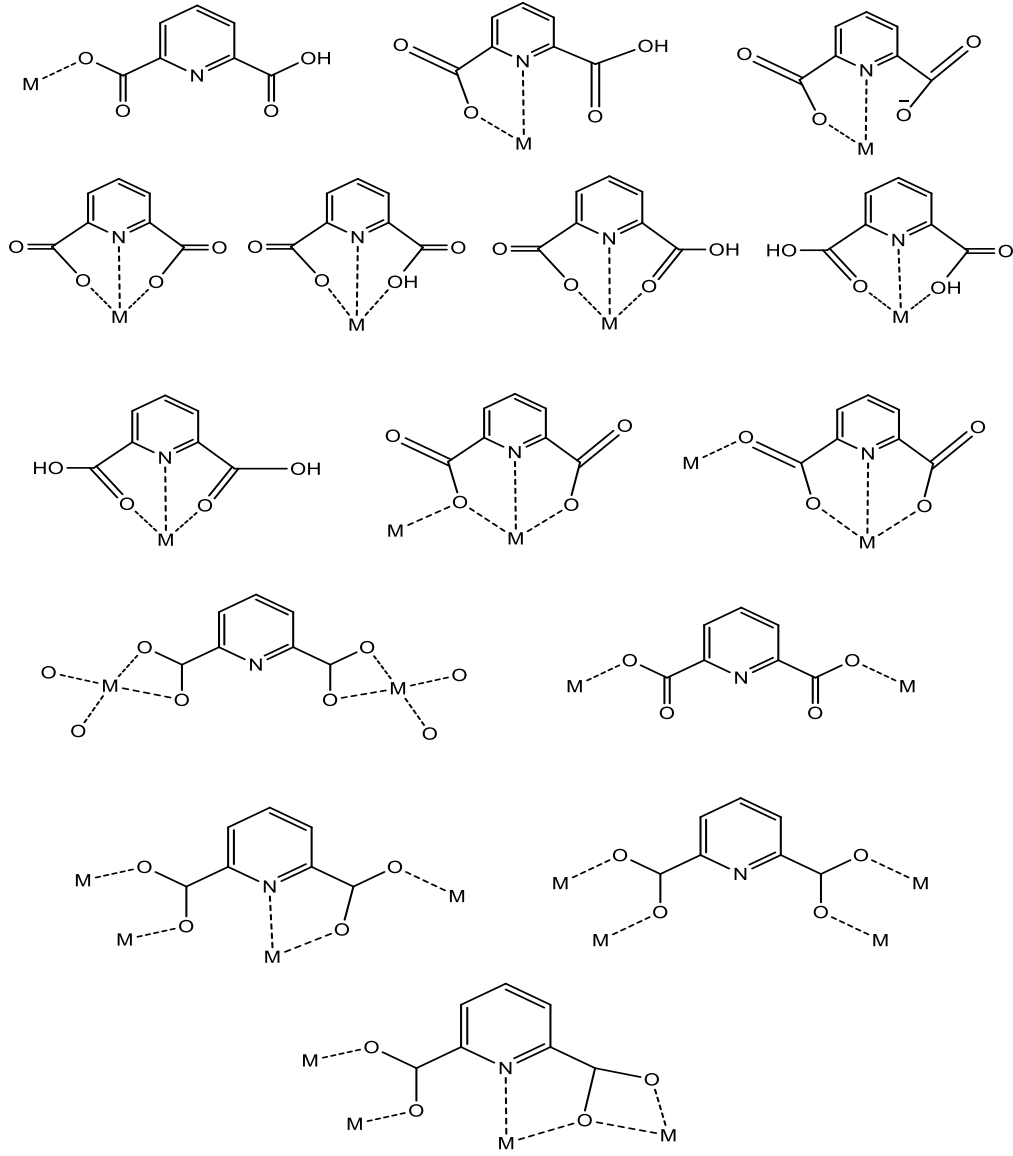
**Özet** –2,6-Piridindikarboksilik asit ve türevleri (H<sub>2</sub>pka), suda çözülebilen, çeşitli işlemlerde enzim inhibitörü, insülin-mimetik etkileri, düşük konsantrasyonlarda demir analizleri, bitki koruyucu, gıda dezenfektanı ve kataliz gibi kullanım alanları vardır. H<sub>2</sub>pka formlarının metal komplekslerinin önemi, olağandışı oksidasyon durumlarında kararlılık, çeşitli koordinasyon sayıları ve ilginç yapısal özellikleri bulunmasındandır. 2,6-Piridindikarboksilik asit ve türevleri metal iyonları ile piridin halkasında bulunan azot atomu ve iki karboksilik asit grubundaki dört oksijenden bağlanarak kompleks oluşturdukları gözlenmiştir. Bu çalışmada, literatürde 2,6-piridindikarboksilik türevlerinin Cr(III) ile basit metal kompleksleri, prolin, biguanid, *N*-bromosüksinimit, 9-aminoakridin, kreatin, 1,1'-biphenyl-4,4'-diamin, 8-aminokinolin, aminoguanidin, metformin, 2-aminpirimidin, 4,4'-bipiridin, 4,4'-dimetoksi-2,2'-bipiridin, 2,2'-bipiridin, 4-metilpiridin, *o*-fenantrolin, 2,9-dimetil-1,10-fenantrolin, 2,6-diaminopiridin, etilendiamin, 2-amino-4/6-metilpiridin, imidazol, pirazol, glisin, 3-amino-1*H*-1,2,4-triazol, benzen, *o/p*-aminobenzoik asit, nikotinik asit, pikolinik asit, izonikotinik asit ve 2-[(2-hidroksipropilimino)metil]fenol ile karışık ligandlı metal kompleksleri incelenmiştir.

**Anahtar Kelimeler** – 2,6-Piridindikarboksilik Asit, Metal Kompleksi, Organik Asit, Organik Baz, Biyolojik Aktivite

### I. GİRİŞ

Piridindikarboksilik asitler, piridin halkasında bulunan elektron verici azot atomu ve iki karboksilik asit grubundaki dört oksijen bulunduran organik asitlerdir. Piridindikarboksilik asitlerin altı farklı izomeri vardır. Bunlar 2,3; 2,4; 2,5; 2,6; 3,4 ve 3,5 piridindikarboksilik asittir. 2,6-Piridindikarboksilik asit ve türevleri, suda çözülebilen, çeşitli işlemlerde enzim inhibitörü,

insülin-mimetik etkileri, düşük konsantrasyonlarda demir analizleri, bitki koruyucu, gıda dezenfektanı ve kataliz gibi kullanım alanları vardır [1]. 2,6-Piridindikarboksilik asit ve türevleri metal iyonları ile piridin halkasında bulunan azot atomu ve iki karboksilik asit grubundaki dört oksijenden bağlanarak kompleks oluşturdukları gözlenmiştir. 2,6-Piridindikarboksilik asit metal iyonlarına bağlanma örnekleri Şekil 1'de gösterilmiştir [1].



Şekil 1. 2,6-Piridindikarboksilik asitin metal iyonlarına bağlanma örnekleri

## II. MATERYAL VE YÖNTEM

Bu çalışmada Scifinger programı kullanılarak literatürde bulunan 2,6-piridindikarboksilik asit türevlerinin Cr(III) ile oluşturdukları basit ve karışık ligandlı metal kompleksleri incelenmiştir.

## III. BULGULAR

Cr(III) metal iyonu ile 2,6-Pirindikarboksilik asit'in  $\{[Cr(pk_a)_2]^+$  [2],  $Na[Cr(pk_a)_2]$  [3],  $Cr(OH)[pk_a](H_2O)$  [4],  $Rb[Cr(pk_a)_2]$  [5],  $[Cr(pk_a)_2(H_2O)_2]^-$  [6],  $Na[Cr(pk_a)_2]$   $[Cr(pk_a)(Hpka)(H_2O)_2]$  [7],  $[Cr(pk_a)(H_2O)_3]^+$  [8],  $[NaCr(pk_a)_2(H_2O)_2]_\infty$  [9],  $Na_2[Cr(pk_a)_2]$ ,  $K[Cr(pk_a)_2]$  [10],  $Na[Cr(pk_a)_2].2H_2O$  [11],

$[Cr_2(OH)_2(pk_a)_2(H_2O)_2]$  [12],  $K[Cr(pk_a)_2]_n$  [13],  $[Cr(H_2O)(OH)(pk_a)_2]$  [14],  $[H_3O][Cr(pk_a)_2][H_3O^+.Cl^-]$  [16],  $[Cr(H_2pk_a)_3]Cl_3$  [16],  $[Cr(pk_a)_2]$  [17],  $NH_4[Cr(pk_a)_2]$  [18],  $K[Cr(pk_a)_2]_n$  [19] ve  $[Cr(pk_a)(H_2O)_3]Cl.2H_2O$  [20]], 4- hidroksokloro-piridin-2,6-dikarboksilik asit'in ( $H_3ca$  ve  $H_2Clpk_a$ )  $\{[Cr(Clpk_a)(OH_2)OH]_2.2H_2O\}$  [16,21,22],  $\{[Cr(Hca)(OH_2)OH]_2.4H_2O,$   $[Cr(H_3ca)_3]Cl_3\}$ , piridin-2,6-bistiyokarboksilik asit ( $H_2ptka$ )  $[Cr(ptka)_2]^-$  [22] ve piridin-2,4,6-trikarboksilik asit'in ( $H_3ptka$ )  $\{Cr(ptka)\}$  [23] basit metal kompleksleri sentezlenmiş ve yapıları aydınlatılmıştır.

o-Fenantrolin {[Cr(pka)(Hpka)(fhen)]. 1,5H<sub>2</sub>O}, 2,2'-bipiridin {[Cr(pka)(Hpka)(22bpy)].2H<sub>2</sub>O}, biguanid {[Cr(pka)(Hpka)(BigH)]} [24], izonikotinic asit, glisin, nikotinic asit, pikolinik asit ve o/p-aminobenzoik asit (HL) {Cr(pka)(L).H<sub>2</sub>O} [25], hidroksilamin/nitrosil {[Cr(pka)(NO)(H<sub>2</sub>NOH)<sub>2</sub>].3H<sub>2</sub>O} [26], 2,2':6',2"-terpiridin {[Cr(pka)(terpy)]} [27], 1,10-fenantrolin, 2,2'-bipiridin, etilendiamin (L<sup>2</sup>) {[Cr(pka)(L<sup>2</sup>)Cl]} [28], benzen [(η<sup>5</sup>-bz)<sub>2</sub>Cr]<sub>2</sub>(pka)<sub>2</sub>Cr].2H<sub>2</sub>O} [29], 2,6-diaminopiridin {(H26dap)[Cr(pka)<sub>2</sub>].0,5H<sub>2</sub>O} [30], DL-aspartik asit, N-bromosüksinimit {[Cr(pka)(asp)(H<sub>2</sub>O)<sub>2</sub>], [Cr(pka)(asp)(H<sub>2</sub>O)(OH)]<sup>-</sup>, [Cr(pka)(asp)(H<sub>2</sub>O)(NBS)], [Cr(pka)(asp)(H<sub>2</sub>O)(OH)(NBS)]<sup>-</sup>} [31], prolin {[Cr(pka)(pro)(H<sub>2</sub>O)]} [32], 2,2'-dipiridilamine [Hdpa][Cr(pka)<sub>2</sub>].3H<sub>2</sub>O} [33], 4,4'-bipiridin {(H44bpy)[Cr(pka)<sub>2</sub>].4H<sub>2</sub>O} [34], kreatin {(Hcre)[Cr(pka)<sub>2</sub>].H<sub>2</sub>pka.6H<sub>2</sub>O} [35], 2,9-dimetil-1,10-fenantrolin {(Hdmp)[Cr(pka)<sub>2</sub>].3H<sub>2</sub>O} [36], 2-aminopirimidin {(Hapy)[Cr(pka)<sub>2</sub>].2H<sub>2</sub>O} [37], 2-amino-6-metilpiridin {(H2a6mp)[Cr(pka)<sub>2</sub>](2a6mp)<sub>0,5</sub>.H<sub>2</sub>O} [38], 3-amino-1H-1,2,4-triazol {[Ag(atr)<sub>2</sub>][Cr(pka)<sub>2</sub>]<sub>2</sub>[Cr(H<sub>2</sub>O)(pka)(μ-OH)<sub>2</sub>].4H<sub>2</sub>O} [39], 2-aminopiridin {(Hapy)[Cr(pka)<sub>2</sub>].5H<sub>2</sub>O.(H<sub>2</sub>pka)}, akrinin {(Hacr)[Cr(pka)<sub>2</sub>].2H<sub>2</sub>O}, 9-aminoakridin {(H9a-acr)[Cr(pka)<sub>2</sub>].4,27H<sub>2</sub>O} [40], 2-[(2-hidroksipropilimino)metil]fenol (L) {[Cr<sub>2</sub>(OH)<sub>2</sub>(pka)<sub>2</sub>(H<sub>2</sub>O)<sub>2</sub>] } [12], pirazol {(HPyz)[Cr(pka)<sub>2</sub>](H<sub>2</sub>pka).5H<sub>2</sub>O}, 2,2'-bipiridin {[Cr(pka)(Bpy)(H<sub>2</sub>O)][Cr(pka)<sub>2</sub>].2H<sub>2</sub>O} [11, 41, 42], 1,10-fenantrolin {[Cr(pka)(phen)Cl].0,5H<sub>2</sub>O, [Cr(phen)(pka)(H<sub>2</sub>O)][Cr(pka)<sub>2</sub>].4H<sub>2</sub>O}, 8-aminokinolin {[Cr(pka)(8-aq)(H<sub>2</sub>O)] [Cr(pka)<sub>2</sub>].2H<sub>2</sub>O} [43], 2-amino-4-methylpirimidin {(2a4mpy)<sub>2</sub>[Cr(pka)<sub>2</sub>]<sub>2</sub>.9H<sub>2</sub>O}, 1, 1'-biphenyl-4,4'-diamin {(bphda)[Cr(pka)<sub>2</sub>]<sub>2</sub>.DMF.4H<sub>2</sub>O} [44], metformin {(Hmfr)[Cr(pka)<sub>2</sub>] } [45], imidazol {(HIm)[Cr(pka)<sub>2</sub>].H<sub>2</sub>pka.5H<sub>2</sub>O} [46], 4-metilpiridin {[H4mp][Cr(pka)<sub>2</sub>].H<sub>2</sub>O} [47], aminoguanidin {(Hagun)[Cr(pka)<sub>2</sub>].1,5H<sub>2</sub>O} [48-50], 2,2'-bipiridin {[Cr(pka)<sub>2</sub>][Cr(bipy)(pka)H<sub>2</sub>O].2H<sub>2</sub>O}, 4,4'-dimetoksi-2,2'-bipiridin {(Hdmbipy)[Cr(pka)<sub>2</sub>].2,5H<sub>2</sub>O} ile 2,6-piridindikarboksilik asitin ve 2,6-diaminopiridin {(H26dap)[Cr(Hac)<sub>2</sub>].2H<sub>2</sub>O} [51], dimetilformamit

{(Hdmf)[Cr(H<sub>2</sub>O)<sub>6</sub>(Hca)<sub>2</sub>] [52], 2,9-dimetil-1,10-fenantrolin {(Hdmp)[Cr(Hca)<sub>2</sub>].3H<sub>2</sub>O} [53], 9-aminoakridin {(H9a-Acr)[Cr(Hca)<sub>2</sub>].4H<sub>2</sub>O} [54], 4-aminodimetilpiridin {(H4admp)[Cr(Hca)<sub>2</sub>].4H<sub>2</sub>O} ve 2-amino-4,6-dimetilpirimidin {(H2adpym)[Cr(Hcda)<sub>2</sub>].3H<sub>2</sub>O.2adpym} [55] ile 4-kloro-2,6-piridindikarboksilik asitin karışık ligandlı krom metal kompleksleri elde edilmiş ve yapıları açıklanmıştır.

#### IV. TARTIŞMA VE SONUÇLAR

Piridindikarboksilik asit türevleri ile diğer organik ligandların bulunduğu birçok çalışma yapılmaktadır. Piridindikarboksilik asit türevleri antiülser, süperoksit giderici, antimikrobiyal, antidiyabetik, antitümör, antimütajen ve antiinflamatuvar gibi aktivitelere sahiptir. Bu aktif grup ile diğer organik veya organik olmayan bileşiklerin bir araya gelmesiyle elde edilecek cokrystal, tuz ve metal komplekslerinde aynı türde özelliklere göstereceği aşıkardır. Piridindikarboksilik asit türevleri ile organik veya organik olmayan bileşiklerinden elde edilecek cokrystal, tuz ve komplekslerin sentezlenmesi ve aktivitelerin incelenmesi literatüre önemli katkı yapacaktır.

#### TEŞEKKÜR

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