

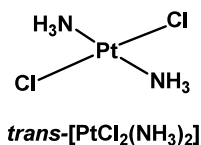
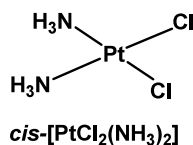
『無機化学』章末問題解答例 第 6 章

1.

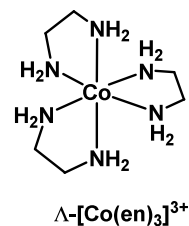
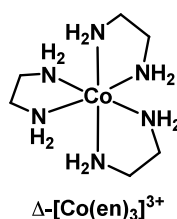
- Pentaamminecobalt(III) chloride
- Tris(2,2'-bipyridine) iron(II) chloride
- Potassium tetrachloropalladate(II)
- Potassium hexacyanoferrate(II)

2.

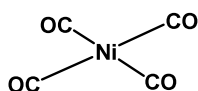
(a)



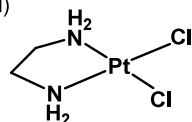
(b)



(c)

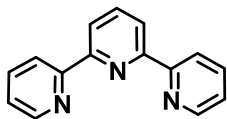


(d)

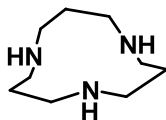


3. 図 6.3 を参照.

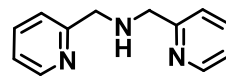
三座配位子としては、図 6.3 に記載されているもの以外に、2,2':6',2''-テルピリジンや 1,5,9-トリアミノシクロドデカンなどがある.



2,2':6',2''-テルピリジン
(2,2':6',2''-terpyridine)

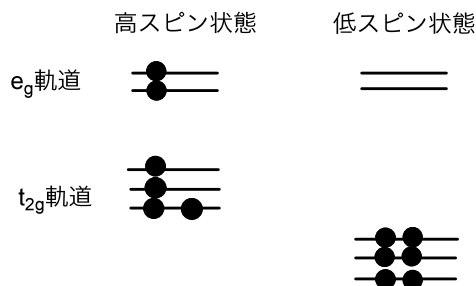


1,5,9-トリアミノシクロドデカン
(1,5,9-triaminocyclododecane
[12]aneN₃)



ジ-(2-ピコリル)アミン
(Di-(2-picolyl)amine)

4.

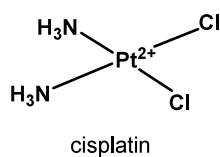


5.

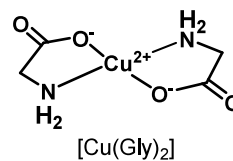
①



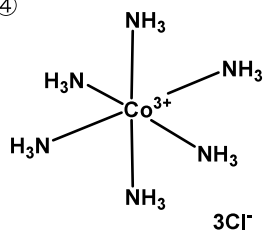
②



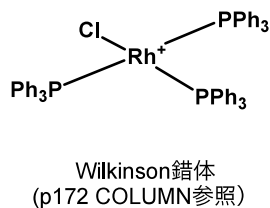
③



④

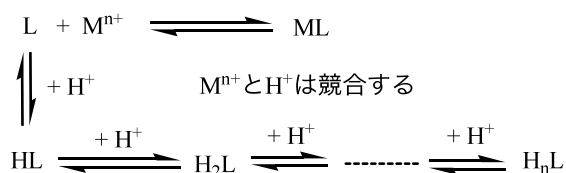


⑤



6.

(a)



みかけの錯体生成定数 $K_{\text{app}} = \frac{[\text{ML}]}{[\text{M}^{n+}][\text{L} + \text{HL} + \text{H}_2\text{L} + \cdots + \text{H}_n\text{L}]}$

それに対し、真の錯体生成定数は、 $K_s = \frac{[\text{ML}]}{[\text{M}^{n+}][\text{L}]}$

(b) (a)より

$$K_{\text{app}} = \frac{[\text{ML}]}{[\text{M}^{n+}][\text{L} + \text{HL} + \text{H}_2\text{L} + \cdots + \text{H}_n\text{L}]} = \frac{[\text{ML}]}{[\text{M}^{n+}]\text{A}} \xrightarrow{\text{変形}} \frac{[\text{ML}]}{[\text{M}^{n+}]} = A(K_{\text{app}}) \quad (\text{式1})$$

$$\text{M}^{n+} \text{の全濃度} : [\text{M}^{n+}]_{\text{total}} = [\text{M}^{n+}] + [\text{ML}]$$

$[\text{M}^{n+}]_{\text{total}}$ のうち、錯体を生成していない M^{n+} の割合を $X(\%)$ 、 ML の割合を $Y(\%)$ とすると、

$$X = \frac{100[\text{M}^{n+}]}{[\text{M}^{n+}]_{\text{total}}} = \frac{100[\text{M}^{n+}] / [\text{M}^{n+}]}{[\text{M}^{n+}]_{\text{total}} / [\text{M}^{n+}]} = \frac{100}{\{[\text{M}^{n+}] + [\text{ML}]\} / [\text{M}^{n+}]} = \frac{100}{\left(1 + \frac{[\text{ML}]}{[\text{M}^{n+}]}\right)}$$

(式1) を代入すると

$$X = \frac{100}{1 + A(K_{\text{app}})}$$

$$\begin{aligned} Y &= \frac{100[\text{ML}]}{[\text{M}^{n+}]_{\text{total}}} = \frac{100[\text{M}^{n+}] / [\text{ML}]}{[\text{M}^{n+}]_{\text{total}} / [\text{ML}]} = \frac{100}{\{[\text{M}^{n+}] + [\text{ML}]\} / [\text{ML}]} = \frac{100}{\left(\frac{[\text{M}^{n+}]}{[\text{ML}]} + 1\right)} \\ &= \frac{100}{\left(\frac{1}{A(K_{\text{app}})} + 1\right)} = \frac{A(K_{\text{app}})}{\{1 + A(K_{\text{app}})\}} \end{aligned}$$