COSMOSIL

COSMOSIL πNAP
Analysis of Cisplatin and its Variants in Water

Technical Note 18

Data courtesy of Prof. Ryuji Kato, Ph D.,
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COSMOSIL πNAP uses a naphthalene-based bonded phase, and exhibits different retention behavior from C_{18}. In this note, πNAP is used to analyze cisplatin (CDDP) and its mono-chloro, none-chloro (hydration complex), and OH-dimer forms in water.
Standard C_{18} columns have difficulty separating compounds of similar hydrophobicity. Perfomance may be improved by using Cholester, a column with improved molecular shape recognition.

(1)Experiment Summary

Cisplatin (CDDP) in water converts to its mono-chloro, hydration complex, and OH-dimer forms, and it is thought that they exist in an equilibrium state (fig. 1). Each of these forms was separated and quantified.

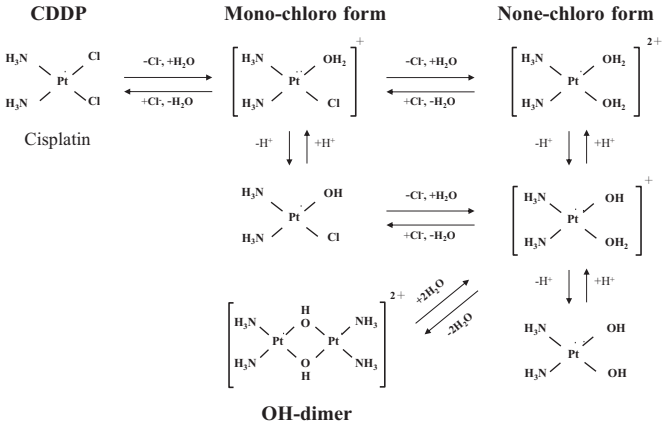


Fig. 1. Equilibrium reactions of cisplatin (CDDP) in water
In water, CDDP loses Cl^-, which is replaced with water. Depending on the pH, it may be replaced by a hydroxide ion. The mono-chloro form may lose another Cl^-, and, in the same way, the water molecules (one or both) may be replaced with a hydroxide ion. These forms are in equilibrium.

(2)Quantification of Cisplatin (CDDP) and its Mono-Chloro, None-Chloro, and OH-Dimer Forms

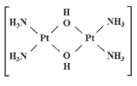
■ Comparing a C_{18} column, COSMOSIL Cholester, and πNAP under identical conditions

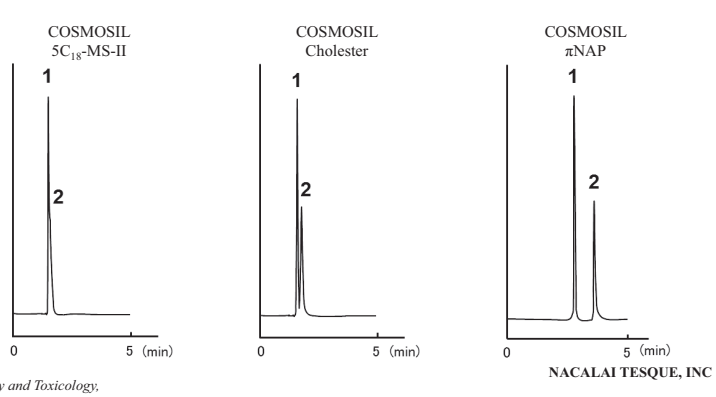
When measuring the OH-dimer nitrate form, the dissociated NO_3^- peak elutes before the OH-dimer peak. C_{18}-MS-II could not separate the two peaks, and Cholester achieved partial separation, but could not separate to baseline. πNAP, however, was able to separate the compounds completely.

COSMOSIL Application Data

Column: COSMOSIL **
Column size: 4.6 mmI.D.-250 mm
Mobile phase: 100 mmol/l $NaClO_4$/Acetonitrile/100 mmol/l $HClO_4$ = 290/10/3
Flow rate: 1.0 ml/min
Temperature: 37 °C
Detection: UV225 nm

Sample: Cisplatin OH-dimer nitrate (2 mmol/l)
1; Nitrate
2; Cisplatin OH-dimer
Injection Vol. 20 µl


OH-dimer



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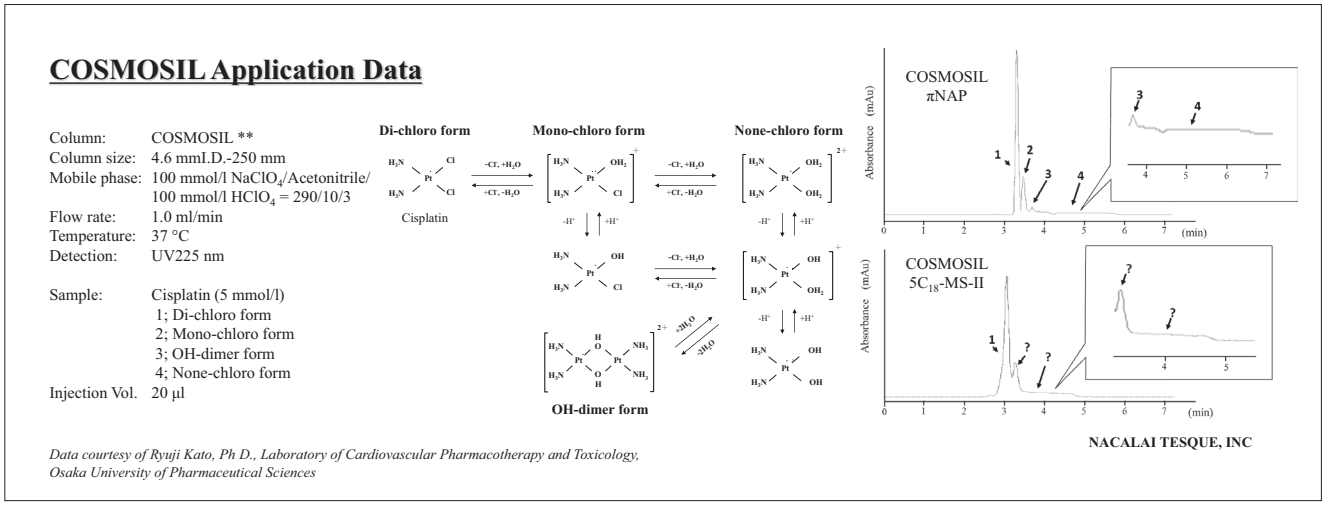
■ Analysis Using COSMOSIL πNAP

Below is a typical chromatogram; the peak separation was excellent. The calibration curve for cisplatin (CDDP) was linear in the range of 0.01 to 4 mM, and the CV values for within-day and between-day variation were within 5%.



(3)Observations

By using COSMOSIL πNAP, it is possible to separate and quantify cisplatin (CDDP) and its mono-chloro, none-chloro, and OH-dimer forms using HPLC.

(4)References

Kato R. et al. A Novel Analytical Method of Cisplatin Using the HPLC with a Naphthylethyl Group Bonded with Silica Gel (πNAP) Column. *Biol Pharm Bull*. **40**(3), 290-296(2017).

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