Application Note

The Analysis of Polymer Additives using Supercritical Fluid Chromatography

Introduction

SFC has been well established for chiral pharmaceutical separations and purifications and has also recently been utilized for achiral pharmaceutical compounds.

As SFC column technology continues to be explored, the SFC is being applied to various industries analyzing a wider range of compounds that ever before.

A typical polymer additive separation using HPLC can take upwards of 40 minutes. The speed of SFC should be able to significantly reduce that analysis time if it can successfully be applied to polymer additive separations.

Jasco SF-2000

Keywords: SFC, Polymer Additives, C18 column, UV Detector, Irgafos 168, Irgafos 168 phosphate, Tinuvin 327, Chimassorb 81

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Experimental

Equipment

CO_2 Delivery Pump:	PU-2080-CO_2
Autosampler:	AS-2059-SF
Column Oven:	CO-2060
UV Detector:	UV-2075
Back Pressure Regulator:	BP-2080

Conditions

Column:	Luna C18 (4.6mmIDx150mmL,5 µm)
CO_2 Flowrate:	3.0mL/min
UV Wavelength:	220nm
Column Temperature:	40 °C

Results

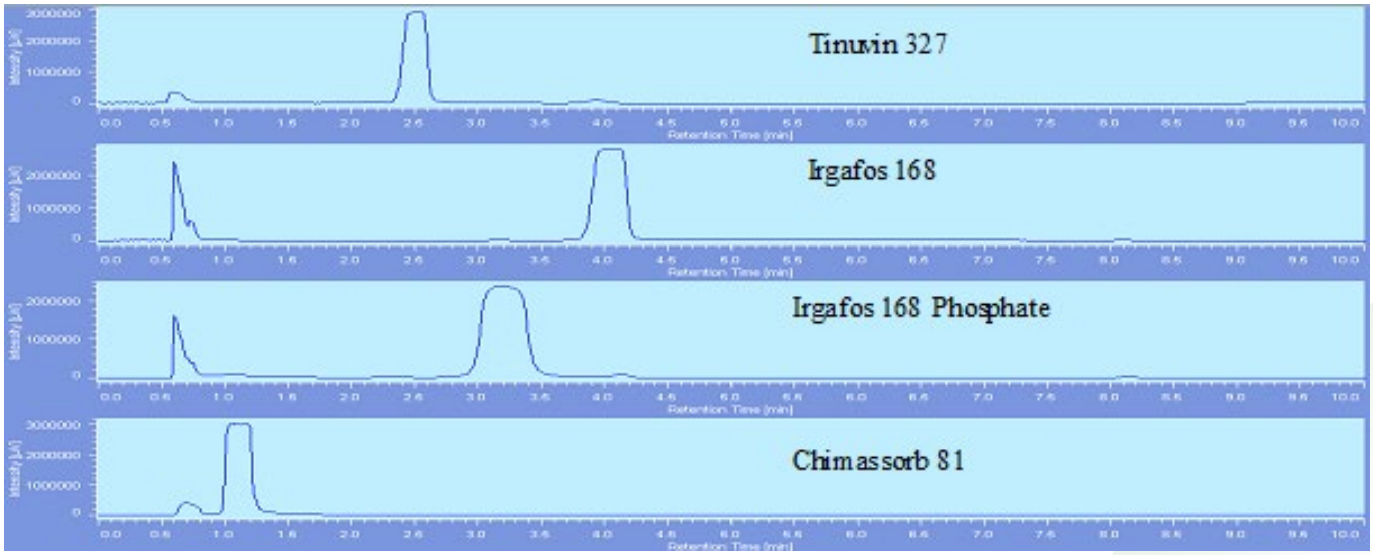

Figure 1. Stack chromatograms of Tinuvin 327 (6ug/uL) ,Irgafos 168 (4ug/uL), Irgafos 168 Phosphate (8ug/uL) and Chimassorb 81 (10ug/uL).
Conditions: Column Luna C18 (150 x 4.6 mm, 5um) , Flow rate 3mLs/min (100% CO2), Temperature 40C, Back Pressure Gradient 150bar to 250bar over 4 minutes, 220nm, 50uL Injection each.

At these concentrations the detector was clearly overloaded with signal.

The chromatogram of the 4 polymer additive standards separated using a pressure gradient is shown in figure 1. As seen the concentration of each was too high and thus the concentration of each was reduced when a mixture of the 4 was created. Figure 2 shows the separation of that mixture using a solvent gradient, while figure 3 shows the separation using the same pressure gradient used in figure 1.

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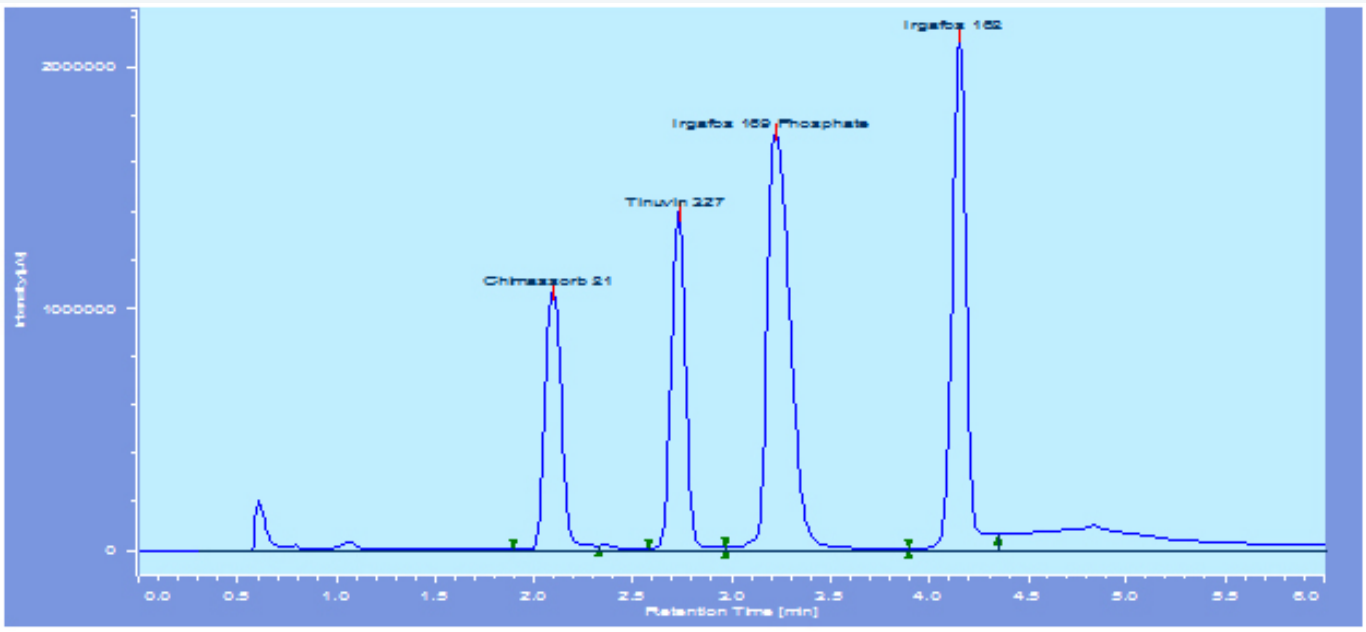

Figure 2. Chromatogram of Tinuvin 327 (0.8ug/uL), Irgafos 168 (1.5ug/uL), Irgafos 168 Phosphate (3ug/uL) and Chimassorb 81 mixture (0.8ug/uL) in Acetone . Conditions: Column Luna C18 (150 x 4.6 mm, 5um) , Flow rate 3mLs/min (Grad 0% to 20% Methanol over 6 minutes), Temperature 40C, Back Pressure 150bar, 220nm, 15uL Injection.

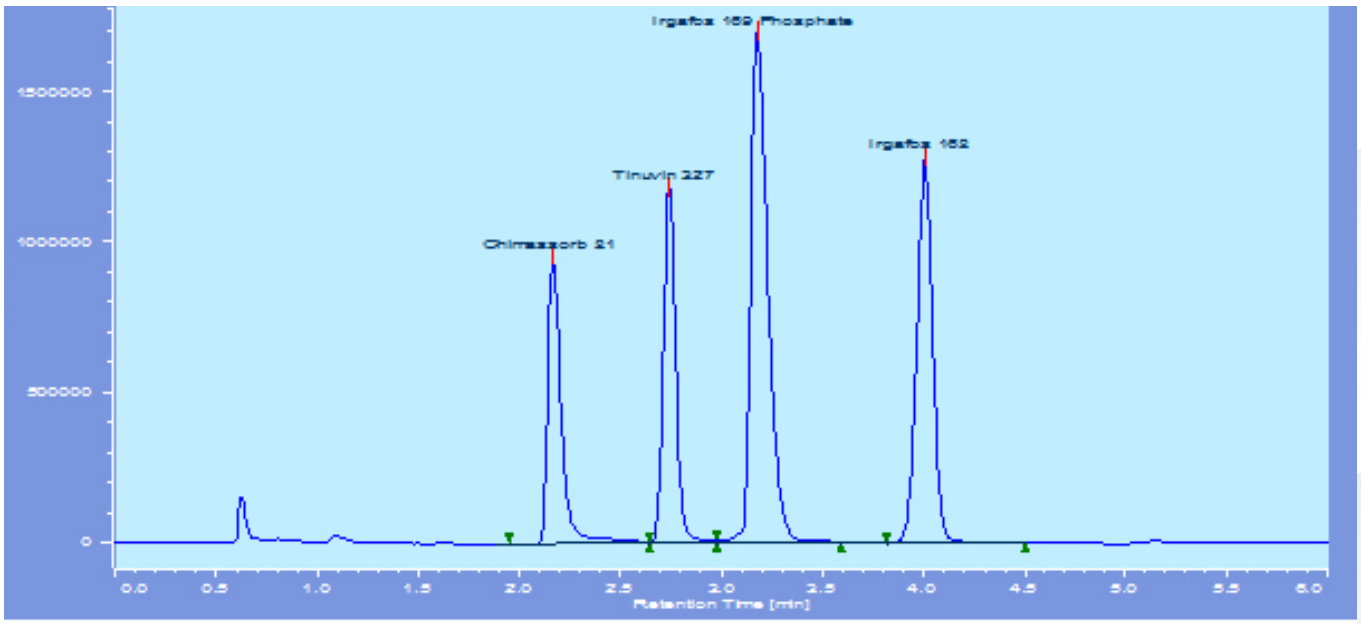

Figure 3.Chromatogram of Tinuvin 327 (0.8ug/uL), Irgafos 168 (1.5ug/uL), Irgafos 168 Phosphate (3ug/uL) and Chimassorb 81 mixture (0.8ug/uL) in Acetone. Conditions: Column Luna C18 (150 x 4.6 mm, 5um) , Flow rate 3mLs/min (100% CO2), Temperature 40C, Back Pressure Gradient 150bar to 200bar over 4 minutes, 220nm, 10uL Injection.

Conclusion

SFC successfully separatedIrgafos 168, Irgafos 168 phosphate, Tinuvin 327 and Chimassorb 81 using only CO2 as the mobile phase on a C18 column.

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