Application Note

Herbicides (Phenoxy acids)

Introduction

In 2010 in the United Kingdom herbicides accounted for 31% of treated land and 44% by weight of pesticide usage on arable crops, this equated to 14.08 million hectares treated with 6251 tonnes(1). Trace residues in crops, milk and meat products are routinely monitored in the interest of safety to humans and livestock. The acidic nature of phenoxy herbicides makes them difficult to retain on C18 whilst gas chromatography requires a derivitization step. The electronegative nitrogen on the Fortis™ Cyano stationary phase causes a strong dipole that can be exploited to retain polar analytes. The phase is very versatile having reverse and normal phase functionality and so would be a perfect addition to your HPLC selectivity tool box.

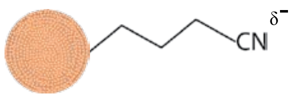


Figure 1.

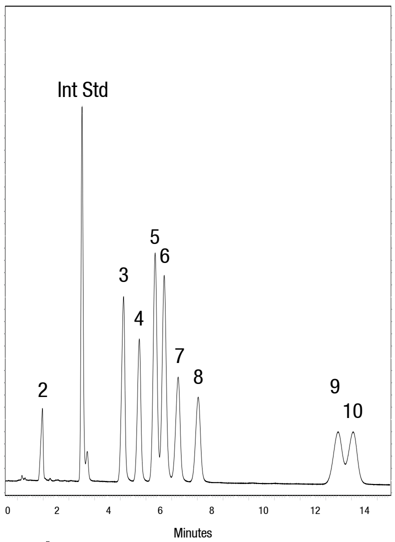
Experimental

The company carrying out the separation was interested in setting up an HPLC method to screen for the polar phenoxy herbicides. The compounds of interest were Banvel (Figure 2), 2,4-D (Figure 3), MCPA (Figure 4), PCOC (Figure 5), 2,4-DCP (Figure 6), 2,4-DP (Figure 7), CMPP (Figure 8), 2,4-DB (Figure 9), MCPB (Figure 10). An internal standard was also used to normalize variation in area response.

Column: Fortis™ Cyano, 50 x 2.1 mm, 3 µm
p/n FCN-020303

Mobile phase
80 : 20 H2O : ACN + 0.2% Acetic Acid

Flow Rate: 0.2 ml/min
Temp: 20oC
Detection: UV 280 nm



Results

Polar phenoxy herbicides are well retained due to interactions with the dipole on the cyano group on the Fortis Cyano stationary phase. This has resulted in a simple isocratic separation for the routine screening of phenoxy herbicides.

Conclusion

The strong dipole on the Fortis Cyano has resulted in unique selectivity which has allowed the retention of polar analytes. This has resulted in excellent resolution under simple isocratic, reverse phase conditions of our customer's phenoxy herbicides.

References

1. Pesticide Usage Survey Report 235, Arable Crops in the United Kingdom 2010, National Statistics, Department for Food, Environment and Rural Affairs.

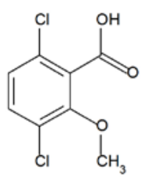


Figure 2. Banvel (3,6-Dichloro-2-methoxy-benzoic acid)

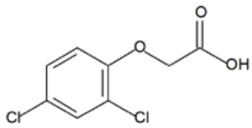


Figure 3. 2,4-D (2,4-Dichlorophenoxyacetic acid)

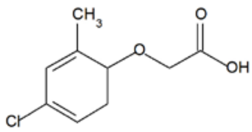


Figure 4. MCPA (2-methyl-4-chlorophenoxy-acetic acid)

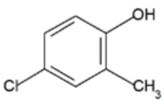


Figure 5. PCOC (4-Chloro -o-cresol)

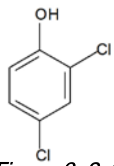


Figure 6. 2,4-DCP (2,4-Dichlorophenol)

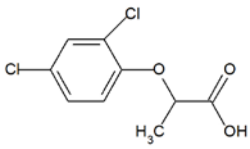


Figure 7. 2,4-DP (2,4-Dichlorophenoxypropionic acid)

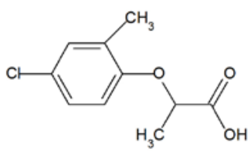


Figure 8. CMPP (Chloromethylphenoxypropionic acid)

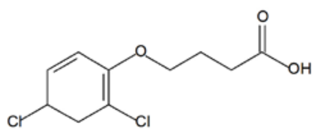


Figure 9. 2,4-DB (4-(2,4-dichlorophenoxy)butyric acid)

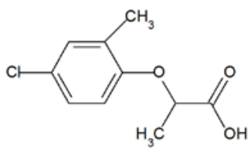


Figure 10. MCPB (4-(4-chloro-2-methylphenoxy)butanoic acid)