

Purification Strategies for Flavones

and Related Compounds
with CombiFlash® Systems

Abstract

CombiFlash® purification systems, in conjunction with RediSep® columns, are useful for purifying flavonoid compounds. Examples are provided from the scientific literature. Flavonoid compounds are purified on silica using hexane/ethyl acetate or dichloromethane/methanol gradients. Reverse phase C18 is a useful method to purify this class of compounds.

Introduction

Flavonoids are bioactive compounds ubiquitous to green plants. These compounds are often colored and show anti-inflammatory, anti-carcinogenic, and anti-atherogenic properties¹. The unique medicinal properties of these compounds make them attractive candidates for purification by natural products chemists and synthesis by medicinal chemists.

Purification Strategies

Table 1 shows that flavonoid compounds are moderately polar. When the phenol groups are methylated (compounds **1** to **3**), the methoxyflavones are purified on silica with a hexane-ethyl acetate gradient. As the number of phenol groups are increased, the increased polarity of the flavones require more polar solvents such as methanol (compound **4**). A flavone (compound **5**) with a glycoside showing further increases in polarity was purified on C18 rather than silica. Typical absorption (detection) wavelengths for these compounds range between 250–285 nm and also 320–380 nm². The purifications listed showed no use of organic modifiers. When running reverse phase, the use of 0.1% trifluoroacetic acid, formic acid, or acetic acid may be useful to sharpen peaks. When purifying the compounds on silica gel, using an ethyl acetate/methanol gradient may prove useful as ethyl acetate is in a different selectivity group than the chlorinated solvents³.

Table 1: Purification of non-polar flavones

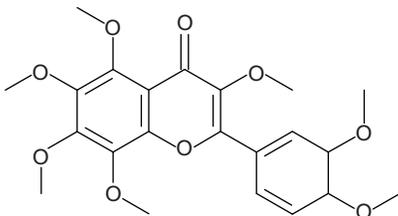
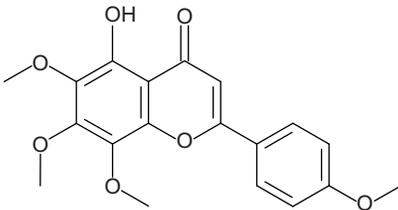
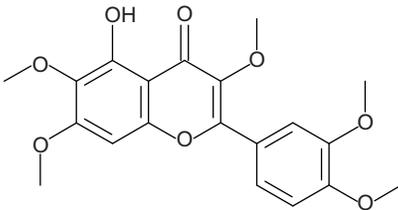
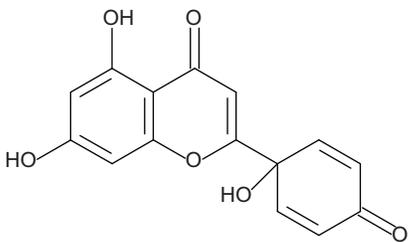
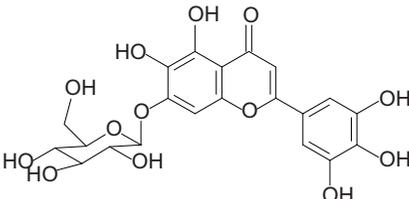
ID and Reference	Structure	Name	Solvent System
1 ⁴		3',4',3,5,6,7,8-Heptamethoxyflavone	Silica column: hexane: ethyl acetate 33 to 50% ethyl acetate gradient C18 column: water: methanol 20 to 80% methanol gradient
2 ²		5-hydroxy-6,7,8,4'-tetramethoxyflavone	Silica column: hexane/ethyl acetate gradient
3 ¹		5-hydroxy-3,6,7,3',4'-pentamethoxyflavone	Silica column: hexane/ethyl acetate gradient

Table 1: Purification of non-polar flavones

ID and Reference	Structure	Name	Solvent System
4 ⁵		Protoapigenone	33% MeOH: 67% CHCl ₃ isocratic
5 ⁶		5,6,7,3',4',5'-hexahydroxyflavone-7-O-β-glucopyranoside	C18 column: water: methanol gradient

Conclusion

Flavonoid compounds are easily purified with CombiFlash systems with RediSep columns. The compounds exhibit modest polarity and can be purified with hexane/ethyl acetate or dichloromethane/methanol gradients. Reverse phase chromatography can also be employed to purify this compound class.

References

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