

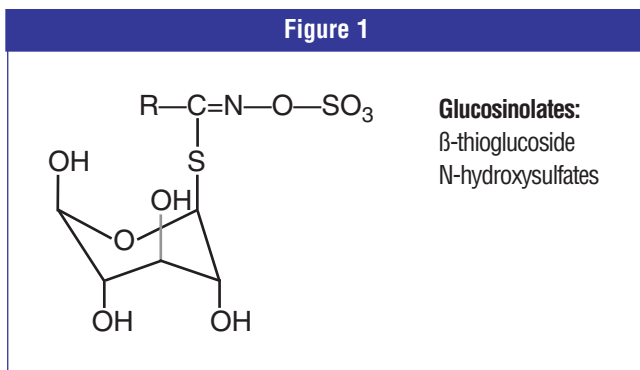
## HPLC Analysis of Glucosinolates in Vegetable Extracts without Ion Pairing Using an Ultra Aqueous C18 Column.

Glucosinolates are a naturally occurring set of compounds found in a variety of edible plants, most notably in broccoli, radish, and cabbage. Agriculturally, the degradation compounds of glucosin-olates have been shown to act as natural pesticides and fungicides (this breakdown occurs in the soil). These toxic compounds then further degrade into harmless compounds. Research on glucosinolates is continuing in hopes of bringing a more environmentally friendly approach to pest control.

Nutritionally, human consumption of these compounds is associated with a significantly reduced risk for a variety of malignant cancers along the alimentary canal. They also have been shown to suppress existing tumor growth. Glucosinolates are precursors to isothiocyanates, such as sulforaphane (4-methylsulfinylbutyl isothiocyanate), which regulates mammalian enzymes of xenobiotic metabolism.

Phenethyl glucosinolate (gluconasturtiin) is one of the glucosinolates widely found in cruciferous vegetables. It is one of the least polar glucosinolates, making it relatively easy to retain by reverse phase high performance liquid chromatography (HPLC). However, there are a number of glucosinolates with hydrophilic "R-" groups, such as 3-methylsulfinylpropyl glucosinolate, that are very difficult to retain by conventional reverse phase HPLC. Additionally, the "R-" group of glucosinolates can vary greatly, resulting in a large number of glucosinolates with widely differing polarities (Figure 1). Thus many analysts resort to reverse phase ion-pairing methods to analyze glucosinolates. The addition of ion-pairing reagents is less convenient, and makes the analyses inherently less reproducible. Ion-pairing reagents also make gradient elution very impractical, due to long equilibration times.

Figure 1



The analysis of a phenethyl glucosinolate standard using an Ultra Aqueous C18 column shows good peak shape without the use of ion-pairing reagents (Figure 2). Extracts of cabbage and watercress were analyzed using the same conditions (Figures 3 and 4). Gradient elution from 0 to 75% acetonitrile was used to retain and elute analytes having a wide range of polarities. The Ultra Aqueous C18 column allows the use of simple reverse phase conditions for the analyses of glucosinolates, saving time as compared to reverse phase ion-pairing methods.

Figure 2: Phenethyl Glucosinolate on Ultra Aqueous C18

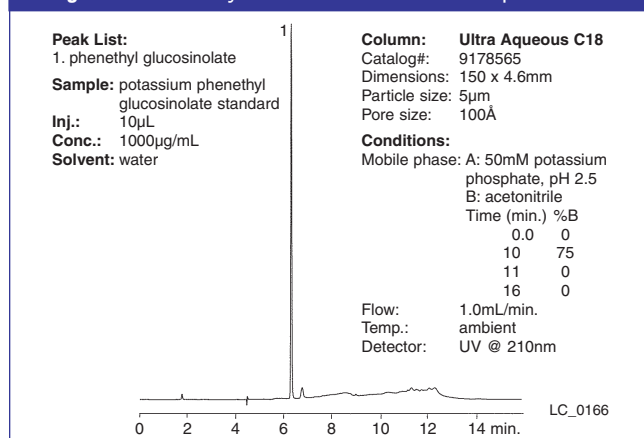


Figure 3: Cabbage Extract on Ultra Aqueous C18

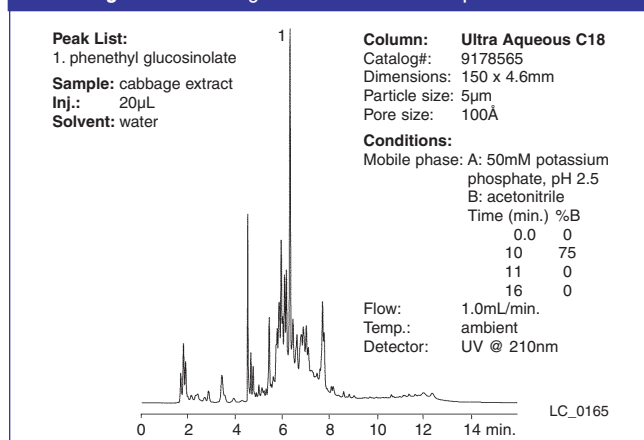
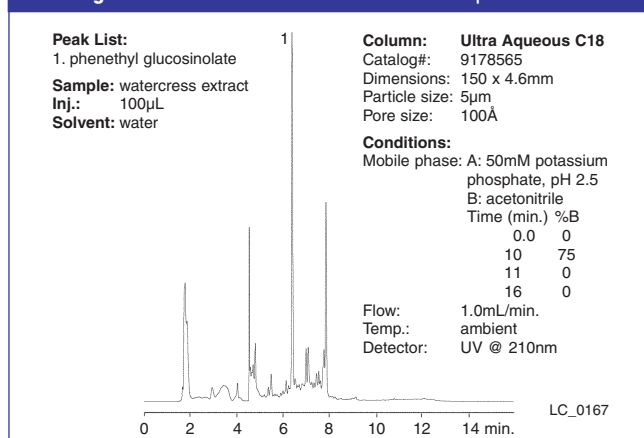


Figure 4: Watercress Extract on Ultra Aqueous C18



### ■ Ultra Aqueous C18, 3µm Columns

Length:	1.0mm ID cat.#	2.1mm ID cat.#	3.2mm ID cat.#	4.6mm ID cat.#
30mm	9178331	9178332	9178333	9178335
50mm	9178351	9178352	9178353	9178355
100mm	9178311	9178312	9178313	9178315

### ■ Ultra Aqueous C18, 3µm Columns with Trident™ Inlet Fitting

Length:	1.0mm ID cat.#	2.1mm ID cat.#	3.2mm ID cat.#	4.6mm ID cat.#
30mm	—	9178332-700	9178333-700	9178335-700
50mm	—	9178352-700	9178353-700	9178355-700
100mm	—	9178312-700	9178313-700	9178315-700

### ■ Ultra Aqueous C18, 5µm Columns

Length:	1.0mm ID cat.#	2.1mm ID cat.#	3.2mm ID cat.#	4.6mm ID cat.#
30mm	9178531	9178532	9178533	9178535
50mm	9178551	9178552	9178553	9178555
100mm	9178511	9178512	9178513	9178515
150mm	9178561	9178562	9178563	9178565
200mm	9178521	9178522	9178523	9178525
250mm	9178571	9178572	9178573	9178575

### ■ Ultra Aqueous C18, 5µm Columns with Trident™ Inlet Fitting

Length:	1.0mm ID cat.#	2.1mm ID cat.#	3.2mm ID cat.#	4.6mm ID cat.#
30mm	—	9178532-700	9178533-700	9178535-700
50mm	—	9178552-700	9178553-700	9178555-700
100mm	—	9178512-700	9178513-700	9178515-700
150mm	—	9178562-700	9178563-700	9178565-700
200mm	—	9178522-700	9178523-700	9178525-700
250mm	—	9178572-700	9178573-700	9178575-700

### ■ Ultra Aqueous C18, Guard Cartridges

Dimensions	cat.#	Qty.
10 x 2.1mm	917850212	3
10 x 4.0mm	917850210	3
20 x 4.0mm	917850220	2

**Acknowledgement:** The phenyl glucosinolate standard and extracts of cabbage and watercress were generously provided by Dr. Gerard Engelen-Eigles, University of Minnesota, Horticulture Department.

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