



## Reference Substances for Herbal Products

# Glucosinolates

As one of the leading manufacturers internationally, PhytoLab offers over 1,100 extensively documented herbal reference substances of all classes of natural compounds. Our portfolio currently includes 17 glucosinolates.

Glucosinolates are secondary plant metabolites that occur in a wide variety of plants mainly from the families of the *Brassicaceae* (e.g. horseradish (*Armoracia rusticana*), black mustard (*Brassica nigra*), wasabi (*Eutrema japonicum*), broccoli (*Brassica oleracea var. italica*), maca (*Lepidium meyenii*)), the *Capparaceae* (e.g. capers (*Capparis spinosa*)) and the *Caricaceae* (e.g. papaya (*Carica papaya*)), but also from the *Euphorbiaceae* and *Tropaeolaceae* (e.g. garden nasturtium (*Tropaeolum majus*)). Besides being responsible for the pungent and bitter taste of these plants, the glucosinolates and their hydrolysis products also protect plants against herbivores and have been shown to have antimicrobial, antiviral, antifungal and anticarcinogenic properties. Due to their antimicrobial properties, herbal medicinal products containing nasturtium herb and horseradish root are used in the treatment of sinusitis, bronchitis and urinary tract infections.

### Currently available phyproof® glucosinolates

Reference Substance	Product #	Reference Substance	Product #
Epiprogoitrin	89657	Gluconasturtiin	89689
Glucobarbarin	89684	Glucoraphanin	89215
Glucoberteroin	83241	Glucoraphenin	89690
Glucobrassicinapin	83242	Glucosibarin	89691
Glucobrassicin	80593	Glucotropaeolin	89216
Glucocheirolin	89685	Progoitrin	89765
Glucoerucin	89686	Sinalbin	89793
Glucoiberin	89687	Sinigrin	89279
Gluconapin	89688		

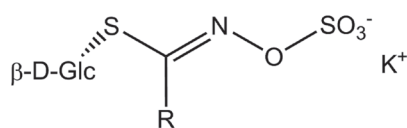


All glucosinolates have a central carbon atom in common, which is bound via a sulfur atom to a glucose, and via a nitrogen atom to a sulfate group. Furthermore, a substance-specific side chain (its structure depending on the amino acid applied in the biosynthesis) is bound to the central carbon atom. As the sulfate group is negatively charged, glucosinolates are most often isolated in the form of their potassium salts.

Upon contact with the enzyme myrosinase and water (myrosinase is kept in a separate compartment in the cell, but can be released e.g. during cutting or chewing), the glucose moiety is cleaved. The remaining molecule can then undergo various spontaneous reactions, usually resulting in the corresponding isothiocyanate. Depending on the reaction conditions also thiocyanates, nitriles or oxzolidine 2-thiones can be formed.

For a reliable quantitative analysis of glucosinolates well characterized reference substances are essential. Currently we offer 17 glucosinolates, all of them supplied together with a comprehensive certificate of analysis. Due to the negative charge of the molecule the counter ion has to be taken into account. For all glucosinolates characterized as primary reference substances, potassium was determined quantitatively and considered as an impurity in the calculation of the absolute content, which therefore refers to the pure glucosinolate only. For up-to-date information on prices and specifications please contact us or visit our webshop at <http://phyproof.phytolab.de>.

### General structure of glucosinolates, side chain structures and resulting isothiocyanates



Glucosinolate	Side Chain R	Isothiocyanate (ITC)
Epiprogoitrin	CH <sub>2</sub> =CH-CHOH-CH <sub>2</sub> -	2(S)-Hydroxy-3-butenyl-ITC
Glucobarbarin	C <sub>6</sub> H <sub>5</sub> -CHOH-CH <sub>2</sub> -	2(S)-Hydroxy-2-phenylethyl-ITC
Glucoberteroin	CH <sub>3</sub> -S-(CH <sub>2</sub> ) <sub>5</sub> -	5-(Methylthio)pentyl-ITC
Glucobrassicinapin	CH <sub>2</sub> =CH <sub>2</sub> -CH <sub>2</sub> -CH <sub>2</sub> -CH <sub>2</sub> -	4-Pentenyl-ITC
Glucobrassicin	3-Indolylmethyl-	3-Indolylmethyl-ITC
Glucocheirolin	CH <sub>3</sub> -SO <sub>2</sub> -CH <sub>2</sub> -CH <sub>2</sub> -CH <sub>2</sub> -	3-(Methylsulfonyl)propyl-ITC
Glucoerucin	CH <sub>3</sub> -S-CH <sub>2</sub> -CH <sub>2</sub> -CH <sub>2</sub> -CH <sub>2</sub> -	4-(Methylthio)butyl-ITC
Glucoiberin	CH <sub>3</sub> -SO-CH <sub>2</sub> -CH <sub>2</sub> -CH <sub>2</sub> -	3-(Methylsulfinyl)propyl-ITC
Gluconapin	CH=CH-CH <sub>2</sub> -CH <sub>2</sub> -	3-Butenyl-ITC
Gluconasturtiin	C <sub>6</sub> H <sub>5</sub> -CH <sub>2</sub> -CH <sub>2</sub> -	2-Phenylethyl-ITC
Glucoraphanin	CH <sub>3</sub> -SO-(CH <sub>2</sub> ) <sub>4</sub> -	Sulforaphane
Glucoraphenin	CH <sub>3</sub> -SO-CH=CH-CH <sub>2</sub> -CH <sub>2</sub> -	Sulforaphene
Glucosibarin	C <sub>6</sub> H <sub>5</sub> -CHOH-CH <sub>2</sub> -	2(R)-Hydroxy-2-phenylethyl-ITC
Glucotropaeolin	C <sub>6</sub> H <sub>5</sub> -CH <sub>2</sub> -	Benzyl-ITC
Progoitrin	CH <sub>2</sub> =CH-CHOH-CH <sub>2</sub> -	2(R)-Hydroxy-3-butenyl-ITC
Sinalbin	p-OH-C <sub>6</sub> H <sub>4</sub> -CH <sub>2</sub> -	p-Hydroxybenzyl-ITC
Sinigrin	CH <sub>2</sub> =CH-CH <sub>2</sub> -	Allyl-ITC

PhytoLab GmbH & Co. KG  
**phyproof**® Reference Substances  
 Dutendorfer Str. 5-7  
 91487 Vestenbergsgreuth  
 Germany  
 Phone: +49 9163 88-395  
 Fax: +49 9163 88-456  
[ref-substances@phytolab.de](mailto:ref-substances@phytolab.de)  
<http://phyproof.phytolab.de>