

## Paclitaxel

Purification on DAVISIL® C18 Silica Media



### 90% of Polar Impurities Removed from Paclitaxel Extract using Davisil® C18 Silica

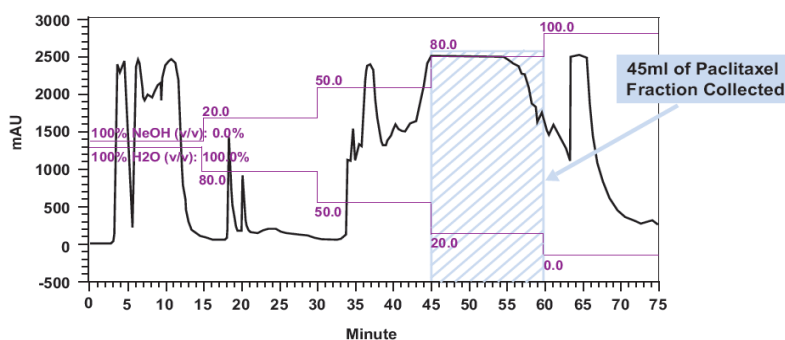
#### Introduction

Isolation of natural products on Davisil® C18 bonded silica is a very useful and cost effective clean up method for removing impurities from target natural compounds. Davisil® reversed phase silica's high 17% carbon load, uniform 60Å pores, and tight 50 micron particle size distribution, provides excellent chemical and structural properties for low pressure purification of natural compounds soluble under aqueous conditions.

Paclitaxel, which is sold by the brand name, Taxol®, is an anti-cancer ("antineoplastic" or "cytotoxic") chemotherapy drug. Paclitaxel, a plant alkaloid, is used to treat breast, ovarian, lung, bladder, prostate, melanoma, esophageal, as well as other types of solid tumor cancers. It has also been used in Kaposi's sarcoma.

Paclitaxel is a natural product isolated from the Canadian yew tree bark. Removing impurities from Paclitaxel is particularly challenging, since the molecular structures in the extracted mixture are very similar.

The crude solvent extract contains Paclitaxel and large quantities of highly polar taxane impurities.



Column : 10mm i.d. x 200mm  
 Packing : 10g Davisil® C18 silica  
 Mobile Phase : see chromatogram  
 Loading Volume : 2mL  
 Detection : UV@230nm

Figure 1. Preparative clean-up of Yew bark extract using Grace Davisil® C18, 60Å, 50µm silica.

### Experimental

#### Methanol solvent extraction

10 grams of powdered Yew bark mixed with 500ml of methanol and rolled for 12 hours at room temperature. 400ml of bark extract was then concentrated to 200ml.

#### Liquid-liquid extraction

90ml of the concentrated extract mixed with 100ml methylene chloride and 100ml water for 2 hours. The equilibrated mixture was then placed in a separatory funnel for 12 hours. The extracted solvent was collected and concentrated to a 2ml injection volume.

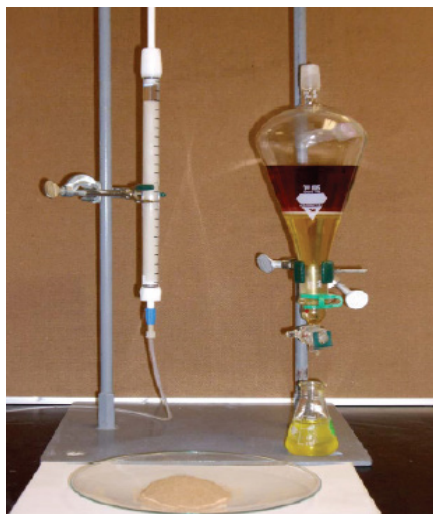
#### Chromatography

10 grams of 633N C18 was slurred with 20ml of isopropanol to pack a low pressure 10mm i.d. x 200mm length column for purification. A methanol/water step gradient was run with the desired compound eluting from the column in the 80/20 methanol/water fraction (fig. 1). This fraction was analyzed with a Grace C18 analytical column (Denali® C18 column 5µm, 4.6mm i.d. x 250mm). The resolution of Cephalomannine/Paclitaxel is 2.78 and the Paclitaxel peak was identified with the standard reference (fig. 2).

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## Results and Discussion



Grace Davisil® C18 silica effectively purified Paclitaxel from 90% of the Yew bark extract impurities using a methanol/water step gradient with methylene chloride.

The analytical Grace Vydac® 238DE54 column separated the Paclitaxel from its neighboring peaks, cephalomannine and 10-deacetylbaccatin.

The traditional stationary phase for crude separations has been silica gel, but the Davisil® C18 silica bonded phase was introduced to provide a material that separates solutes by dispersive interactions and some semi-polar interactions.

The superior bonding technology and purity of the Davisil® C18 silica effectively retained and enriched the moderately polar target molecule, Paclitaxel while removing the majority of crude impurities from the extraction sample.

Easy identification of the retained Paclitaxel and Cephalomannine peaks was performed on the Denali® C18 reversed phase analytical column due to its high retentivity, high efficiency and excellent peak symmetry. Paclitaxel and similar hydrophilic polar substances separate well on C18 reversed-phase Davisil® silica from their crude extraction mixtures in aqueous mobile phases with moderate organic content.

High efficiencies and good resolution were obtained for these substances showing the benefit for crude separation on Davisil® high purity media.

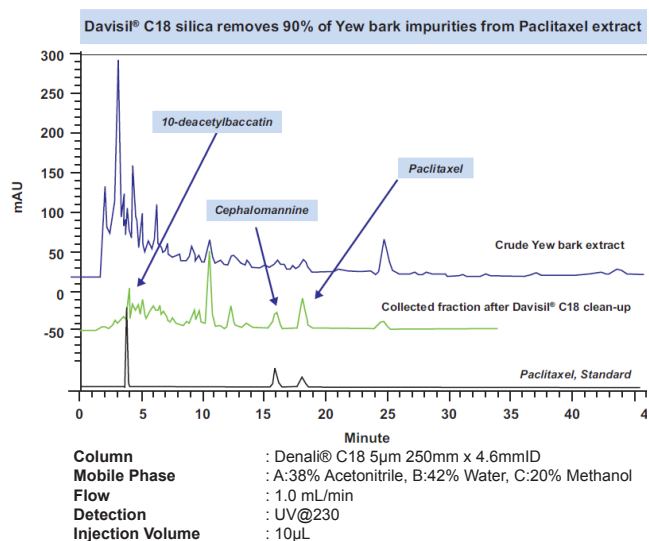
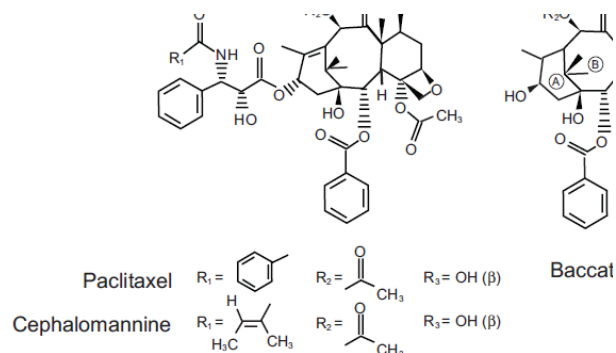


Figure 2. Analytical analysis of the collected fraction purified using Davisil® C18 silica compared to the crude Yew bark extract and a Paclitaxel standard (Sigma Aldrich).



### Ordering Information :

Description	Pkg	Stock N#
DAVISIL® C18 Silica Bonded 60Å 35-70µm	250g	FA0042
DAVISIL® C18 Silica Bonded 60Å 35-70µm	1kg	FA0030
DAVISIL® C18 Silica Bonded 60Å 10-14µm	250g	FA0043
DAVISIL® C18 Silica Bonded 60Å 10-14µm	1kg	FA0018
Omnifit 10mmID x 250mL Adjustable Glass Column	Ea	WH0002
Denali C18 5µm 250mm x 4.6mmID HPLC COLUMN	Ea	BA0532



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SepaChrom is specialized in the manufacturing and trading products for chromatography. Our offer includes Grace Davisil® complete product line, Denali® and Vydac® HPLC columns and OmniFit® low pressure LC columns.

We also supply Flash Chromatography instrument and cartridges and HPLC column, including packing service.

Please contact your local representative to ask a quote and further technical information, or, contact us at [info@sepachrom.com](mailto:info@sepachrom.com)