



Using the CHATA CHEM+NECT™ Pre-packaged Sulfuric Acid Mobile Phase for HPLC Analysis in the Fermentation Process of Fuel Grade Ethanol

New solution optimizes efficiency

Problem: using an HPLC with an open mobile phase system for analysis in the fermentation process of fuel grade ethanol can create challenges in keeping systems clean. Fungal growth and particulates in the mobile phase resulting from open lab preparation can cause significant pressure restrictions with loss in system efficiency. With the growing need to spend more time optimizing and increasing ethanol plant efficiency and production, analytical laboratories are pressured to do more tests while maximizing system performance and minimizing down time.

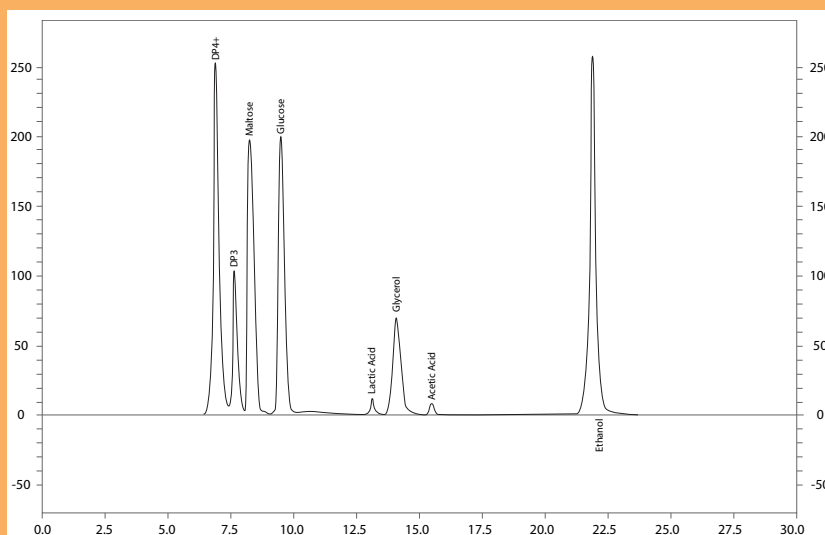
Solution: CHATA CHEM+NECT™ pre-packaged *closed system* mobile phase technology for HPLC analysis of ethanol fermentation process. This technology helps prevent fouling and microbial growth with a sterile mobile phase in a closed bag system that also helps maintain lower, consistent back pressures.

In the ethanol lab environment, the mobile phase is a critical component of the HPLC system and laboratory process. It affects chromatographic data, technician and plant operator time, and LC performance.

CHEM+NECT™ is an enabling technology that provides a completely sterile, closed mobile phase system. With easy to use connection fittings, the mobile phase bag can be directly connected to the HPLC system or dispensed

WESTERN WISCONSIN ENERGY, LLC BOYCEVILLE, WI HPLC ANALYSIS

Sample ID: 11/29/2006 7:39:23 AM calibration slw
Method Name: C:\CLASS-VP\Enterprise\Projects\Default\Method\HPLC Method.met
Data: C:\CLASS-VP\Data\HPLC\gm\9 28 06\11-29-2006 7-39-23 AM\11-29-2006 7-39-23 AM.dat
Acquired: 11/29/2006 8:11:37 AM
Printed: 11/29/2006 8:11:37 AM



FID-10A Results

Pk #	Name	Retention Time	Area	ESTD concentration
1	DP4+	7.033	3869195	3.250 CAL
2	DP3	7.758	1455002	1.000 CAL
3	Maltose	8.458	2709753	2.000 CAL
5	Glucose	10.000	2841566	2.000 CAL
7	Lactic Acid	13.250	259677	0.300 CAL
8	Glycerol	14.083	1081401	1.000 CAL
9	Acetic Acid	15.342	168403	0.300 CAL
10	Ethanol	21.767	6838089	12.000 CAL

TOTALS **19223086** **21.850 CAL**

APPLICATION NOTE

into a separate container. The bag stand fits in the HPLC bottle reservoir tray or can be placed on the bench, thus, creating no disruption to current system configurations. It is available in 0.002N and 0.005N Sulfuric Acid.

“The (CHATA) mobile phase is working very well and has really cleaned up our system. The connectors that were sent fit perfectly and were easy to install.” Reported Danelle Haugen, Lab Manager of Western Wisconsin Energy, LLC. “Amazingly enough our mobile phase has managed to help us keep running smoothly in addition to lowering our psi rates.” A cleaning process was done according to a protocol provided by a Shimadzu consultant.

“Just to give you an example of how your mobile phase has helped us:
Past: Clean system = 290 psi using mobile phase used in-house.
Present: Clean system = 220 psi using CHATA Biosystems mobile phase.”

A high quality, closed sterile system helps ethanol labs operate longer between maintenance functions. CHEM+NECT™ is an easily integrated technology that provides the quality assurance needed for the increasing pressures placed on the ethanol laboratories.

BENEFITS

- Single and multi site consistency and standardization
- Reduced HPLC maintenance functions
- Time to focus on other higher priority processes
- Ease of use for technicians and plant operators
- Maximizes long term HPLC performance
- Reduced HPLC backpressures

Special Acknowledgements:

Dr. Jim Mott, Shimadzu Scientific Instruments, Inc.
Danelle Haugen, Western Wisconsin Energy, LLC

HPLC = High Performance Liquid Chromatography

During Ethanol production, HPLC is used to characterize the carbohydrate, alcohol and organic content of the fermentation broth.

Equipment and Conditions

HPLC: Shimadzu LC 20-A

Column: Phenomenex Rezex

Column Temperature: 65°

Flow Rate: 0.6 mL/min

Mobile Phase: CHATA Pre-Packaged 0.005N Sulfuric Acid 0.2um filtered, degassed



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