



Corporation

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August 3, 2020

Mr. Daecheol Shin
Samyang Corporation
730 Daedok-daero
Yusung-gu, Daejeon-s
34055 Korea

Re: NWT Lab Report 2020-5312 – Resin Certificate

Dear Mr. Shin:

Please find the attached certificate and revised report as of August 3, 2020 documenting results of the TOC analysis on four (4) resin samples.

Samples were placed in a 25mm column. Ultrapure water was passed through the column at a rate of 30 bed volumes per hour. Grab samples were taken at intervals and analyzed with a Dohrman DC-80 TOC analyzer. Results are expressed as a delta TOC which is defined as TOC from resin effluent minus TOC blank at flow rate equal to 30 bed volumes per hour.

Sincerely,

M. R. Miller
Laboratory Supervisor



NWT CHEMICAL ANALYSIS OF RESINS

1. SCOPE

Chemical analysis of ion exchange resins.

2. PRODUCTS ANALYZED

Four (4) resins have been received for chemical analysis and referenced as follows:

Type
Anionic resin: TRILITE MAPN440K
Cationic resin: TRILITE MCN116K
Anionic resin: TRILITE MAN210K
Mixed Bed resin: TRILITE MMN316K

3. RESULTS

The analytical results are resented in the tables below:

Grade	Δ TOC ($\mu\text{g}/\text{l}$) at 100 minutes	Test Method
MCN116K	<10	ASTM D2187-17*
MAN210K	<10	
MMN316K	<10	
MAPN440K	<10	

Test method for TOC (Total Organic Carbon), modified test methods from NWT Procedure #s 626 & 807 based in ASTM D2187-17

1. Transfer 300 mL of virgin resin to test column (25mm diameter, 1.2 m length).
2. Pass ultrapure water (less than 30 ppb TOC) as 30 BV (bed volume)/hr through the column for 120 minutes.
3. Determine the delta TOC (delta TOC = sample TOC - blank TOC)