

NANO CHEM[®]

HCX[™] Purifier Medium NANO CHEM[®] Inert Gas Purifiers

Removal of Hydrocarbons from Inert Gases & Hydrogen

Overview

NANO CHEM[®] HCX[™] Purifiers are designed to remove trace hydrocarbons from inert gases and hydrogen. An example of a process sensitive to hydrocarbon contamination is DUV lithography. Deposition of carbon-based films from purge gas contaminants on the optical components decreases light throughput and negatively affects the patterning process.

NANO CHEM[®] HCX[™] purification medium, the active component in White Knight[™] (WK-Series) Purifiers, removes non-methane hydrocarbons with sub-ppb efficiency and high capacity for extended purifier lifetime.

Applications

- Purge gas purification for photolithography where trace hydrocarbons are detrimental to transmission of optical components (carbon deposits)
- Compatible gases include Nitrogen (N₂), Helium (He), Neon (Ne), Argon (Ar), Krypton (Kr), Xenon (Xe), Hydrogen (H₂), Carbon Dioxide (CO₂), Deuterium (D₂), CDA, and Sulfur Hexafluoride (SF₆)

Features and Benefits

- Custom-designed adsorbent material for point-of-use hydrocarbon removal offering:
 - High Capacity
 - Long Lifetimes
 - Sub-ppb Efficiency for non-methane hydrocarbon removal in inert gases (N₂, He, Ne, Ar, Kr, Xe), Hydrogen (H₂), and Carbon Dioxide (CO₂)
- Low Overall Cost of Ownership
- Room temperature operation - no power required
- No conditioning required
- Easy to install and operate
- Media refills available for WK-500F-HCX and WK2500FHGX purifier models
- Patented technology

Specifications

- 0.003 µm particle filter with 9-log retention (99.9999999%)
- Internal surface finish < 10 µin R_a
- Metal parts of Stainless Steel, Type 316L
- Maximum operating temperature of 40°C (104°F)

n-Butane Removal by NANO CHEM[®] HCX[™] Purifier Capacity

Large capacity of HCX[™] purifier for n-butane removal was experimentally verified by FTIR (Figure 1). Heating to 100°C and extended purging with inert gas did not release adsorbed n-butane, indicating strong affinity for hydrocarbons. **Challenge: 985 ppm n-Butane**

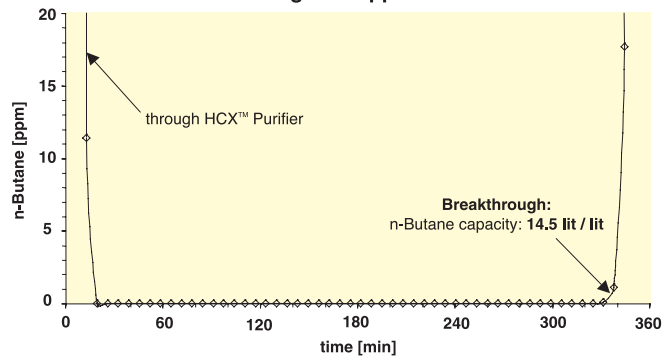


Figure 1: n-Butane Capacity of HCX[™] Purifier
30 ml bed volume, 958 ppm challenge at 1.4 slpm (0.8 NM³/hr)

FTIR (Fourier Transform Infrared Spectroscopy)

Efficiency

APIMS measurements indicate removal of n-butane to < 100 ppt (Detection Limit of APIMS) at challenges as high as 50 ppm (Figure 2). Purifier was initially bypassed for < 25 minutes to verify instrument response.

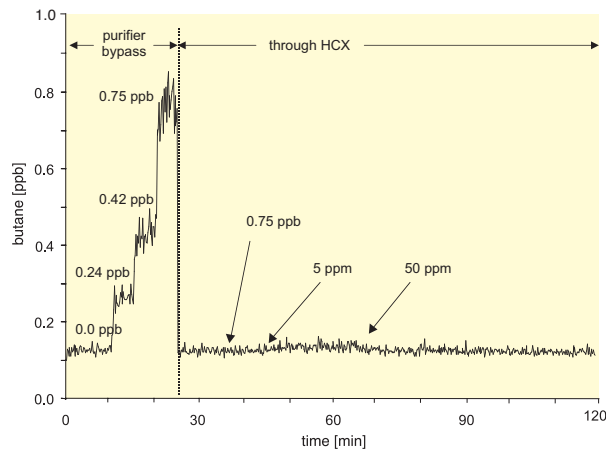


Figure 2: Efficiency of HCX[™] Purifier for n-butane removal at challenges from 0.75 ppb to 50 ppm. (200 ml bed volume)

ppt – parts per trillion

APIMS (Atmospheric Pressure Ionization Mass Spectrometry)

Purifier Models / Sizes

NANOCHEM® HCX™ purification medium is available in a wide variety of hardware configurations for point-of-use, distribution, source and bulk purification applications:

Model	Maximum Recommended Flow Rate**		Media Volume ml or liters	Maximum Allowable Operating Pressure Without End-Point	
	slpm	(NM ³ /hr)		psig	(Mpa)
Purifilter®	3	(0.2)	25 ml	1,000	(7)
A-Series*	50	(3)	300, 500, 2000 ml	500	(3.55)
L-Series	8-150	(0.5-9)	60, 300, 500, 2000 ml	500	(3.55)
HP-Series	50	(3)	500 ml	2,850	(19.8)
MS-Series	1000	(60)	8, 16, 32 liters	300	(2.17)
WK-Series*	10	(0.6)	50, 55 ml	1000	(7)
	75-80	(4.5-48)	300, 500, 700, 2500, 5000	500	(3.55)
	0 1000	(60)	ml 9 liters	350	(2.51)

*Drop-in replacements available for competing hardware designs.

**For higher flow rates, contact Nippon Sanso Matheson

NOTE: 0.003 µm particle filter with 99.999999% retention standard on all models..



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