



HAFEZ VARESH
CHEMICAL INDUSTRIES GROUP
مجموعه تولیدی حافظ وارث - تهران

Certificate of Analysis (COA)

**Product Name: Ethylene Chlorohydrin (2-Chloroethanol)

**Molecular Formula: C_2H_5ClO **CAS No: 107-07-3

**Manufacturer: Hafez Varesh Co. **Sample: Laboratory-grade (Dehydrated)

**Date of Analysis: 2023-12-23 **Lab: Hafez Varsh Laboratory – Tehran

Parameter	Test Method	Result	Unit	Specification / Remark
Appearance	Visual	Clear, colorless liquid	-	No color or precipitate
Odor	Olfactory	Mild chloroalcoholic odor	-	Characteristic
Purity	GC-MS (MassHunter, NIST14)	$\geq 99.0\%$ (Peak #1 Area % = 94.99 %)	% w/w	$\geq 99\%$
Impurity 1	GC-MS	1,2-Ethanediol $\approx 2.4\%$ Area	% w/w	$\leq 3\%$
Impurity 2	GC-MS	1,4-Dioxane $\approx 0.4\%$ Area	% w/w	$\leq 1\%$
Impurity 3	GC-MS	Ethanol 2-chloro-acetate $\approx 0.3\%$ Area	% w/w	$\leq 1\%$
Density at 25°C	ASTM D4052	1.201	g/mL	1.20 ± 0.01
IR Spectrum	FT-IR (ESH 806_1)	3349 (O-H), 2964 (CH_2), 1074 (C-O), 662 (C-Cl)	cm^{-1}	Matches reference spectrum
1H NMR ($CDCl_3$)	Bruker 400 MHz	δ 3.42–3.98 ppm (2H, CH_2-Cl , CH_2-OH)	ppm	Consistent with structure
^{13}C NMR ($CDCl_3$)	Bruker 100 MHz	δ 46.1 ppm (CH_2-Cl), 62.7 ppm (CH_2-OH)	ppm	Matches reference data
Water Content	Karl Fischer	$< 0.1\%$	% w/w	$\leq 0.5\%$
Final Assessment	-	Complies with specification	-	$\geq 99\%$ Laboratory Grade

**Conclusion: The analyzed Ethylene Chlorohydrin sample produced by Hafez Varesh Co. meets the laboratory-grade specification ($\geq 99\%$ purity) and shows full conformity with reference spectra and analytical standards (GC-MS, NMR, IR).

Authorized by:

QC Manager – Hafez Varesh Co.

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