

HYDRANAL™ Technical Information Sheet T012 Rev. 2

Reagent Selection for Safer Karl Fischer (KF) Titration without Imidazole

In 2015, the European Commission classified imidazole as a CMR (carcinogenic, mutagenic and reprotoxic) substance and added H360D statement (“may damage the unborn child”). The initial trigger for the evaluation was the usage of imidazole in the food industry and therefore an intended oral intake. Although KF reagents contain imidazole only in dissolved and diluted form, are always handled in closed systems in small analytical amounts, and direct contact with imidazole is unlikely, professional users of CMR substances must carry out a risk assessment considering the whole work process.

So far, alternatives to imidazole have adversely impacted the performance of KF reagents and users have had limited options to move away from any potential CMR risk. Now, after dedicated research, the Hydranal Center of Excellence has developed new reagents that are free of imidazole and do not compromise on performance. Customers who wish to upgrade to imidazole-free reagents from current Hydranal reagents can do so without changes in the titration method. A cross-reference is provided below.

Volumetric two-component titration			
Reagent system with imidazole		Reagent system without imidazole	
Titrating agent	Medium	Titrating agent	Medium
34801 HYDRANAL-Titrant 5 34811 HYDRANAL-Titrant 2	34800 HYDRANAL-Solvent	34801 HYDRANAL-Titrant 5 34811 HYDRANAL-Titrant 2	34432 HYDRANAL NEXTGEN Solvent FI
34732 HYDRANAL-Titrant 5 E ¹⁾ 34723 HYDRANAL-Titrant 2 E ¹⁾	34730 HYDRANAL-Solvent E	34801 HYDRANAL-Titrant 5 34811 HYDRANAL-Titrant 2	34431 HYDRANAL NEXTGEN Solvent E-FI

Volumetric one-component titration			
Please note, an imidazole-free system for one-component titration is currently not available. Consider switching to two-component system as below:			
One-component titration		Two-component titration	
Reagent system with imidazole		Reagent system without imidazole	
Titrating agent	Medium	Titrating agent	Medium
34805 HYDRANAL-Composite 5 34806 HYDRANAL-Composite 2	37817 HYDRANAL-Methanol Rapid 34741 HYDRANAL-Methanol Dry	34801 HYDRANAL-Titrant 5 34811 HYDRANAL-Titrant 2	34432 HYDRANAL NEXTGEN Solvent FI
34805 HYDRANAL-Composite 5 34806 HYDRANAL-Composite 2	34734 HYDRANAL-CompoSolver E	34801 HYDRANAL-Titrant 5 34811 HYDRANAL-Titrant 2	34431 HYDRANAL NEXTGEN Solvent E-FI

¹⁾ Ethanolic 34732 and 34723 contain Imidazol hydroiodide as CMR component

Coulometric titration				
	Reagent system with imidazole		Reagent system without imidazole	
	Anolyte	Catholyte	Anolyte	Catholyte
Cell with diaphragm	34836 HYDRANAL-Coulomat AG	34840 HYDRANAL-Coulomat CG	34433 HYDRANAL NEXTGEN Coulomat AG-FI	34840 HYDRANAL-Coulomat CG
	34820 HYDRANAL Coulomat AK	34821 HYDRANAL Coulomat CG-K	34471 HYDRANAL NEXGEN Coulomat A-FA	34470 HYDRANAL NEXGEN Coulomat C-FA
Cell without diaphragm	34836 HYDRANAL-Coulomat AG 34810 HYDRANAL-Coulomat AD	-	34433 HYDRANAL NEXTGEN Coulomat AG-FI	-

Hydranal FI reagents can be mixed with co-solvents following the same rules as for imidazole-containing reagents.

Product Number	Product Name	Description	Packaging
34801	HYDRANAL-Titrant 5	Two-component reagent, titer ~5 mg/mL (free of CMR substances)	500 mL; 1 L; 2.5 L
34811	HYDRANAL-Titrant 2	Two-component reagent, titer ~2 mg/mL (free of CMR substances)	500 mL; 1 L; 2.5 L
34431	HYDRANAL NEXTGEN Solvent E-FI	Medium for volumetric two-component Karl Fischer titration (ethanol-based), free of imidazole (free of CMR substances)	1 L
34432	HYDRANAL NEXTGEN Solvent FI	Medium for volumetric two-component Karl Fischer titration (methanol-based), free of imidazole (free of CMR substances)	1 L
34433	HYDRANAL NEXTGEN Coulomat AG-FI	Anolyte suitable for cells with and without diaphragm, free of imidazole (free of CMR substances)	500 mL
34471	HYDRANAL NEXGEN Coulomat A-FA	Anolyte for coulometric Karl Fischer titration of ketones and Li-ion battery electrolytes, preferred for cells with diaphragm, acetonitrile-based, free of alcohols (free of CMR substances)	500 mL
34470	HYDRANAL NEXGEN Coulomat C-FA	Catholyte for coulometric Karl Fischer titration of ketones and Li-ion battery electrolytes, acetonitrile-based, free of alcohols (free of CMR substances)	10 x 5 mL ampoules

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