

REACH Potassium carbonate Technical Committee Analytical methods recommendation

Analytical techniques for identification and quantification of main constituent and impurities

The REACH Regulation says, in Annex VI:

“For each substance the information given shall be sufficient to enable each substance to be identified. If it is not technically possible or if it does not appear scientifically necessary to give information on one or more items below, the reason shall be clearly stated.”

ECHA's “Guidance for identification and naming of substances under REACH” allows/recommends in chapter 4.2.1.3 the uses of other methods if scientifically justified.

Based on our discussion and the views of the technical experts, the TC agreed finally to select the appropriate methods from Annex VI of the Regulation, apply waivers for methods that are seen as 'scientifically not necessary' or 'technically not possible', and provide additional appropriate methods for substance identification and for quantitative determination of composition or purity. To pass the completeness check all fields have to be properly filled, either with results or with waiving statements.

The following methods are recommended:

a) Substance Identification

1.	UV-Vis	waiver (scientifically not necessary*)
2.	IR	method regarded as appropriate (water removal by evaporation prior to analysis necessary)
3.	¹ H-NMR / ¹³ C-NMR	waiver (technically not possible*), no organic C
4.	MS	waiver (scientifically not necessary*)
5.	HPLC	waiver (scientifically not necessary*)
6.	GC	waiver (technically not possible*)
7.	Total alkalimetry and hydroxide determination by titration	additional method regarded as appropriate for quantification of carbonate ion
8.	Atomic emission spectrophotometry (AES)	additional method regarded as appropriate for quantification of K ⁺ but also for other cations (e.g. Na ⁺)
9.	Water content by Karl-Fischer titration	additional method regarded as appropriate for SI of H ₂ O (quantitative)

The methods as described above can be used for both liquid and solid potassium carbonate. IR analysis is only possible with solid material. In case of aqueous solutions, water has to be evaporated prior to analysis. The water content has to be determined and should reflect the weight loss after evaporation of the aqueous solution.

Total alkalimetry and hydroxide analysis is used to determine the carbonate content of the substance. With IR, the identity of carbonate is given and with AES the potassium content can be established. These 3 methods are sufficient to confirm that the substance is potassium carbonate and that it is relatively pure (mono-constituent).

b) Impurities

The most common impurities are potassium hydroxide, sodium carbonate and potassium bicarbonate should be quantified with company specific methods

If there are impurities present in the substance at a concentration higher or equal to 0.1 % then we recommend determining also the concentration of these impurities using appropriate methods (for examples see below). The results of the analysis should also be attached to the IUCLID of your legal entity.

1.	metals	ICP-OES (alternatively for As, Se, Sb: CV Hydride-AAS, for Hg: CV atomic fluorescence spectroscopy; CV = cold vapour)
2.	anions (Cl, Br, SO ₄ , ...)	IC
3.	organic impurities (volatile)	GC-MS (HS-GC or extraction method)
4.	organic impurities (non volatile)	GC or LCMS or GC-MS (extraction method)
5.	non-volatile residue	gravimetry with residue on evaporation
6.	others	specific method to be provided by companies

The methods should preferably be based on established standards/norms, otherwise on validated company methods.

* The TC is aware that the reasons for 'scientifically not necessary' or 'technically not possible' must be clearly stated as required by Annex IV.

The TC understands 'scientifically not necessary' as that the method does not deliver relevant information that allows the identification of the substance, e.g. the UV-Vis spectrum consists only of broad, unspecific absorption bands which are by far determined by the solvent water, and the same or very similar spectrum could be reproduced by solutions of many other inorganic acids or other substances.