

Methoden voor de bepaling van anionen

Deze procedure vervangt de procedure CMA/2/I/C van oktober 2010.

Richtlijnen voor de conservering en bewaring van watermonsters worden gegeven in CMA/1/B.

MATRIX: GRONDWATER

De volgende analysemethoden kunnen gebruikt worden voor het bepalen van anionen in grondwater:

Chloride (a)	<ul style="list-style-type: none"> • ISO 10304-1:2007 Water quality - Determination of dissolved anions by liquid chromatography of ions - Part 1: Determination of bromide, chloride, fluoride, nitrate, nitrite, phosphate and sulfate (CMA/2/I/C.3) en ISO 10304-1:2007/Cor 1:2010 • ISO 10304-4:1997 Water quality - Determination of dissolved anions using liquid chromatography of ions. Part 4: Determination of chlorate, chloride and chlorite in water with low contamination • ISO 9297: 1989 Water quality – Determination of chloride – Silver nitrate titration with chromate indicator (Mohr's method) • EN ISO 15682: 2000 Water quality – Determination of chloride by flow analysis (CFA and FIA) and photometric or potentiometric detection • ISO/DIS 15923-1:2011 Water quality – Determinations of ions by a discrete analysis system and spectrophotometric detection – Part 1: Ammonium, chloride, nitrate, nitrite, orthophosphate, silicate and sulfaat (CMA/2/I/C.8)
Fluoride	<ul style="list-style-type: none"> • ISO 10304-1: 2007 Water quality - Determination of dissolved anions by liquid chromatography of ions - Part 1: Determination of bromide, chloride, fluoride, nitrate, nitrite, phosphate and sulfate (CMA/2/I/C.3) en ISO 10304-1:2007/Cor 1:2010 • ISO 10359-1:1992 Water quality – Determination of fluoride – Part 1: Electrochemical probe method for potable and light polluted water (b) (CMA/2/I/C.1.1) • NEN 6589:2005 Water - Potentiometrische bepaling van het gehalte aan totaal anorganisch fluoride met doorstroomsystemen (FIA en CFA) • CMA/2/I/C.1.2 Spectrofotometrische bepaling van opgelost fluoride met een doorstrooianalysesysteem
Nitraat	<ul style="list-style-type: none"> • ISO 10304-1:2007 Water quality - Determination of dissolved anions by liquid chromatography of ions - Part 1: Determination of bromide, chloride, fluoride, nitrate, nitrite, phosphate and sulfate (CMA/2/I/C.3) en ISO 10304-1:2007/Cor 1:2010 • EN ISO 13395:1996 Water quality – Determination of nitrite nitrogen and nitrate nitrogen and the sum of both by flow analyses (CFA en FIA) and spectrometric detection (CMA/2/I/C.6) • ISO 7890-3: 1988 Water quality – Determination of nitrate – Part 3: Spectrometric method using sulfosalicylic acid • ISO/DIS 15923-1:2011 Water quality – Determinations of ions by a discrete analysis system and spectrophotometric detection – Part 1: Ammonium, chloride, nitrate, nitrite, orthophosphate, silicate and sulfaat (CMA/2/I/C.8)
Nitriet	<ul style="list-style-type: none"> • ISO 10304-1:2007 Water quality - Determination of dissolved anions by liquid chromatography of ions - Part 1: Determination of bromide, chloride, fluoride, nitrate, nitrite, phosphate and sulfate (CMA/2/I/C.3) en ISO 10304-1:2007/Cor 1:2010

	<ul style="list-style-type: none"> • ISO 13395:1996 Water quality – Determination of nitrite nitrogen and nitrate nitrogen and the sum of both by flow analyses (CFA en FIA) and spectrometric detection (CMA/2/I/C.6) • ISO 6777:1984 Water quality – Determination of nitrite – Molecular absorption spectrometric method • ISO/DIS 15923-1:2011 Water quality – Determinations of ions by a discrete analysis system and spectrophotometric detection – Part 1: Ammonium, chloride, nitrate, nitrite, orthophosphate, silicate and sulfaat (CMA/2/I/C.8)
Sulfaat	<ul style="list-style-type: none"> • ISO 10304-1: 2007 Water quality - Determination of dissolved anions by liquid chromatography of ions - Part 1: Determination of bromide, chloride, fluoride, nitrate, nitrite, phosphate and sulfate (CMA/2/I/C.3) en ISO 10304-1:2007/Cor 1:2010 • ISO 22743:2006 Water quality - Determination of sulfates - Method by continuous flow analysis (CFA) • ISO/DIS 15923-1:2011 Water quality – Determinations of ions by a discrete analysis system and spectrophotometric detection – Part 1: Ammonium, chloride, nitrate, nitrite, orthophosphate, silicate and sulfaat (CMA/2/I/C.8)
Totaal cyanide	<ul style="list-style-type: none"> • EN ISO 14403: 2002 Water quality – Determination of total cyanide and free cyanide by continuous flow analysis (CMA/2/I/C.2.2) • ISO 6703-1:1984 Water quality – Determination of cyanide – Part 1: Determination of total cyanide (CMA/2/I/C.2.1)
Vrije cyanide	<ul style="list-style-type: none"> • EN ISO 14403: 2002 Water quality – Determination of total cyanide and free cyanide by continuous flow analysis (CMA/2/I/C.2.3)
Chroom(VI)	<ul style="list-style-type: none"> • ISO 11083:1994 Water quality – Determination of chromium(VI) – Spectrometric method using 1,5 diphenylcarbazine • ISO 10304-3:1997 Water quality - Determination of dissolved anions using liquid chromatography of ions. Part 3: Determination of chromate, iodide, sulfite, thiocyanate and thiosulfate • EPA 7199:1996 Determination of hexavalent chromium in drinking water, groundwater and industrial waste water effluents by ion chromatography (CMA/2/I/C.7)

- (a) Voor de bepaling van chloride wordt bij toepassing van de titrimetrische methode en de doorstroomanalysemethode steeds een totaal halogeen gehalte (chloride, bromide, jodide) bepaald. Ionenchromatografie daarentegen is in staat om selectief chloride te meten.
- (b) Voor de bepaling van fluoride met ion-selectieve elektrode volgens ISO 10359-1 wordt het gebruik van de buffer zoals beschreven in DIN 38405-D4 aanbevolen. De validatiegegevens opgenomen in ISO 10359-1 zijn eveneens bepaald op basis van deze buffer.

MATRIX: ELUATEN

De volgende analysemethoden kunnen gebruikt worden voor het bepalen van anionen in eluaten:

Chloride (c)	<ul style="list-style-type: none"> • ISO 10304-1:2007 Water quality - Determination of dissolved anions by liquid chromatography of ions - Part 1: Determination of bromide, chloride, fluoride, nitrate, nitrite, phosphate and sulfate (CMA/2/I/C.3) en ISO 10304-1:2007/Cor 1:2010
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	<ul style="list-style-type: none"> • ISO 10304-4:1997 Water quality - Determination of dissolved anions using liquid chromatography of ions. Part 4: Determination of chlorate, chloride and chlorite in water with low contamination • ISO 9297: 1989 Water quality – Determination of chloride – Silver nitrate titration with chromate indicator (Mohr's method) • EN ISO 15682: 2000 Water quality – Determination of chloride by flow analysis (CFA and FIA) and photometric or potentiometric detection • ISO/DIS 15923-1:2011 Water quality – Determinations of ions by a discrete analysis system and spectrophotometric detection – Part 1: Ammonium, chloride, nitrate, nitrite, orthophosphate, silicate and sulfaat (CMA/2/I/C.8)
Fluoride	<ul style="list-style-type: none"> • ISO 10304-1: 2007 Water quality - Determination of dissolved anions by liquid chromatography of ions - Part 1: Determination of bromide, chloride, fluoride, nitrate, nitrite, phosphate and sulfate (CMA/2/I/C.3) en ISO 10304-1:2007/Cor 1:2010 • ISO 10359-1:1992 Water quality – Determination of fluoride – Part 1: Electrochemical probe method for potable and light polluted water (d) (CMA/2/I/C.1.1) • NEN 6589:2005 Water - Potentiometrische bepaling van het gehalte aan totaal anorganisch fluoride met doorstroomsystemen (FIA en CFA) • CMA/2/I/C.1.2 Spectrofotometrische bepaling van opgelost fluoride met een doorstroomanalysestelsel
Sulfaat	<ul style="list-style-type: none"> • ISO 10304-1: 2007 Water quality - Determination of dissolved anions by liquid chromatography of ions - Part 1: Determination of bromide, chloride, fluoride, nitrate, nitrite, phosphate and sulfate (CMA/2/I/C.3) en ISO 10304-1:2007/Cor 1:2010 • ISO 22743:2006 Water quality - Determination of sulfates - Method by continuous flow analysis (CFA) • ISO/DIS 15923-1:2011 Water quality – Determinations of ions by a discrete analysis system and spectrophotometric detection – Part 1: Ammonium, chloride, nitrate, nitrite, orthophosphate, silicate and sulfaat (CMA/2/I/C.8)
Totaal cyanide	<ul style="list-style-type: none"> • EN ISO 14403: 2002 Water quality – Determination of total cyanide and free cyanide by continuous flow analysis (CMA/2/I/C.2.2) • ISO 6703-1:1984 Water quality – Determination of cyanide – Part 1: Determination of total cyanide (CMA/2/I/C.2.1)
Chroom(VI)	<ul style="list-style-type: none"> • ISO 11083:1994 Water quality – Determination of chromium(VI) – Spectrometric method using 1,5 diphenylcarbazine • ISO 10304-3:1997 Water quality - Determination of dissolved anions using liquid chromatography of ions. Part 3: Determination of chromate, iodide, sulfite, thiocyanate and thiosulfate • EPA 7199:1996 Determination of hexavalent chromium in drinking water, groundwater and industrial waste water effluents by ion chromatography (CMA/2/I/C.7)

- (c) Voor de bepaling van chloride wordt bij toepassing van de titrimetrische methode en de doorstroomanalysemethode steeds een totaal halogeen gehalte (chloride, bromide, jodide) bepaald. Ionenchromatografie daarentegen is in staat om selectief chloride te meten.
- (d) Voor de bepaling van fluoride met ion-selectieve elektrode volgens ISO 10359-1 wordt het gebruik van de buffer zoals beschreven in DIN 38405-D4 aanbevolen. De validatiegegevens opgenomen in ISO 10359-1 zijn eveneens bepaald op basis van deze buffer.