

**FIA**                      **List of Methods**

<b>Method</b>	<i>Analytical principle</i>						<i>Relation to standards</i>
Quantification limit	<b>Calibration ranges</b>						Applicable to <Remarks>
<b>Total Aluminium</b>	<i>Pyrocatechol violet</i>						<i>APHA 3500 Al modified</i>
0.01 mg/l	<b>0.05</b>	...	<b>0.5</b>	mg/l	Al-T	Water / Wastewater / Soil extract	
	<b>0.2</b>	...	<b>2</b>	mg/l	Al-T		
<b>Ammonium (Ammonia)</b>	<i>Gas diffusion/ pH-indicator</i>						<i>ISO 11732</i>
0.03 mg/l	<b>0.1</b>	...	<b>1</b>	mg/l	NH <sub>4</sub> -N	Water / Wastewater / Soil extract	
	<b>0.5</b>	...	<b>10</b>	mg/l	NH <sub>4</sub> -N	<also UM N/P>	
	<b>2</b>	...	<b>50</b>	mg/l	NH <sub>4</sub> -N		
< 0.01 mg/l	<b>0.02</b>	...	<b>1</b>	mg/l	NH <sub>4</sub> -N	Water / Wastewater / Soil extract	
	<b>0.2</b>	...	<b>5</b>	mg/l	NH <sub>4</sub> -N	<wide-range GD cell>	
	<b>2</b>	...	<b>20</b>	mg/l	NH <sub>4</sub> -N	<also UM N/P>	
0.05 mg/l	<b>0.2</b>	...	<b>5</b>	mg/l	NH <sub>4</sub> -N	Kjeldahl digest	
	<b>0.5</b>	...	<b>10</b>	mg/l	NH <sub>4</sub> -N	<combination manifold	
	<b>2</b>	...	<b>50</b>	mg/l	NH <sub>4</sub> -N	Kjeldahl / Water ...>	
0.02 mg/l	<b>0.1</b>	...	<b>2</b>	mg/l	NH <sub>4</sub> -N	Kjeldahl digest	
	<b>0.2</b>	...	<b>5</b>	mg/l	NH <sub>4</sub> -N	<wide-range GD cell>	
	<b>1</b>	...	<b>10</b>	mg/l	NH <sub>4</sub> -N	<combination manifold	
						Kjeldahl / Water ...>	
<b>Borate</b>	<i>Azomethine H</i>						
< 0.1 mg/l	<b>0.2</b>	...	<b>5</b>	mg/l	B	Water	
	<b>0.5</b>	...	<b>10</b>	mg/l	B		
<b>Calcium</b>	<i>o-Cresolphtalein-Komplexon</i>						
< 0.05 mg/l	<b>0.1</b>	...	<b>5</b>	mg/l	Ca	Water / Wastewater/ Soil extract	
	<b>5</b>	...	<b>100</b>	mg/l	Ca		
	<b>10</b>	...	<b>200</b>	mg/l	Ca		
	<b>25</b>	...	<b>500</b>	mg/l	Ca		
<b>Chloride</b>	<i>Hg-thiocyanate / Fe(III)</i>						<i>ISO 15682</i>
< 0.5 mg/l	<b>1</b>	...	<b>7</b>	mg/l	Cl <sup>-</sup>	Water / Wastewater / Soil extract	
	<b>3</b>	...	<b>30</b>	mg/l	Cl <sup>-</sup>		
	<b>10</b>	...	<b>100</b>	mg/l	Cl <sup>-</sup>		
	<b>100</b>	...	<b>1000</b>	mg/l	Cl <sup>-</sup>		

<b>Chloride</b>		<i>Normal dialysis for matrix removal; Hg-thiocyanate / Fe(III)</i>					<i>ISO 15682</i>
5	mg/l	<b>10</b>	...	<b>100</b>	mg/l	Cl <sup>-</sup>	Water / Wastewater /
		<b>20</b>	...	<b>200</b>	mg/l	Cl <sup>-</sup>	Soil extract /
		<b>50</b>	...	<b>500</b>	mg/l	Cl <sup>-</sup>	Food extract
		<b>100</b>	...	<b>1000</b>	mg/l	Cl <sup>-</sup>	

<b>Chloride</b>		<i>High sensitivity dialysis for matrix removal; Hg-thiocyanate / Fe(III)</i>					<i>DIN EN ISO 15682</i>
0,5	mg/l	<b>1</b>	...	<b>10</b>	mg/l	Cl <sup>-</sup>	Water / Wastewater /
		<b>5</b>	...	<b>50</b>	mg/l	Cl <sup>-</sup>	Soil extract /
							Food extract

<b>Chlorine, free</b>		N,N-Diethyl-1,4-phenylenediamine					DIN EN ISO 7393
0,1	mg/l	<b>0.2</b>	...	<b>5</b>	mg/l	Cl <sub>2</sub>	Water / Wastewater /
							Soil extracts

<b>Chlorine, total</b>		Potassiumjodide / N,N-Diethyl-1,4-phenylenediamine					DIN EN ISO 7393
0,1	mg/l	<b>0.2</b>	...	<b>5</b>	mg/l	Cl <sub>2</sub>	Water / Wastewater /
							Soil extracts

<b>Chromium(VI)</b>		<i>Diphenylcarbazide</i>					<i>ISO 23913</i>
0.005	mg/l	<b>0.02</b>	...	<b>0.5</b>	mg/l	Cr(VI)	Water / Wastewater /
		<b>0.05</b>	...	<b>2</b>	mg/l	Cr(VI)	Soil extract
		<b>0.2</b>	...	<b>10</b>	mg/l	Cr(VI)	

<b>Cyanide</b>		<i>Pyridine-4-carbonic acid / 1,3-Dimethylbarbituric acid</i>					<i>ISO 14403</i>
0.003	mg/l	<b>0.01</b>	...	<b>0.5</b>	mg/l	CN <sup>-</sup>	Water / Wastewater /
		<b>0.1</b>	...	<b>5</b>	mg/l	CN <sup>-</sup>	Soil extract
							<distilled samples>

<b>Weak acid dissociable ("free") Cyanide</b>		<i>Digestion at pH = 3.8; Gas transfer with enrichment; Pyridine-4-carbonic acid / 1,3-Dimethylbarbituric acid</i>					<i>ISO 14403</i>
0.001	mg/l	<b>0.005</b>	...	<b>0.2</b>	mg/l	FCN <sup>-</sup>	Water / Wastewater /
		<b>0.02</b>	...	<b>1</b>	mg/l	FCN <sup>-</sup>	Soil extract

<b>Total Cyanide</b>		<i>UV- + hydrolyt. Digest.; Gas transfer with enrichment; Pyridine-4-carbonic acid / 1,3-Dimethylbarbituric acid</i>					<i>ISO 14403</i>
0.002	mg/l	<b>0.005</b>	...	<b>0.2</b>	mg/l	TCN <sup>-</sup>	Water / Wastewater /
		<b>0.02</b>	...	<b>1</b>	mg/l	TCN <sup>-</sup>	Soil extract

<b>Formaldehyde</b>		<i>Acetylacetone</i>					<i>anal. DIN EN 120</i>
0.02	mg/l	<b>0.1</b>	...	<b>5</b>	mg/l	HCHO	Water / Wastewater / Absorption liquid
		<b>0.5</b>	...	<b>25</b>	mg/l	HCHO	
<b>Hydrazine</b>		<i>Dimethylaminobenzaldehyde</i>					<i>anal. DIN 38413 Part 1</i>
0.003	mg/l	<b>0.01</b>	...	<b>0.5</b>	mg/l	Hy.	Water / Wastewater / Power station process liquid
		<b>0.02</b>	...	<b>1</b>	mg/l	Hy.	
<b>Total Iron</b>		<i>Ascorbic acid / FerroZine</i>					<i>anal. DIN 38406 Part 1</i>
0.01	mg/l	<b>0.05</b>	...	<b>2</b>	mg/l	Fe <sub>t</sub>	Water / Wastewater
		<b>0.5</b>	...	<b>20</b>	mg/l	Fe <sub>t</sub>	
<b>Iron(II)</b>		<i>FerroZine</i>					<i>anal. DIN 38406 Part 1</i>
0.01	mg/l	<b>0.05</b>	...	<b>2</b>	mg/l	Fe <sup>2+</sup>	Water / Wastewater
		<b>0.5</b>	...	<b>20</b>	mg/l	Fe <sup>2+</sup>	
<b>Magnesium</b>		<i>Xylidyl blue 1</i>					
0.003	mg/l	<b>0.05</b>	...	<b>1</b>	mg/l	Mg	Water / Wastewater / Soil extract
		<b>0.5</b>	...	<b>10</b>	mg/l	Mg	
		<b>5</b>	...	<b>100</b>	mg/l	Mg	
		<b>20</b>	...	<b>400</b>	mg/l	Mg	
<b>Manganese</b>		<i>Pyridyl-azo-Naphthol</i>					
0.01	mg/l	<b>0.025</b>	...	<b>2</b>	mg/l	Mn <sup>2+</sup>	Water
		<b>0.2</b>	...	<b>10</b>	mg/l	Mn <sup>2+</sup>	
<b>Nitrate</b>		<i>Cd / Sulfanilamide / NED</i>					<i>ISO 13395</i>
0.005	mg/l	<b>0.02</b>	...	<b>1</b>	mg/l	NO <sub>3</sub> -N	Water / Wastewater / Soil extract <also UM N/P>
		<b>0.2</b>	...	<b>10</b>	mg/l	NO <sub>3</sub> -N	
		<b>0.5</b>	...	<b>20</b>	mg/l	NO <sub>3</sub> -N	
<b>Nitrate</b>		<i>Normal dialysis for matrix removal; Cd / Sulfanilamide / NED</i>					<i>ISO 13395</i>
0.02	mg/l	<b>0.2</b>	...	<b>5</b>	mg/l	NO <sub>3</sub> -N	Water / Wastewater / Soil extract / Food extract
		<b>0.5</b>	...	<b>20</b>	mg/l	NO <sub>3</sub> -N	
		<b>2</b>	...	<b>100</b>	mg/l	NO <sub>3</sub> -N	
<b>Nitrate</b>		<i>High-sensitivity dialysis for matrix removal; Cd / Sulfanilamide / NED</i>					<i>ISO 13395</i>
0.01	mg/l	<b>0.05</b>	...	<b>2</b>	mg/l	NO <sub>3</sub> -N	Water / Wastewater / Soil extract
		<b>0.1</b>	...	<b>2</b>	mg/l	NO <sub>3</sub> -N	
		<b>0.2</b>	...	<b>10</b>	mg/l	NO <sub>3</sub> -N	

<b>Nitrite</b>		<i>Sulfanilamide / NED</i>				<i>ISO 13395</i>	
0.002	mg/l	<b>0.01</b>	...	<b>1</b>	mg/l	NO <sub>2</sub> -N	Water / Wastewater /
		<b>0.1</b>	...	<b>5</b>	mg/l	NO <sub>2</sub> -N	Soil extract
		<b>0.2</b>	...	<b>10</b>	mg/l	NO <sub>2</sub> -N	<also UM N/P>
<b>Nitrite</b>		<i>Normal dialysis for matrix removal; Sulfanilamide / NED</i>				<i>ISO 13395</i>	
0.02	mg/l	<b>0.2</b>	...	<b>5</b>	mg/l	NO <sub>2</sub> -N	Water / Wastewater /
		<b>0.5</b>	...	<b>20</b>	mg/l	NO <sub>2</sub> -N	Soil extract /
		<b>2</b>	...	<b>100</b>	mg/l	NO <sub>2</sub> -N	Food extract
<b>Nitrite</b>		<i>High-sensitivity dialysis for matrix removal; Sulfanilamide / NED</i>				<i>ISO 13395</i>	
0.01	mg/l	<b>0.05</b>	...	<b>2</b>	mg/l	NO <sub>2</sub> -N	Water / Wastewater /
		<b>0.1</b>	...	<b>2</b>	mg/l	NO <sub>2</sub> -N	Soil extract
		<b>0.2</b>	...	<b>10</b>	mg/l	NO <sub>2</sub> -N	
<b>Total Nitrogen</b>		<i>Two-stage oxidative digestion to nitrate</i>					
0.05	mg/l	<b>0.05</b>	...	<b>2</b>	mg/l	TN	Water / Wastewater /
		<b>0.5</b>	...	<b>20</b>	mg/l	TN	Soil extract
<b>Organic acids</b>		<i>Hydroxamate after esterification</i>					
10	mg/l	<b>20</b>	...	<b>1000</b>	mg/l	Acetic acid	Water / Wastewater /
		<b>500</b>	...	<b>10000</b>	mg/l	Acetic acid	Soil extract
<b>Orthophosphate</b>		<i>Phosphomolybdenum blue</i>				<i>ISO 15681</i>	
0.005	mg/l	<b>0.02</b>	...	<b>2</b>	mg/l	o-PO <sub>4</sub> -P	Water / Wastewater /
		<b>0.2</b>	...	<b>10</b>	mg/l	o-PO <sub>4</sub> -P	Soil extract
		<b>0.5</b>	...	<b>20</b>	mg/l	o-PO <sub>4</sub> -P	<also UM N/P>
0.005	mg/l	<b>0.02</b>	...	<b>1</b>	mg/l	o-PO <sub>4</sub> -P	Water / Wastewater /
		<b>0.2</b>	...	<b>10</b>	mg/l	o-PO <sub>4</sub> -P	<combination with total phosphorus>
0.01	mg/l	<b>0.05</b>	...	<b>2</b>	mg/l	o-PO <sub>4</sub> -P	Water / Wastewater /
		<b>0.5</b>	...	<b>10</b>	mg/l	o-PO <sub>4</sub> -P	<combination with total phosphorus> ascorbic acid method>
<b>Orthophosphate</b>		<i>Phosphomolybd. blue (PMB) with solid-phase enrichment of PMB</i>					
0.0002	mg/l	<b>0.001</b>	...	<b>0.02</b>	mg/l	o-PO <sub>4</sub> -P	Drinking water /
		<b>0.005</b>	...	<b>0.10</b>	mg/l	o-PO <sub>4</sub> -P	Surface water

<b>Phenol Index</b>		<i>Polymethine dye with liquid/liquid extraction</i>				<i>DIN EN ISO 14402</i>
0.005	mg/l	<b>0.01</b> ...	<b>0.5</b> mg/l	Phenol		Water / Wastewater
		<b>0.2</b> ...	<b>10</b> mg/l	Phenol		
0.01	mg/l	<i>Without liquid/liquid extraction</i>				
		<b>0.05</b> ...	<b>5</b> mg/l	Phenol		Destillates
		<b>1</b> ...	<b>25</b> mg/l	Phenol		
<b>Total Phosphorus</b>		<i>Oxidative + hydrolytic digestion to orthophosphate phosphomolybdenum blue</i>				<i>ISO 15681</i>
0.05	mg/l	<b>0.1</b> ...	<b>5</b> mg/l	TP		Water / Wastewater / Soil extract
		<b>1</b> ...	<b>20</b> mg/l	TP		
<b>Total Phosphorus</b>		<i>Oxidative + hydrolytic digestion to orthophosphate with solid-phase enrichment of phosphomolybdenum blue</i>				<i>ISO 15681</i>
0.005	mg/l	<b>0.01</b> ...	<b>0.2</b> mg/l	TP		Drinking water / Surface water
		<b>0.05</b> ...	<b>0.5</b> mg/l	TP		
<b>Silicate</b>		<i>Silicomolybdenum blue</i>				<i>ISO 16264</i>
0.05	mg/l	<b>0.2</b> ...	<b>10</b> mg/l	SiO <sub>2</sub>		Water / Wastewater
		<b>1</b> ...	<b>50</b> mg/l	SiO <sub>2</sub>		
<b>Sulfate</b>		<i>Methylthymol blue</i>				
5	mg/l	<b>5</b> ...	<b>50</b> mg/l	SO <sub>4</sub>		Water / Wastewater
		<b>20</b> ...	<b>200</b> mg/l	SO <sub>4</sub>		
<b>Sulfate</b>		<i>turbidimetric (BaSO<sub>4</sub>)</i>				
2	mg/l	<b>5</b> ...	<b>100</b> mg/l	SO <sub>4</sub>		Water / Wastewater / Soil extract
		<b>20</b> ...	<b>200</b> mg/l	SO <sub>4</sub>		
<b>Sulfide</b>		<i>Methylene blue</i>				<i>anal. DIN 38405 Part 26</i>
0.02	mg/l	<b>0.1</b> ...	<b>2</b> mg/l	S <sup>2-</sup>		Water / Wastewater / <without H <sub>2</sub> S gas transfer>
		<b>0.5</b> ...	<b>10</b> mg/l	S <sup>2-</sup>		
<b>Sulfide</b>		<i>Methylene blue</i>				<i>anal. DIN 38405 Part 26</i>
	mg/l	<b>0.05</b> ...	<b>2</b> mg/l	S <sup>2-</sup>		Water / Wastewater / <samples processed using LACHAT Micro Dist>
		<b>0.2</b> ...	<b>10</b> mg/l	S <sup>2-</sup>		
<b>Sulfide</b>		<i>Gas transfer with enrichment; Methylene blue</i>				<i>analog DIN 38405 Part 26</i>
0.001	mg/l	<b>0.02</b> ...	<b>1</b> mg/l	S <sup>2-</sup>		Water / Wastewater / Landfill leachate
		<b>0.05</b> ...	<b>2</b> mg/l	S <sup>2-</sup>		
		<b>0.1</b> ...	<b>5</b> mg/l	S <sup>2-</sup>		
		<b>0.2</b> ...	<b>10</b> mg/l	S <sup>2-</sup>		

<b>Free Sulfite</b>		<i>DTNB with gas transfer of SO<sub>2</sub></i>					
	mg/l	<b>2</b>	...	<b>50</b>	mg/l	FSO <sub>2</sub>	Beverages
		<b>10</b>	...	<b>150</b>	mg/l	FSO <sub>2</sub>	
<b>Total Sulfite</b>		<i>DTNB with dialysis of the detection product</i>					
	mg/l	<b>10</b>	...	<b>250</b>	mg/l	TSO <sub>2</sub>	Beverages
		<b>20</b>	...	<b>400</b>	mg/l	TSO <sub>2</sub>	
		<b>20</b>	...	<b>500</b>	mg/l	TSO <sub>2</sub>	
<b>Tensides anion.</b>		<i>Methylene blue liquid/liquid extraction</i>					<i>ISO/DIS 16265 (draft)</i>
0.01	mg/l	<b>0.02</b>	...	<b>1</b>	mg/l	MBAS	Water / Wastewater
		<b>0.2</b>	...	<b>5</b>	mg/l	MBAS	
<b>Urea</b>		<i>Dimethylaminobenzaldehyde</i>					
	g/l	<b>0.01</b>	...	<b>0.5</b>	g/l	N	Fertilizer
		<b>0.1</b>	...	<b>5</b>	g/l	N	
		<b>0.2</b>	...	<b>10</b>	g/l	N	

**Remarks**

*In general two adjacent measurement ranges can be installed without hardware changes on the analyzer.*

*The Quantification limit (Limit of determination) corresponds to C.V. = 10 % (IUPAC Recommendation 1995).*

**Universal Manifold N/P** for Water and Soil Analysis