METTLER TOLEDO iNORGANIC VENTURES

Colorimetric Method for Measuring Chloride

FERRICYANIDE COLORIMETRY METHOD (EPA 325.2)

Method Description

The thiocyanate ion (SCN-) is liberated from mercuric thiocyanate through sequestration of mercury by chloride ion to form un-ionized mercuric chloride. In the presence of ferric ion, the liberated SCN- forms highly colored ferric thiocyanate in concentration proportional to the original chloride concentration.

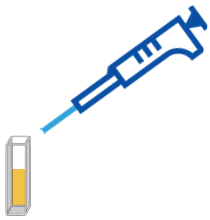
Test Procedure

1. Pipette 410 µL* of the sample into the cuvette.

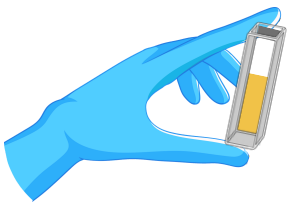
** µL = microliter*

2. Pipette 1800 µL of **DI H2O** into the cuvette.

3. Pipette 1800 µL of **RGT-CHLORIDE-CL-BTL-1-OF-1** into the cuvette.



4. Cap cuvette, and shake 10-15 times to mix reagent & sample within.



5. Wait duration of reaction time: 7 minutes. **Note:** Solution should turn orange during reaction time.

6. Insert cuvette into the UV-Vis and record absorbance of sample.

Be sure to use a new pipette tip for every addition. Replace the pipette tip between every step. Always dispose of all waste properly.

Expected Limits of Detection

Path Length (mm)	Method Detection Limit (mg Cl/L)
10	2.5
50	4.1

Detection limits were calculated to be equal to three times the standard deviation of a series of 10 replicate measurements of the calibration blank.
Note: 10 mm path length detection limit lower than 50 mm path length due to decreased effect of background from **RGT-CHLORIDE-CL-BTL-1-OF-1** color.

Preparation of Calibration Standards

Use the following volumes to prepare a Calibration Curve using a stock standard containing 1000 mg/L of Chloride. Select at least 3-4 calibration standards that bracket your expected concentration range. Dilute all standards in DI H2O or a matrix most suited to your sample type.

Concentration (mg Cl/L)	Volume of Standard Aliquot (mL)	Final Volume (mL)
0.00	0.00	50
2.0	0.20	**100***
5.0	0.25	50
10.0	0.50	50
25.0	1.25	50
50.0	2.50	50
75.0	3.75	50
100.0	5.00	50

** Larger final volume needed for 2.0 mg Cl/L standard due to small standard aliquot volume.*

Calibration Tip:

If using different calibration standards to construct your calibration curve, ensure that the concentrations of neighboring standards do not exceed a ten fold difference.

METTLER TOLEDO iNORGANIC VENTURES

Colorimetric Method for Measuring Nitrogen as Ammonia

SALICYLATE METHOD (ISO 15923-1)

Method Description

Ammonium reacts with hypochlorite, formed by alkaline hydrolysis of sodium dichloroisocyanurate, and with salicylate at a pH of at least 12.6 in the presence of sodium nitroprusside as a catalyst. This produces a compound with a blue color (Indophenol).

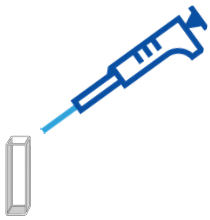
Test Procedure

1. Pipette 3330 µL* of the sample into the cuvette.

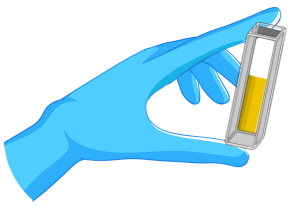
** µL = microliter*

2. Pipette 330 µL of **RGT-AMMONIA-NH3-BTL-1-OF-2** into the cuvette.

3. Pipette 330 µL of **RGT-AMMONIA-NH3-BTL-2-OF-2** into the cuvette.

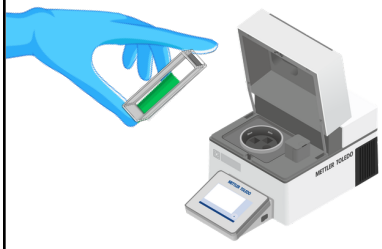


4. Cap cuvette, and shake 10-15 times to mix reagent & sample within.



5. Wait duration of reaction time: 10 minutes. **Note:** Solution should turn green during reaction time.

6. Insert cuvette into the UV-Vis and record absorbance of sample.



Be sure to use a new pipette tip for every addition. Replace the pipette tip between every step. Always dispose of all waste properly.

Expected Limits of Detection

Path Length (mm)	Method Detection Limit (mg N/L)
10	0.005
50	0.003

Detection limits were calculated to be equal to three times the standard deviation of a series of 10 replicate measurements of the calibration blank.

Preparation of Calibration Standards

Use the following volumes to prepare a Calibration Curve using a stock standard containing 10 mg/L of Nitrogen from Ammonia. Select at least 3-4 calibration standards that bracket your expected concentration range. Dilute all standards in DI H2O or a matrix most suited to your sample type.

Concentration (mg N/L)	Volume of Standard Aliquot (mL)	Final Volume (mL)
0.00	0.00	50
0.02	0.20	**100***
0.05	0.25	50
0.10	0.50	50
0.25	1.25	50
0.50	2.50	50
0.75	3.75	50
1.00	5.00	50

** Larger final volume needed for 0.02 mg N/L standard due to small standard aliquot volume.*

Calibration Tip:

If using different calibration standards to construct your calibration curve, ensure that the concentrations of neighboring standards do not exceed a ten fold difference.

METTLER TOLEDO iNORGANIC VENTURES

Colorimetric Method for Measuring Phosphorus as Orthophosphate

ASCORBIC ACID METHOD (ISO 15923-1)

Method Description

Ammonium molybdate and antimony potassium tartrate react in an acid medium with dilute solutions of phosphorus to form an antimony-phospho-molybdate complex. This complex is reduced to an intensely blue-colored complex by ascorbic acid. The color is proportional to the phosphorus concentration.

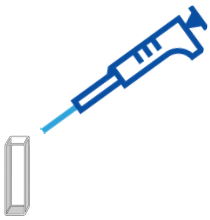
Test Procedure

1. Pipette 3450 µL* of the sample into the cuvette.

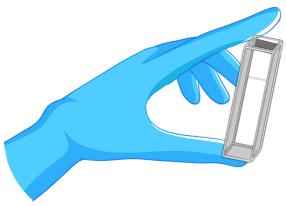
** µL = microliter*

2. Pipette 390 µL of **RGT-PHOSPHATE-PO4-BTL-1-OF-2** into the cuvette.

3. Pipette 170 µL of **RGT-PHOSPHATE-PO4-BTL-2-OF-2** into the cuvette.



4. Cap cuvette, and shake 10-15 times to mix reagent & sample within.



5. Wait duration of reaction time: 10 minutes. **Note:** Solution should turn blue during reaction time.

6. Insert cuvette into the UV-Vis and record absorbance of sample.

Be sure to use a new pipette tip for every addition. Replace the pipette tip between every step. Always dispose of all waste properly.

Expected Limits of Detection

Path Length (mm)	Method Detection Limit (mg P/L)
10	0.010
50	0.004

Detection limits were calculated to be equal to three times the standard deviation of a series of 10 replicate measurements of the calibration blank.

Preparation of Calibration Standards

Use the following volumes to prepare a Calibration Curve using a stock standard containing 10 mg/L of phosphorus from orthophosphate. Select at least 3-4 calibration standards that bracket your expected concentration range. Dilute all standards in DI H2O or a matrix most suited to your sample type.

Concentration (mg P/L)	Volume of Standard Aliquot (mL)	Final Volume (mL)
0.00	0.00	50
0.02	0.20	**100***
0.05	0.25	50
0.10	0.50	50
0.25	1.25	50
0.50	2.50	50
0.65	3.25	50
0.75	3.75	50
0.85	4.25	50
1.00	5.00	50

** Larger final volume needed for 0.20 mg P/L standard due to small standard aliquot volume.*

Calibration Tip:

If using different calibration standards to construct your calibration curve, ensure that the concentrations of neighboring standards do not exceed a ten fold difference.

METTLER TOLEDO iNORGANIC VENTURES

Turbidimetric Method for Measuring Sulfate

TURBIDIMETRIC METHOD (ISO 15923-1)

Method Description

Sulfate ion is converted to a barium suspension under controlled conditions. The resulting turbidity is determined photometrically and compared to a curve prepared from standard sulfate solutions.

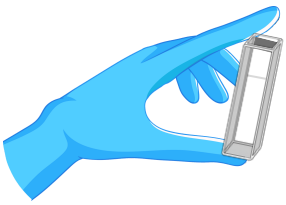
Test Procedure

1. Pipette 2000 µL* of the sample into the cuvette.

** µL = microliter*

2. Pipette 2000 µL of **RGT-SULFATE-SO4-BTL-1-OF-1** into the cuvette.

3. Cap cuvette, and shake 10-15 times to mix reagent & sample within.



4. Wait duration of reaction time: 4.5 minutes. **Note:** Solution should turn cloudy during reaction time.

5. Insert cuvette into the UV-Vis and record absorbance of sample.

Be sure to use a new pipette tip for every addition. Replace the pipette tip between every step. Always dispose of all waste properly.

Expected Limits of Detection

Path Length (mm)	Method Detection Limit (mg SO_4/L)
10	10
50	5.7

Detection limits were calculated to be equal to three times the standard deviation of a series of 10 replicate measurements of the calibration blank.

Preparation of Calibration Standards

Use the following volumes to prepare a Calibration Curve using a stock standard containing 100 mg/L of Sulfate. Select at least 3-4 calibration standards that bracket your expected concentration range. Dilute all standards in DI H2O or a matrix most suited to your sample type.

Concentration (mg SO_4/L)	Volume of Standard Aliquot (mL)	Final Volume (mL)
0	0.0	50
5	2.5	50
10	5.0	50
15	7.5	50
20	10.0	50
30	15.0	50
40	20.0	50

Calibration Tip:

If using different calibration standards to construct your calibration curve, ensure that the concentrations of neighboring standards do not exceed a ten fold difference.