

INTRODUCING READY TO USE

Discrete Analyzer ReAGENTS

WEAPONS OF MASS PRODUCTION

THURSDAY, FEBRUARY 2
8:00 AM EST | 1:00 PM UTC



PRESENTED BY:
Mike Booth,
Director, Technical



Mission Briefing



Mission Briefing

- About Inorganic Ventures
- What is a Discrete Analyzer?
- Instrument Tips & Tricks
- Put time back on your side
- Backup - Supporting Data
- Introducing Discrete Analyzer ReAGENTS
- Questions



What does Inorganic Ventures do?

Inorganic Ventures (IV) is a manufacturer of inorganic Certified Reference Materials (CRMs) commonly referred to as a “standards”, “chemical standards” or “calibration standards.”

- Elemental Standards
 - High Purity Single Element
 - Custom Blends
- pH Standards
- Conductivity Standards
- Titrants
- **Reagents**



What is a Discrete Analyzer?

THE LATEST INTELLIGENCE



What is a Discrete Analyzer?

An instrument that tests samples:

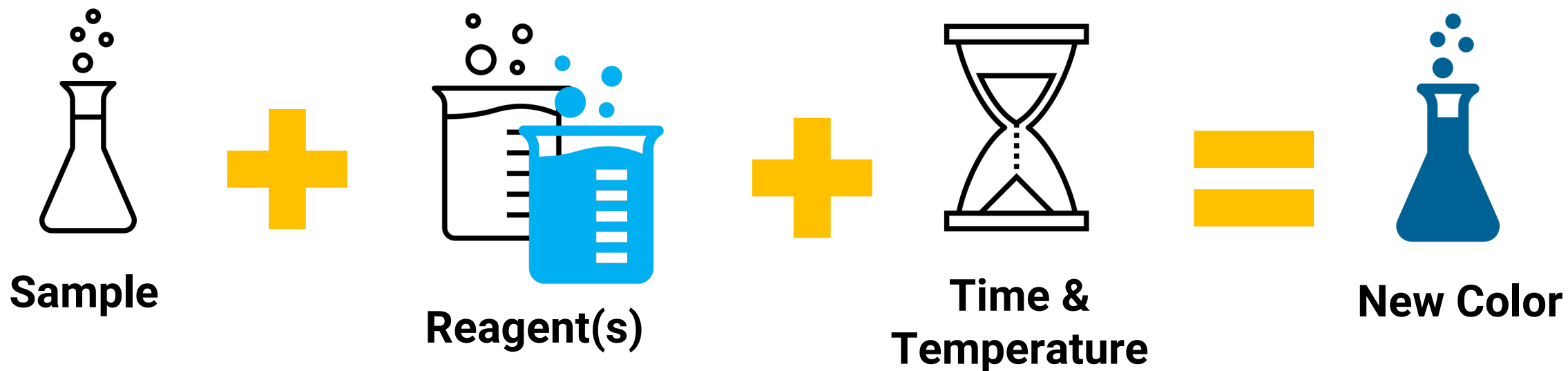
One **sample** at a time

One **analyte** at a time



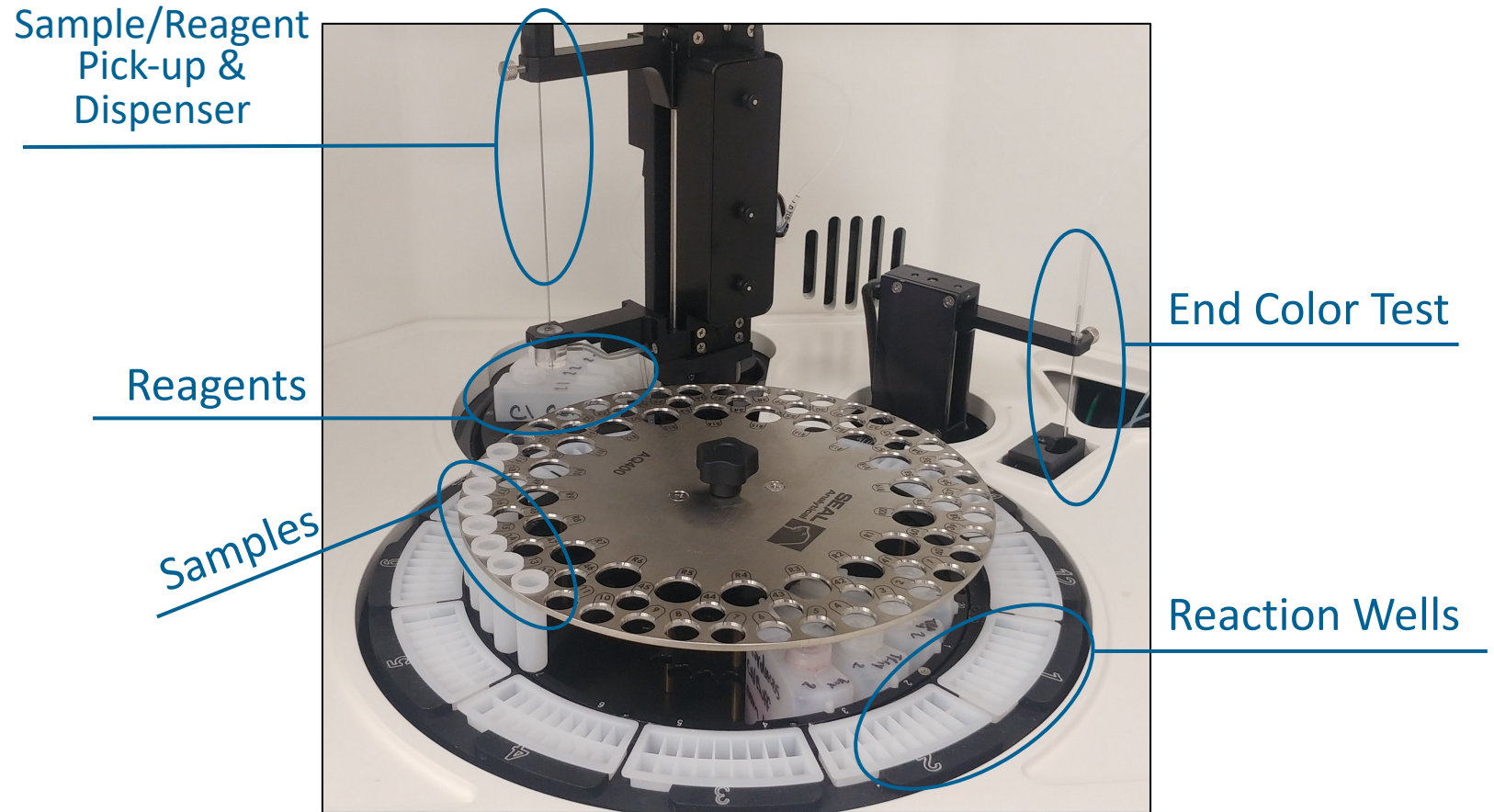
How Do Discrete Analyzers Work?

Discrete Analyzers use wet chemistry methods to make the samples change color depending on the concentration of the analyte.



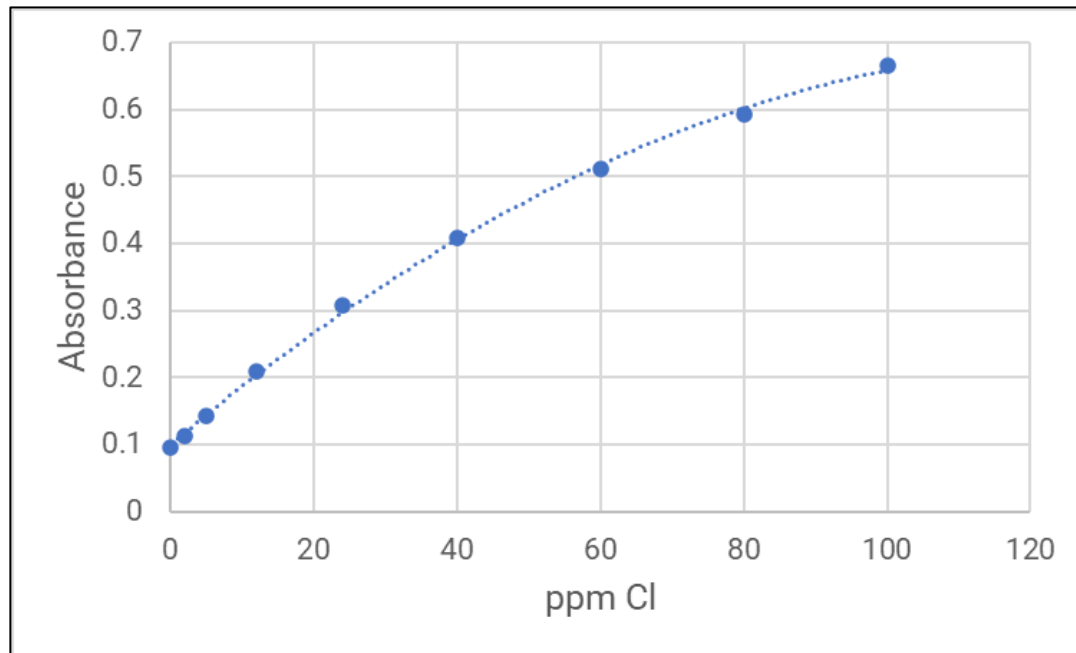
Discrete Analyzers: Instrument Mechanics

- Automated steps and data collection
- Up to 8 hours of lab work can be automated to run within 1 hour



How do Discrete Analyzers Work?

The new color generated in the reaction is compared against a calibration curve to calculate the sample's concentration of the analyte.



The calibration curve is made from IV's existing CRM products!



Instrument Surveillance

Tips & Tricks



Instrumentation Tips & Tricks



- Follow the manufacturers' recommendations for maintenance and have your analyser serviced to comply with UKAS/ISO:17025 Accreditation.
- It is recommended that any operator is ideally trained by an accredited person.
- **Always keep detailed records for maintenance and training.**

Instrumentation Tips & Tricks



- Refill diluent bottles the night before to allow them to degas and prevent outliers from microbubbles.
- If possible, put reagents on the instrument the night prior to analysis to allow them to equilibrate.
- **Always double check tubing before you start your analysis.**

Instrumentation Tips & Tricks



- Audit your processes for sources of contamination.
 - DI/RO water system needs to be working correctly as failure can lead to certain compounds like Nitrates to be present.
 - Clearly label reagent vessels and avoid using the same vessel for multiple reagents.
 - Be mindful of contamination from the air. For example: NH_3 and Cl.
 - Also be cautious of cross contamination from the reagents themselves. For example: Hg from Cl reagents
- **If reusing Reagent Vessels make sure to wash them well with DI Water and dry.**

Instrumentation Tips & Tricks

- Use Reagents and Calibration materials that comply with the relevant ISO accreditation standards.
- If making your own standards or reagents, ensure that they are clearly identified with the following information:
 - Reagent Name
 - Expiry Date
 - Source chemicals with their expiry date
 - Name of Manufacturer

Instrumentation Tips & Tricks

1. It can be beneficial to filter Chloride Colour Reagent through a GFC paper and store in light proof container before use.
2. Sulphate Reagent sometimes needs sonicating to maintain optimum performance.
 - a) Not all gelatins will perform similarly, keep that in mind when purchasing new material.
3. Make sure to properly matrix match your samples and standards. For example, the Ammonia method is extremely pH sensitive, so ensure that samples and standards are pH adjusted similarly.
4. Carefully monitor your background absorbances. High backgrounds can be a source of failing correlation coefficients for PO_4 and SO_4 .

Discrete Re**AGENTS**
put time back on your side



Discrete Analyzer Reagents



Time Savings

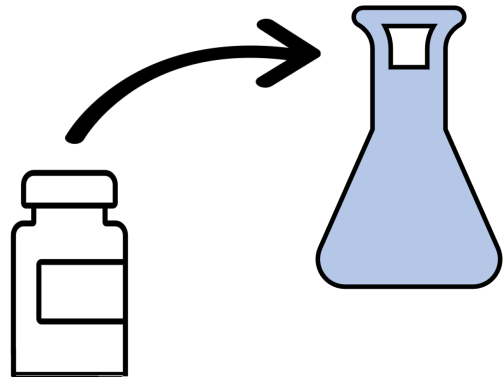


Lot-to-lot consistency



Stability studies with detailed documentation

Time Study – Chloride Reagent

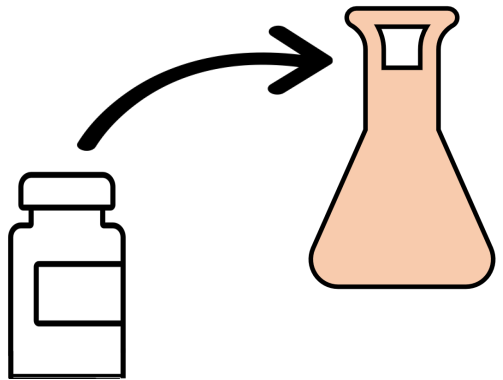


Step 1:

Weigh Ferric nitrate & transfer to flask.

Step 2:

Dilute to volume & mix.



Step 3:

Weigh Mercuric thiocyanate & transfer to flask.

Step 4:

Dilute to volume & mix.

Step 5:

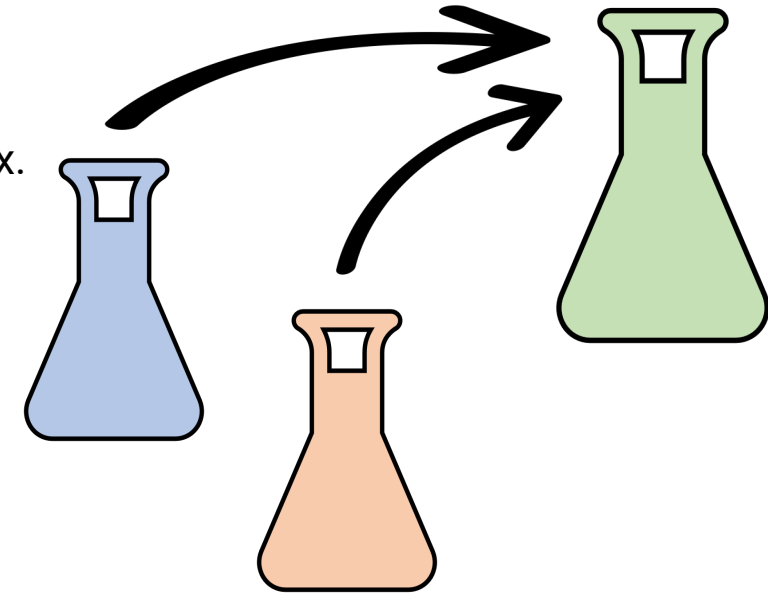
Measure Ferric nitrate solution & transfer to flask.

Step 6:

Measure Mercuric thiocyanate solution & transfer to flask.

Step 7:

Dilute to volume & mix.



DIY Reagents	Phosphate Method		Sulfate Method	Chloride Method
	EPA Method 365.1 Rev 2.0 / ISO Method 15923-1		ISO Method 15923-1	EPA Method 325.2 / ISO Method 15923-1
	Color Reagent	Ascorbic Reagent	Turbidity Reagent	Combined Color Reagent
Starting Materials Required	Potassium antimonyl tartrate	Ascorbic Acid	Barium Chloride	Ferric Nitrate
	Ammonium molybdate		Sodium Chloride	Mercuric thiocyanate
	Sulfuric acid		Gelatin	Methanol
Time to DIY (2-5L)	1 hour 30 mins	20 mins	1 hour 30 mins	1 hour 45 mins
Projected Stability	2 months	1 week	1 week	3 months
Notes	Sulfuric acid will need time to cool		Gelatin needs to be qualified	Needs to be filtered before use

Ready-to-use Discrete ReAGENTS	Phosphate Method		Sulfate Method	Chloride Method
	EPA Method 365.1 Rev 2.0 / ISO Method 15923-1		ISO Method 15923-1	EPA Method 325.2 / ISO Method 15923-1
	Color Reagent	Ascorbic Reagent	Turbidity Reagent	Combined Color Reagent
IV Product	DA-PO4-COLOR	DA-PO4-ASCORBIC	DA-SO4-TURB	DA-CL-COLOR
Guaranteed Stability	6+ Months	6+ Months	6+ Months	6+ Months



Download PO4 Method
Chemistry Sheet



Download SO4 Method
Chemistry Sheet



Download Cl Method
Chemistry Sheet

Every Agent needs occasional backup

SUPPORTING DATA



Stability Studies

Our biggest challenge is Stability,
Stability, Stability!

IV's ISO:17034 accreditation requires a
robust product stability program.

- Long-Term Stability
- Transport Stability



Stability Study Design

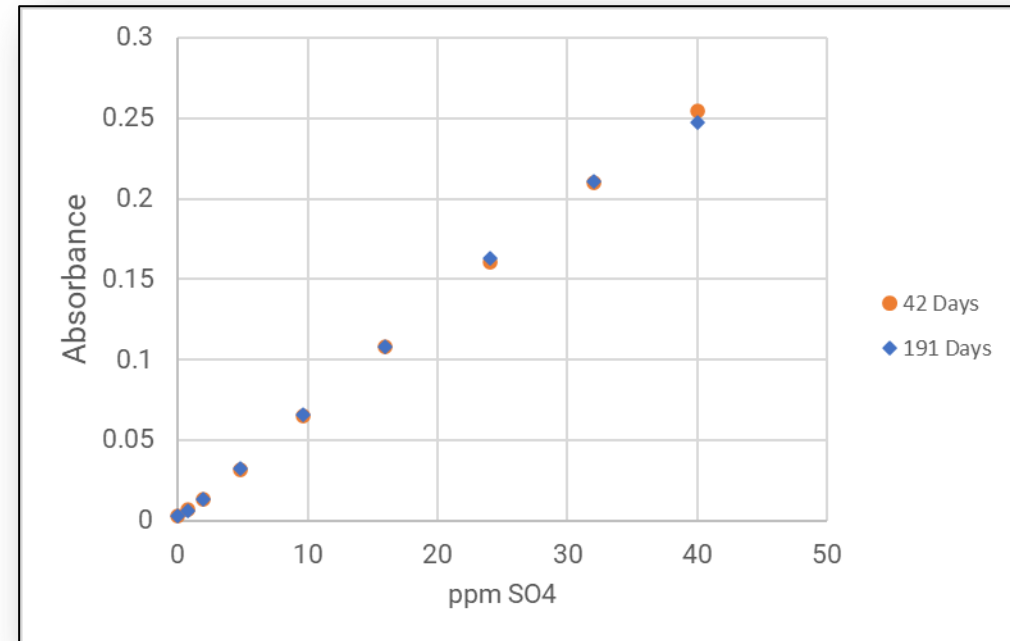
1. Regular testing of reagents stored refrigerated and at room temperature.
 - *All reagents are protected from light*
2. Calibration curve fits, absorbances, and results of control samples are being tracked over the study.
3. Transport studies for short term storage in extreme heat and cold conditions.



Lot Consistency

Maintaining a constant baseline is an important factor in sample analysis using discrete analyzers.

Having consistently manufactured lots over time can help troubleshoot baseline issues.



Sulphate Calibration Standard Absorbance 42 Days vs 191 Days								
0 ppm	0.8 ppm	2 ppm	4.8 ppm	9.6 ppm	16 ppm	24 ppm	32 ppm	40 ppm
-6.5%	-1.3%	1.0%	1.7%	0.9%	0.2%	1.5%	0.3%	-2.9%

Detailed Product Documentation

DISCRETE ANALYZER REAGENT Mercuric thiocyanate / Ferric nitrate solution

Catalog No: DA-CL-COLOR
Lot No: T2-DA726755

Starting Material: Mercury (II) thiocyanate
Starting Material Lot No: IV-2397

Starting Material: Iron (III) nitrate nonahydrate
Starting Material Lot No: IV-2394

NOMINAL CONCENTRATION: 0.6255 g/L Mercury (II) thiocyanate / 30.3 g/L Iron (III) nitrate nonahydrate

This solution is a reagent and is not intended to be used as a certified reference material.

PREPARATION

This reagent solution is ready to use without further preparation for analyzing Chloride in water utilizing discrete analyzer methods based upon EPA Method 325.2. Figure 1 demonstrates a Chloride calibration curve generated on a SEAL AQ400 discrete analyzer using this reagent.

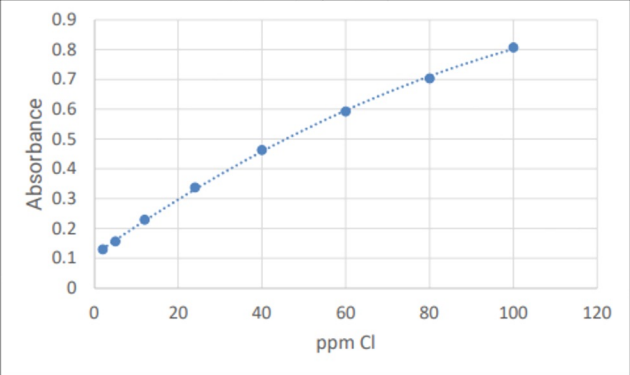


Figure 1: Correlation Coefficient = 0.9996 / Polynomial Order = 2

Concentration	Result	Acceptance Limits
2	0.1296	0.0850 – 0.1416
5	0.1570	0.1066 – 0.1776
12	0.2292	0.1570 – 0.2616
24	0.3372	0.2308 – 0.3846
40	0.4629	0.3058 – 0.5096
60	0.5926	0.3829 – 0.6381
80	0.7032	0.4446 – 0.7410
100	0.8072	0.4992 – 0.8320

STORAGE AND HANDLING

Store refrigerated at 4° C while in sealed TCT bag. After opening the sealed TCT bag keep cap tightly sealed when not in use. Continue to store bottle at 4° C when not in use. Do not return removed aliquots to container. Allow for reagent to reach room temperature and shake well before use.

- Reagent Composition
- Source of Method Chemistry
- Sample Calibration Curve
- Absorbance Data with Acceptance Limits

Introducing Discrete Analyzer Re**AGENTS**: **MISSION RESPONSIBLE**



Discrete Analyzer ReAGENTS

- Chloride
 - **DA-CL-COLOR-125ML \$73**
- Sulfate
 - **DA-SO4-TURB-125ML \$150**
- Phosphate (may be tested as Phosphorus)
 - **DA-PO4-ASCORBIC-125ML \$188**
 - **DA-PO4-COLOR-125ML \$95**
- Chloride Method
 - **ICCL1**
- Sulfate Method
 - **ICS041**
- Phosphate Method
 - **ICP041**
 - **ICPP041**



Stay tuned...

MORE REAGENTS COMING TO A LAB NEAR YOU



2023 Roadmap

<i>Method</i>	MFG & Initial Test	1 Month	3 Month	6 Month	9 Month	12 Month	15 Month	18 Month
Chloride (EPA 325.2)								
Sulfate (ISO 15923-1)								
o-Phosphate (EPA 365.1)								
Ammonia (ISO 15923-1)								
Hardness (EPA 130.1)								
NO ₃ /NO ₂ (Cd Reduction, EPA 353.2)								
Silica (EPA 370.1)								
NO ₃ /NO ₂ (Hydrazine Reduction, ISO 15923-1)								

IV will be adding more methods throughout 2023:
Alkalinity, Cyanide, Fluoride, Chromium & More!



Let our Discrete ReAGENTS infiltrate your lab!

Claim a free 30mL sample



Click Here or Scan to Claim

Join us at Pittcon for the Movie Premier



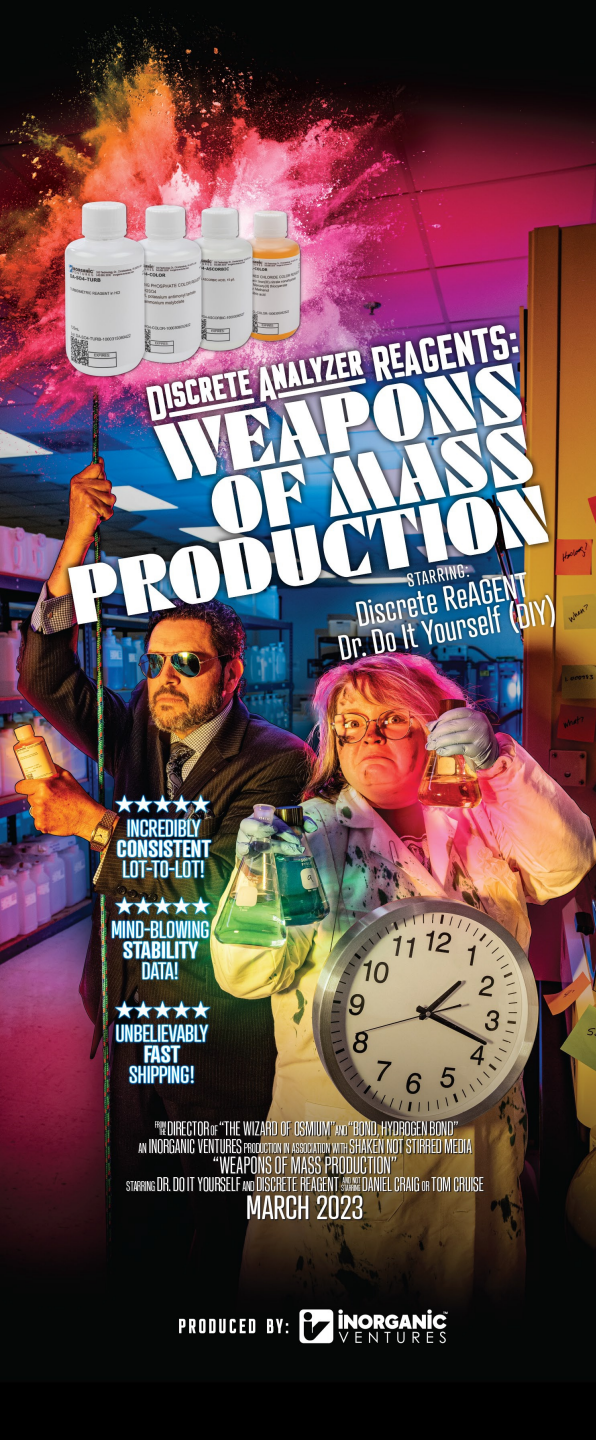
Presentations on the show floor:

Benefits of Pre-Made Reagents for Discrete Analyzers

Mike Booth | Tuesday, March 21 at 3pm

Forging a Path to the SI: The Development of Primary
Certified Reference Materials (PCRMs)

Madeline Gozzi | Wednesday, March 22 at 10am



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Questions?

info@inorganicventures.com

www.inorganicventures.com/forum