



“TOTAL WORKFLOW” SAMPLE PREP APPROACH TO OPTIMIZE ELEMENTAL ANALYSIS

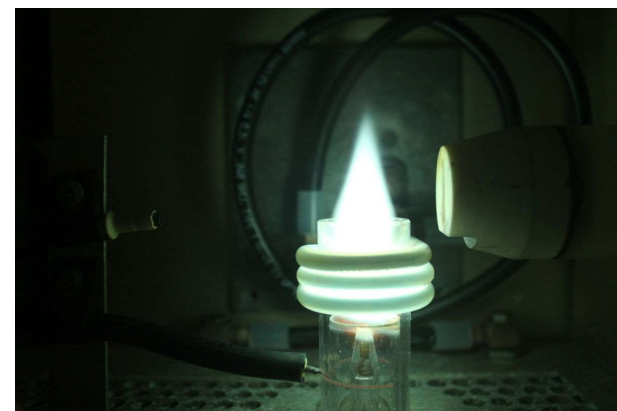
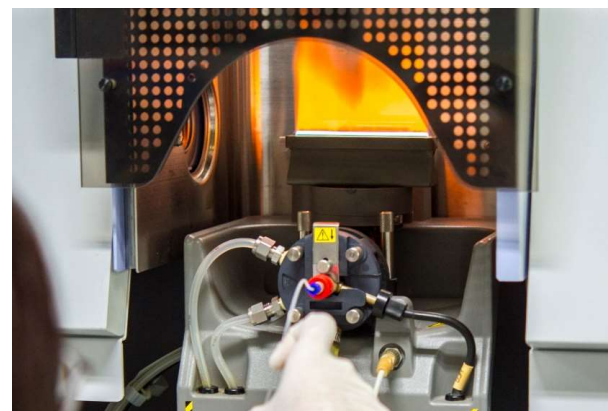


MILESTONE
HELPING
CHEMISTS

Choocheep Pungsomwong
Application Supervisor

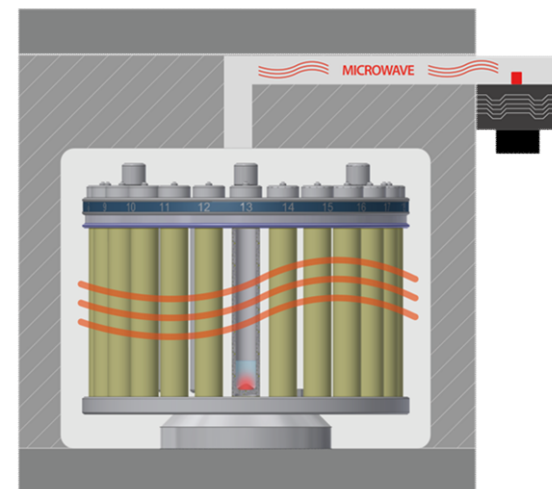
TRENDS IN ATOMIC SPECTROSCOPY

- Over the years laboratories transitioned from flame AA and GFAA to ICP-OES and ICP-MS
 - Higher throughput
 - Lower detection limits
 - Improved accuracy
 - Meet new regulations

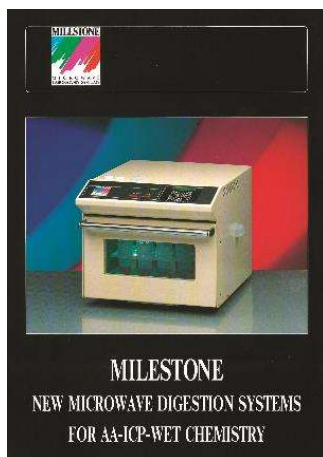


TRENDS IN SAMPLE PREPARATION

- Digestion moved from open vessels to microwave closed-vessel
 - Digestion time/ productivity
 - Higher digestion quality
 - Lower acid volumes
 - Lower blanks
 - Safety



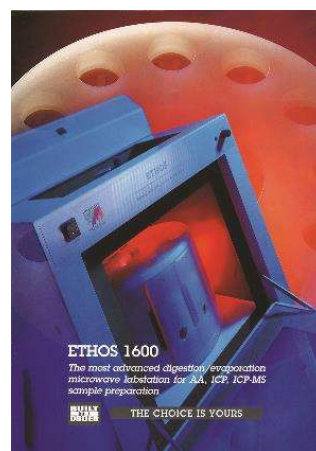
EVOLUTION OF THE MICROWAVE DIGESTION SYSTEMS



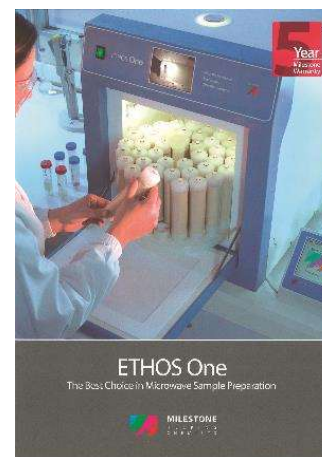
MLS-1200



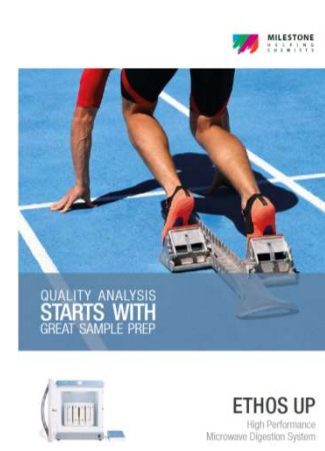
MLS Mega



ETHOS 1600



ETHOS One



ETHOS UP

1989

2023

INCREMENTAL INNOVATION

HIGHER THROUGHPUT



90's



2024

EASIER WORKFLOW, BETTER CONTROL & HIGH SAFETY

DIGESTION PROGRAM

TIME POWER

10'	250 W	Unpulsed power
8'	500 W	Pulsed power
5'	400 W	Pulsed power
2'	300 W	Pulsed power

1989

Power driven programs



2024

Contactless Temperature control in all vessels (easyTEMP)

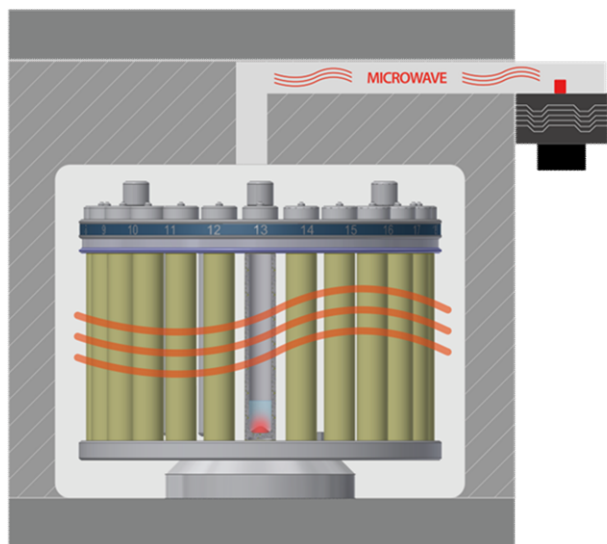
WIDER DIGESTION CAPABILITIES

- Rugged vessels constructions
- Higher temperature and pressure
- Full recovery of all elements
- Higher safety
- No need of rupture disk or membrane

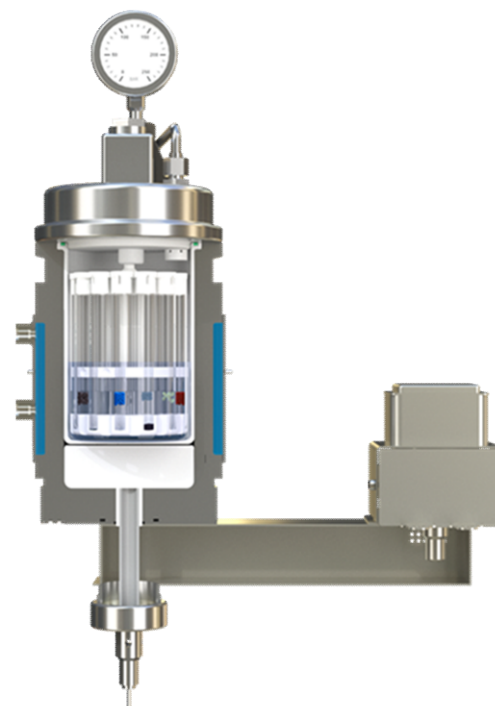


Vent-and-reseal technology
Milestone patent

INCREMENTAL VS DISRUPTIVE INNOVATION



Rotor-based

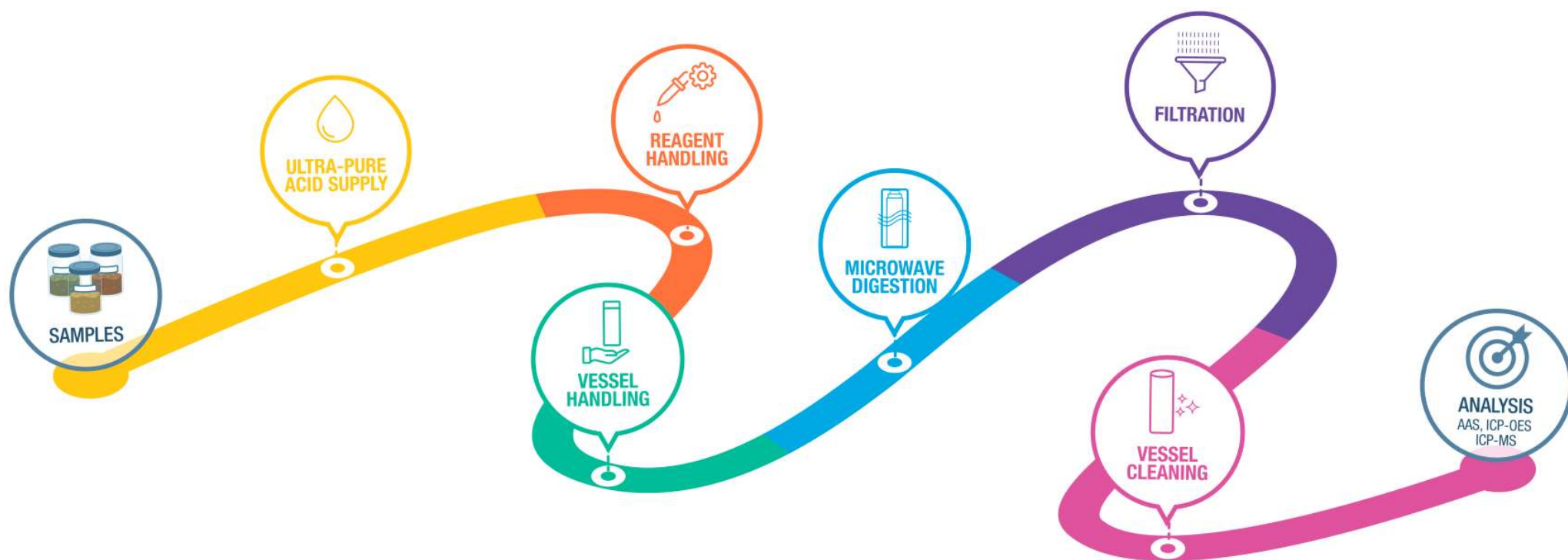


Single Reaction Chamber (SRC)
technology



WHY SHOULD I CARE ABOUT MY SAMPLE PREP
WORKFLOW?

ELEMENTAL ANALYSIS WORKFLOW

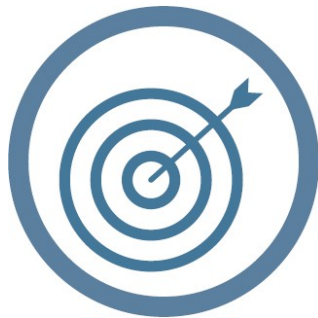


THE IMPACTS OF THE SAMPLE PREP WORKFLOW



SPEED

Sample per run
Turnaround time
Cleaning



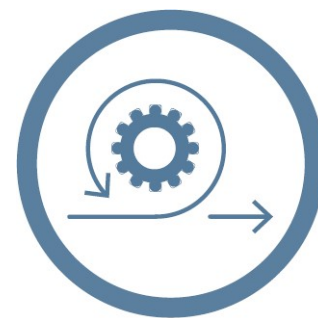
QUALITY

Analytes recovery
Low detection limits
Remove interferences
Reproducibility



EFFICIENCY

Operator time
Cost per sample



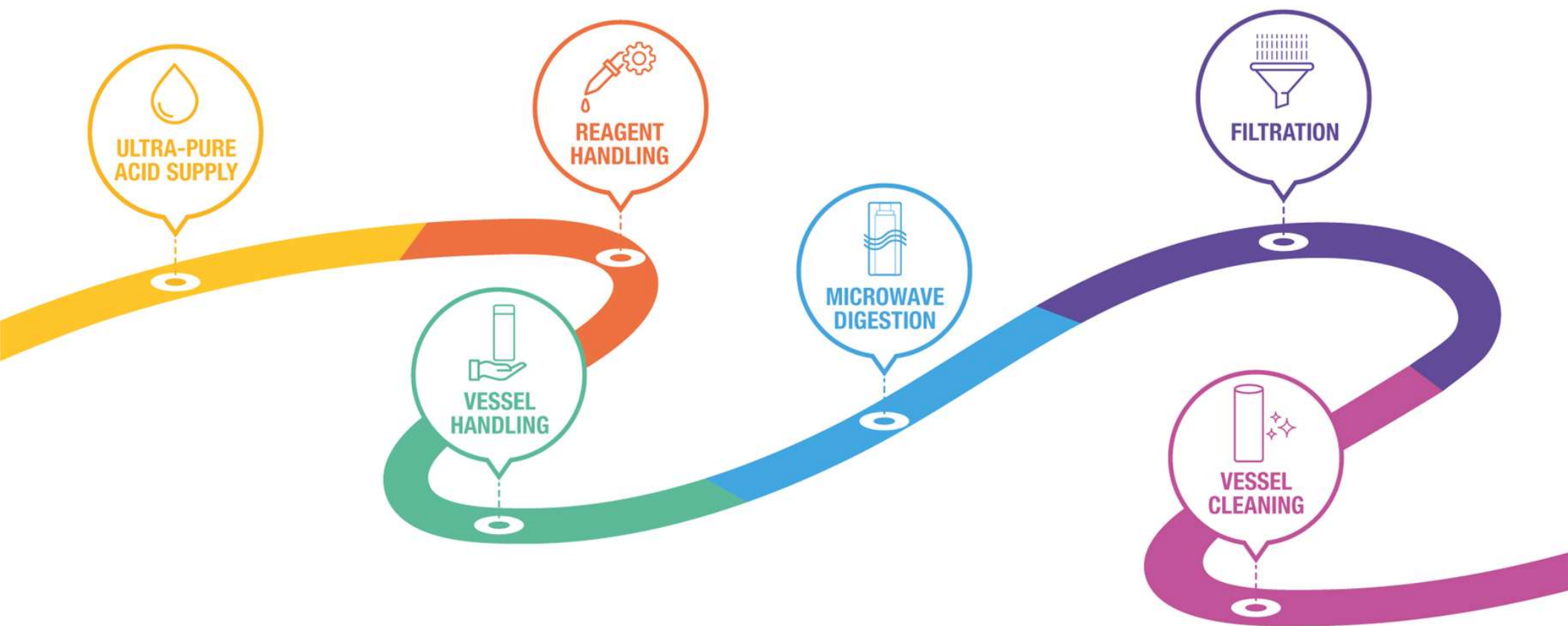
MINIMIZE DISRUPTIONS

Avoid reprocessing
Reduce contamination
Acid supply
Exposure to acids



HOW TO OPTIMIZE THE SAMPLE PREP WORKFLOW

SAMPLE PREP WORKFLOW



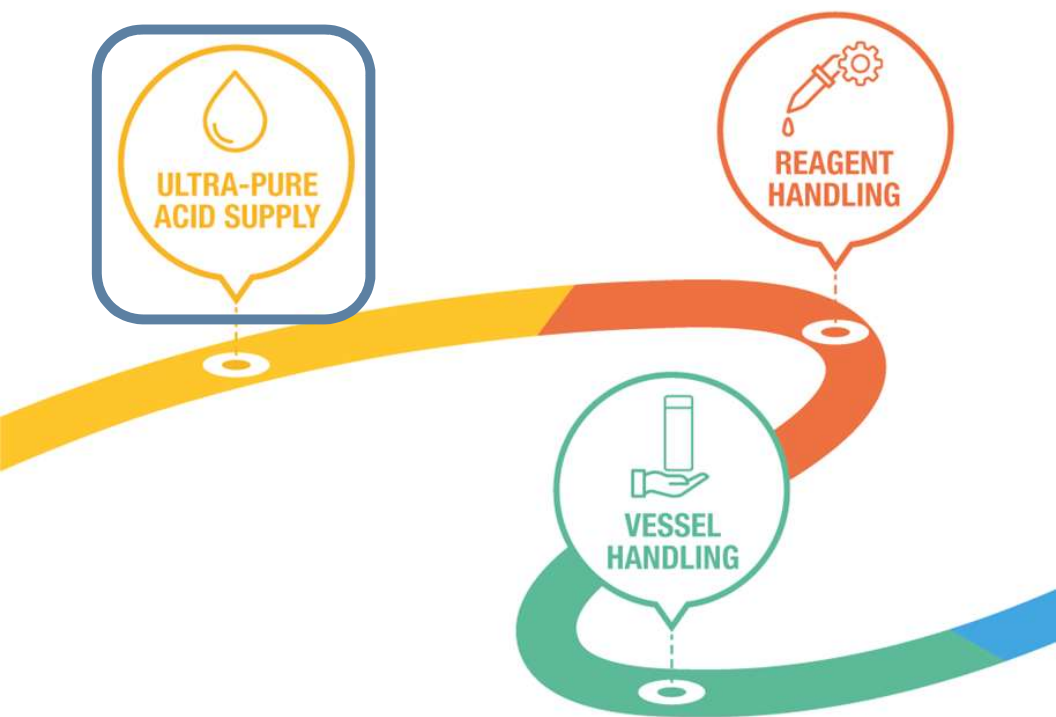
HIGH-PURITY ACIDS



CHALLENGES

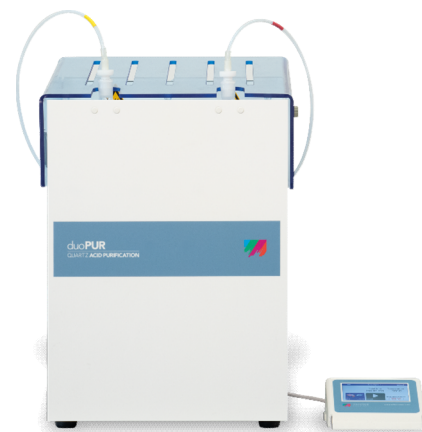
- Primary reagent
- Impact detection limits
- Expensive
- Contamination
- Supply chain issues

HIGH-PURITY ACIDS



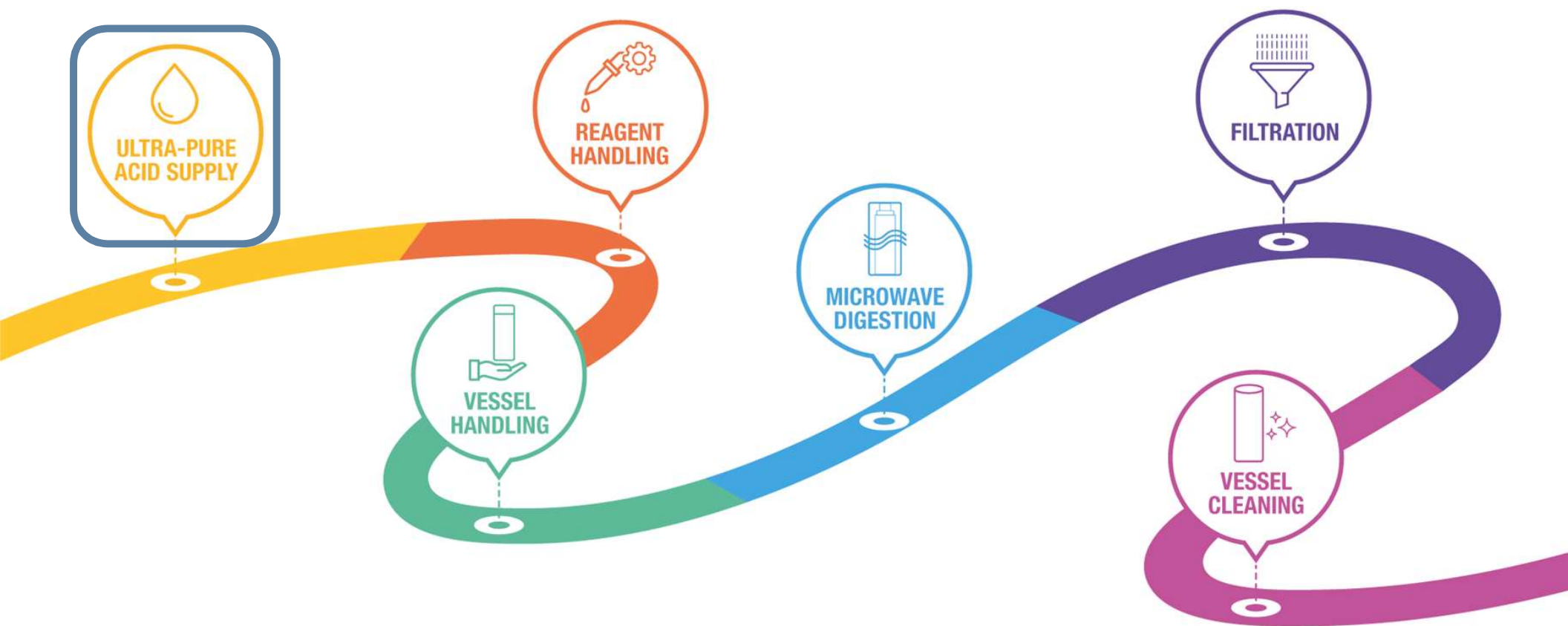
SOLUTION

Sub-boiling acid purification

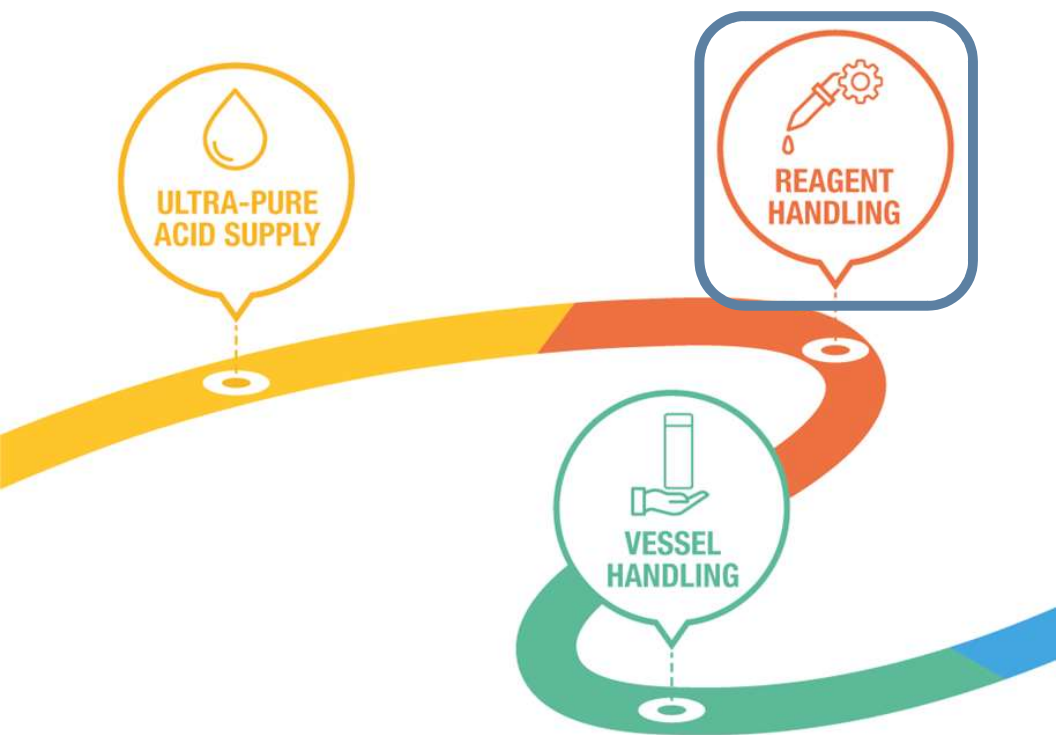


duoPUR

SAMPLE PREP WORKFLOW



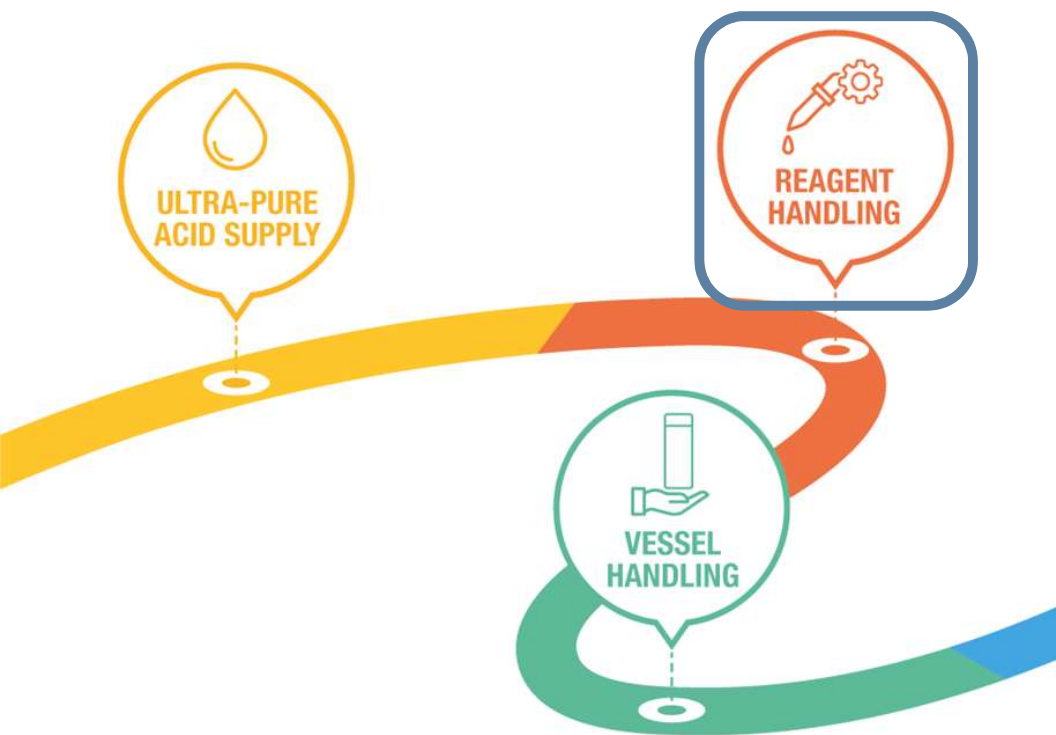
REAGENT HANDLING



CHALLENGES

- Manual step
- Safety
- Operator time
- Risk of contamination
- Consistency

REAGENT HANDLING

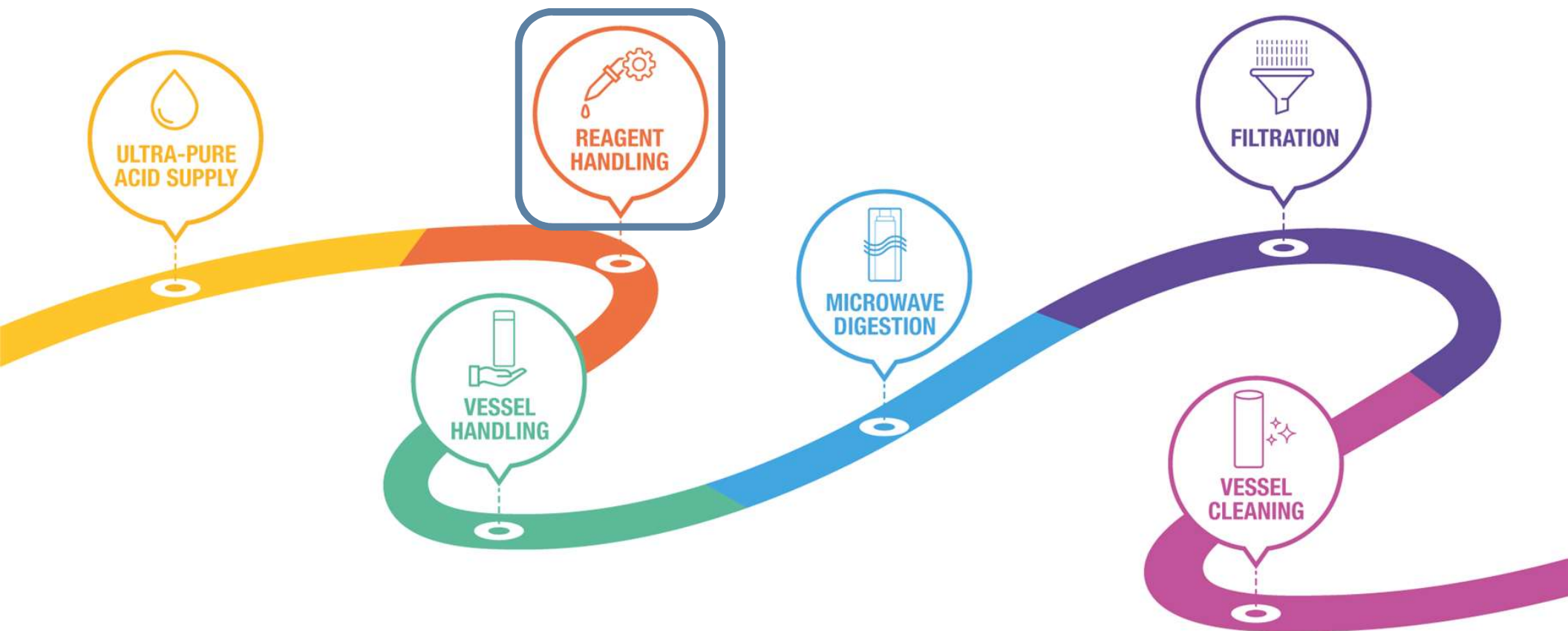


SOLUTION Automated Dosing Station

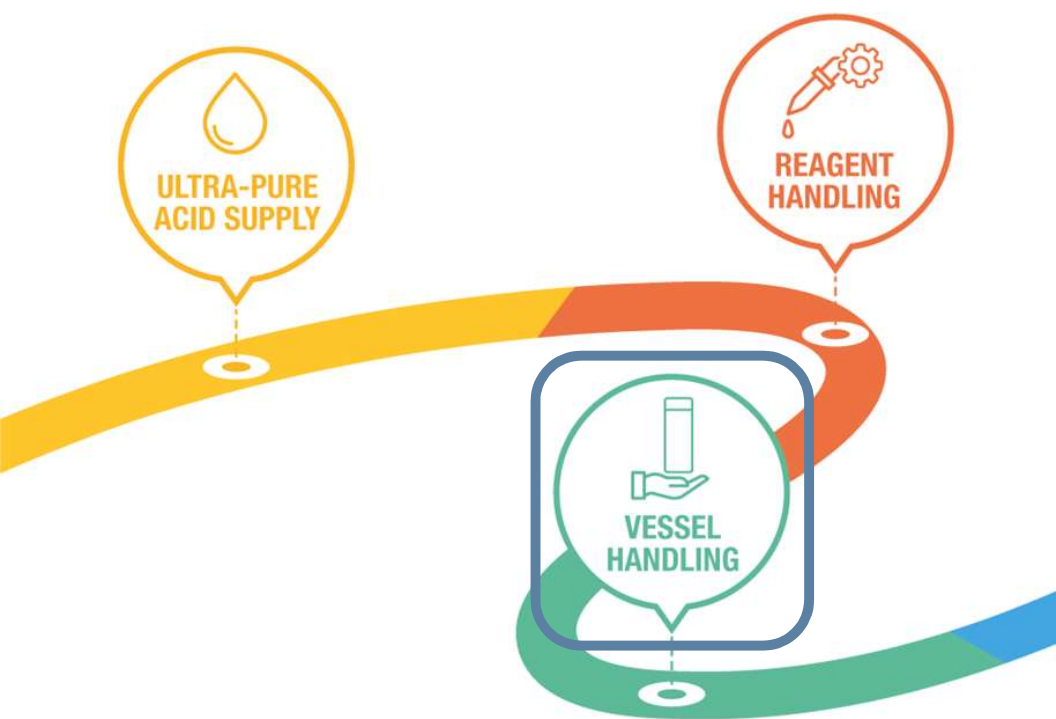


easyFILL

SAMPLE PREP WORKFLOW



VESSEL HANDLING

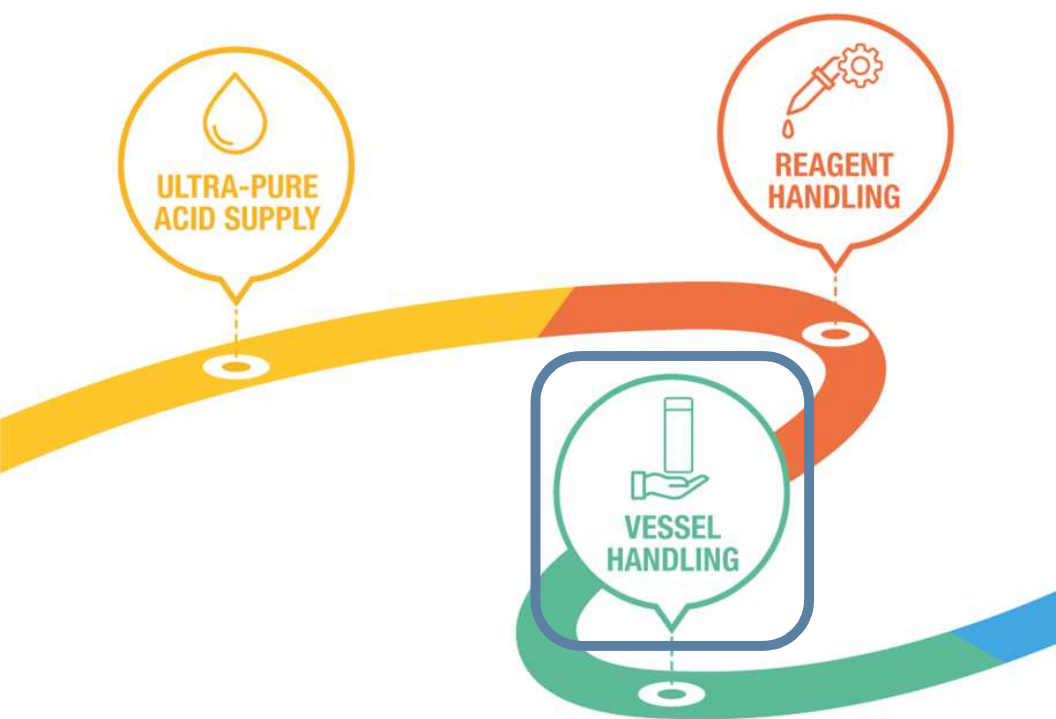


CHALLENGES

- Limit productivity
- Tedious operation
- Operator time
- Consistent closure



VESSEL HANDLING



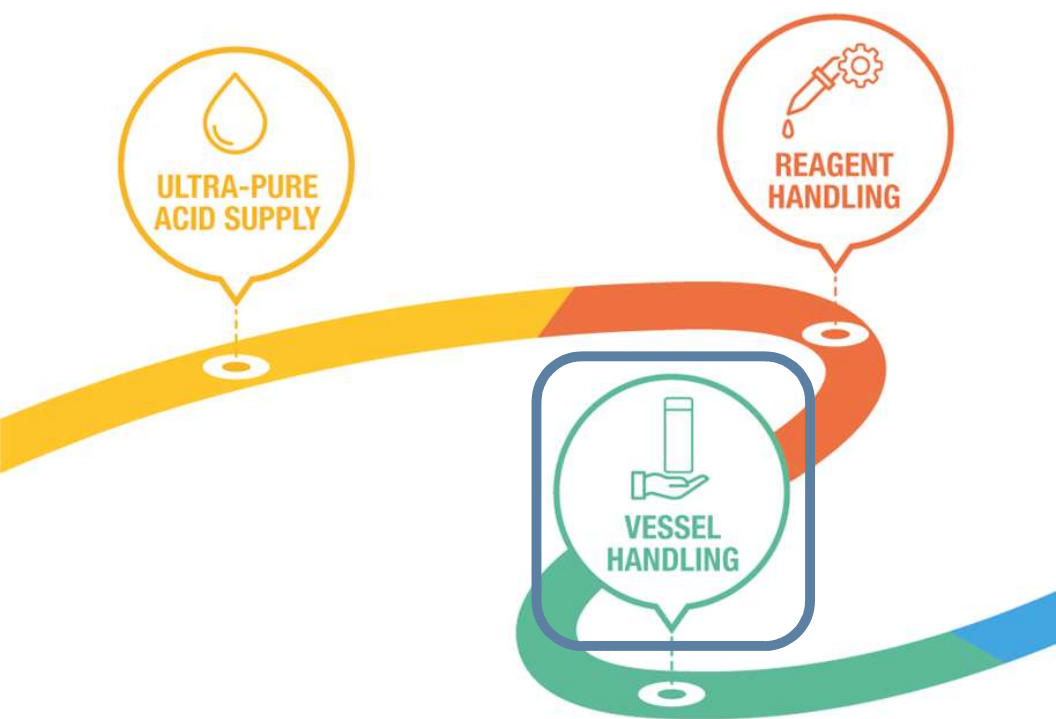
SOLUTION

Automated Capping Station



easyCAP

VESSEL HANDLING



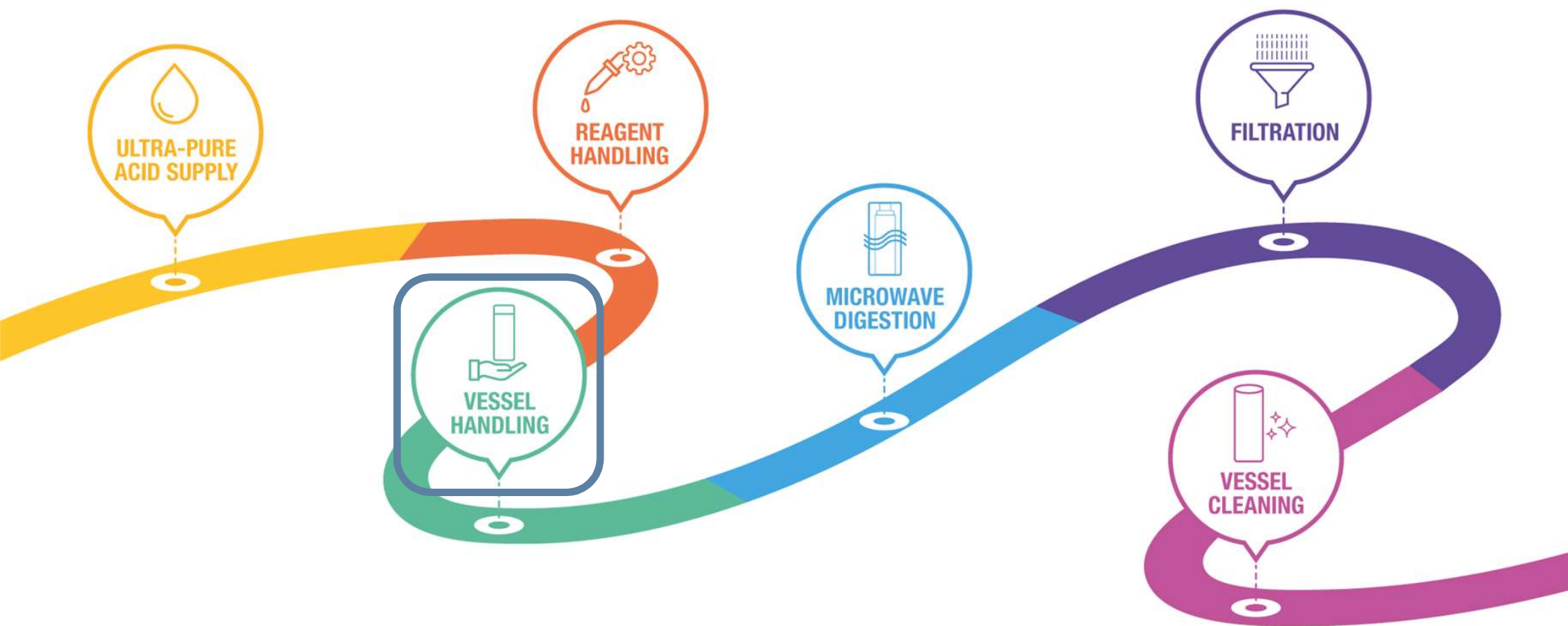
SOLUTION

Loose-fitting cap



Single Reaction Chamber (SRC)
technology

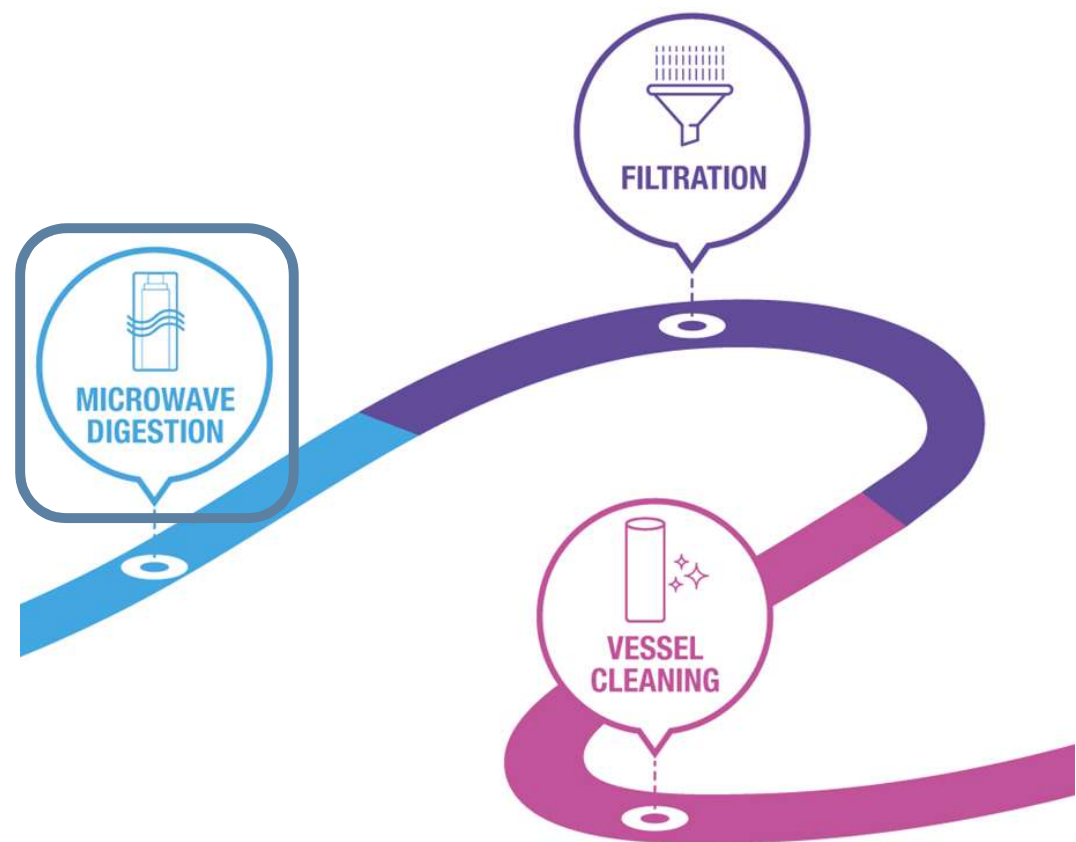
SAMPLE PREP WORKFLOW



SAMPLE DIGESTION

CHALLENGES

- Recovery of target analytes
 - Avoid venting during the run
- Productivity
- Complete digestion
 - Interferences on the analysis
 - Reprocessing
- Low blanks
 - Acid volume



SAMPLE DIGESTION

SOLUTIONS

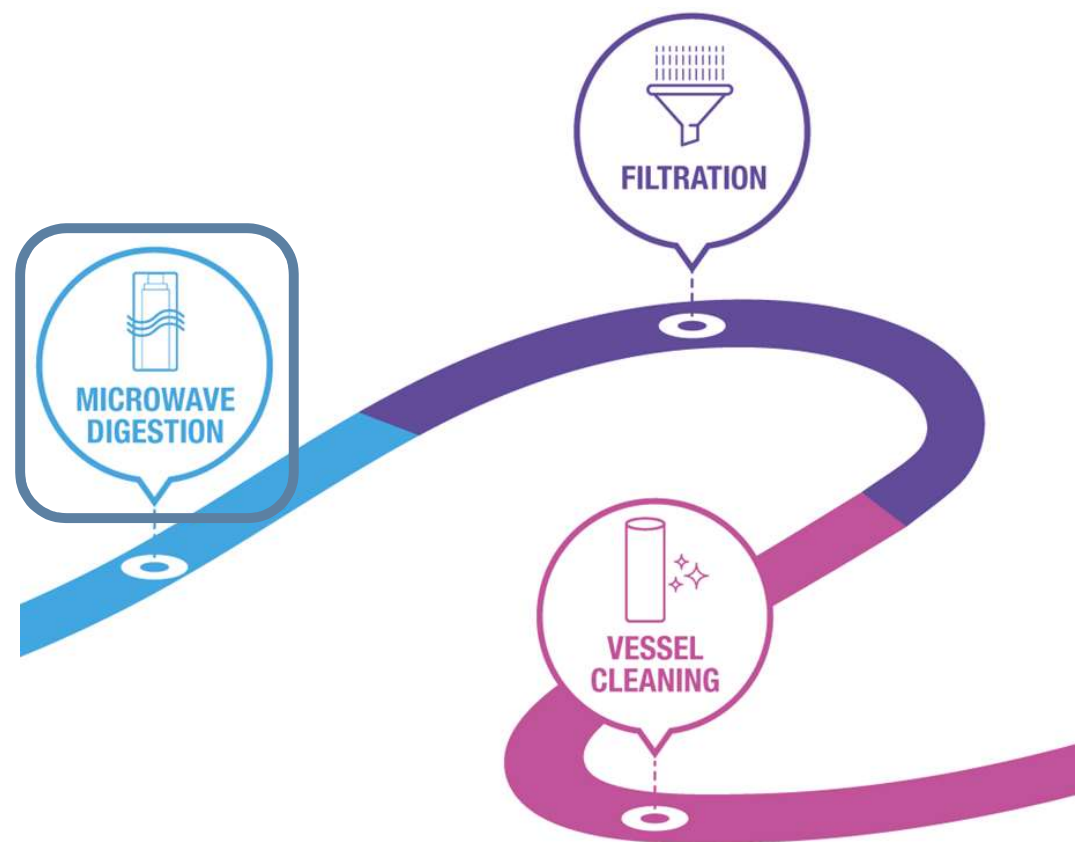
Rotor-based digestion
Single Reaction Chamber
digestion



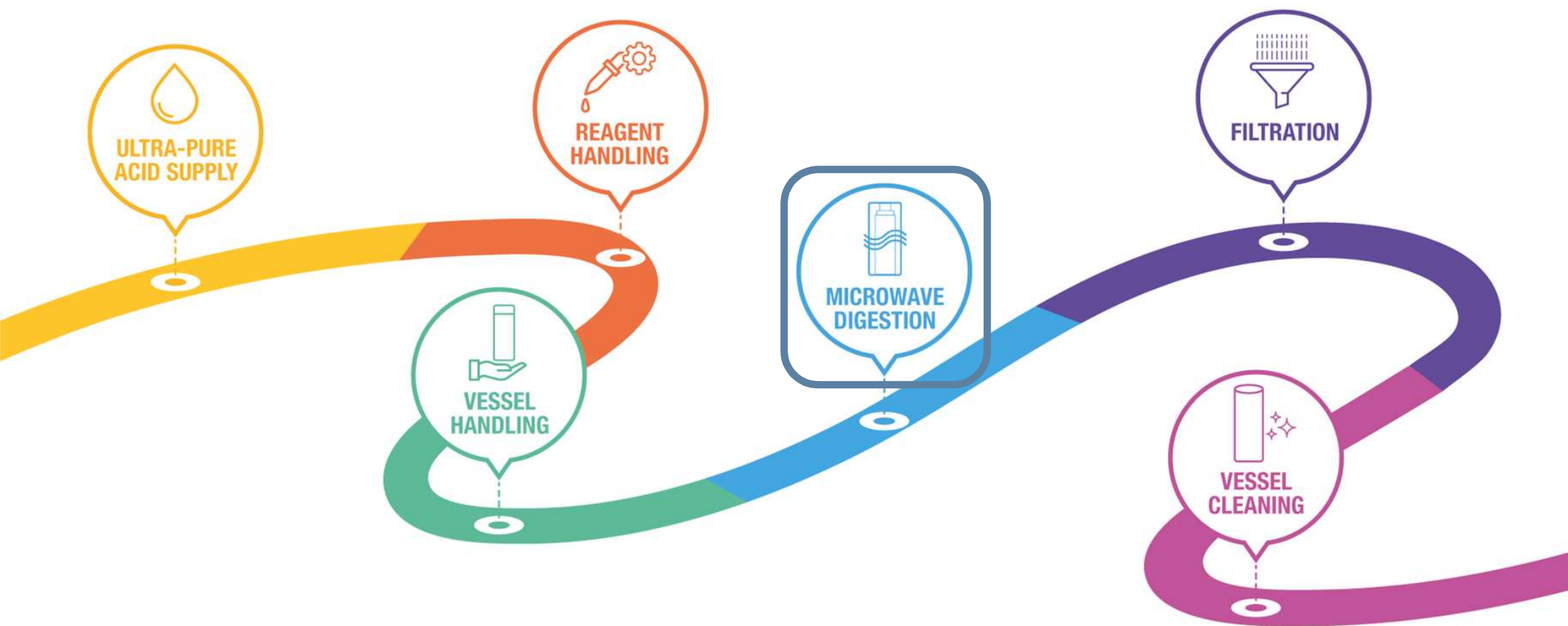
ETHOS UP



ultraWAVE 3



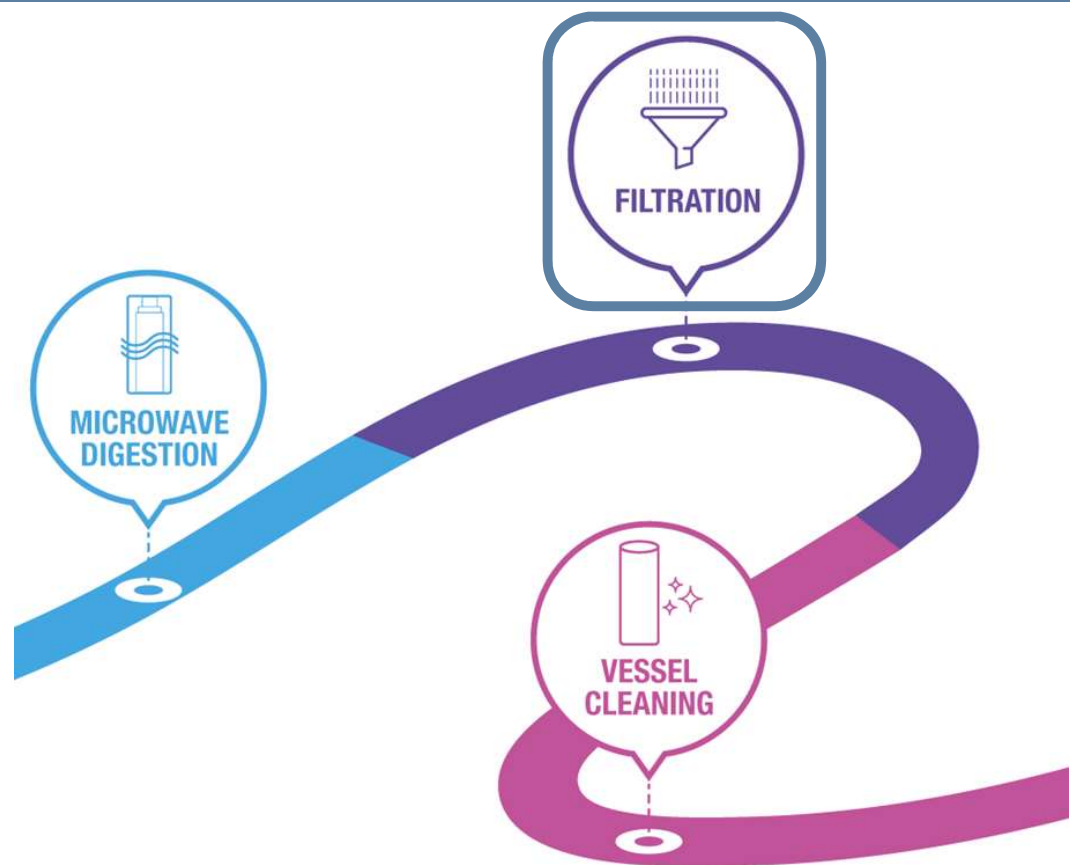
SAMPLE PREP WORKFLOW



SAMPLE FILTRATION

CHALLENGES

- Productivity
- Time consuming
- Occupy valuable space in the hood



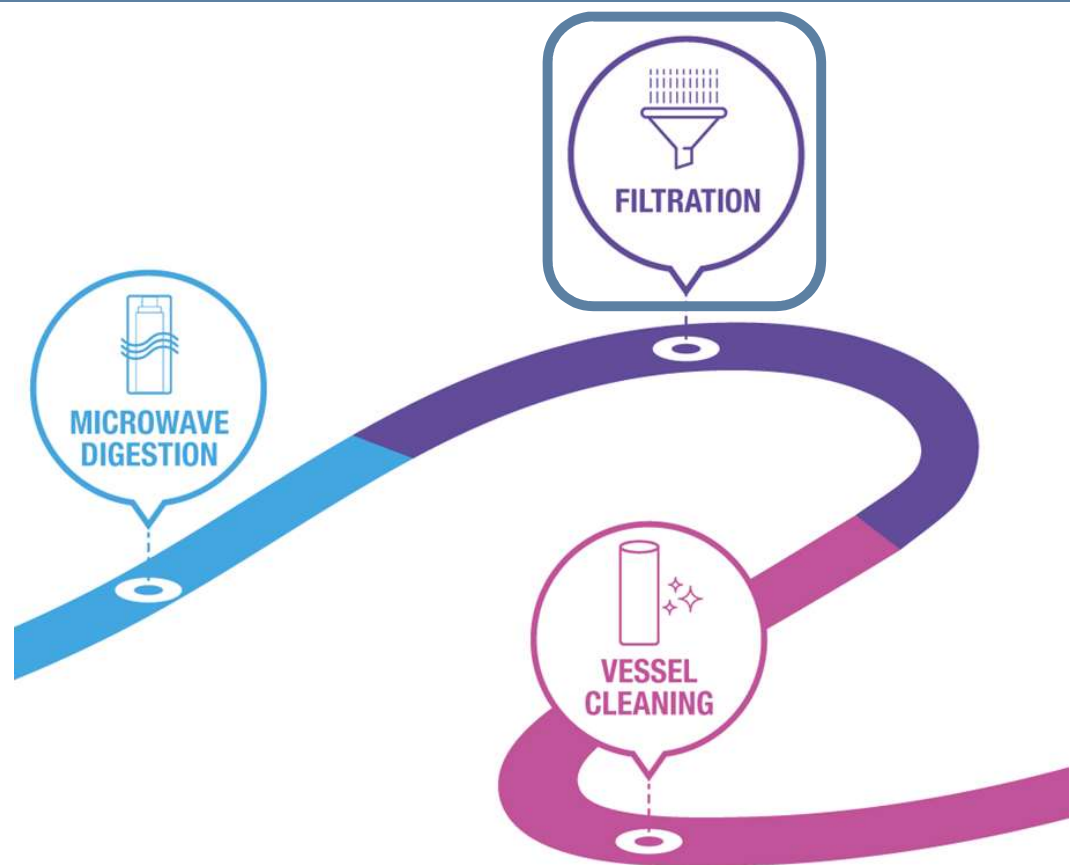
SAMPLE FILTRATION

SOLUTION

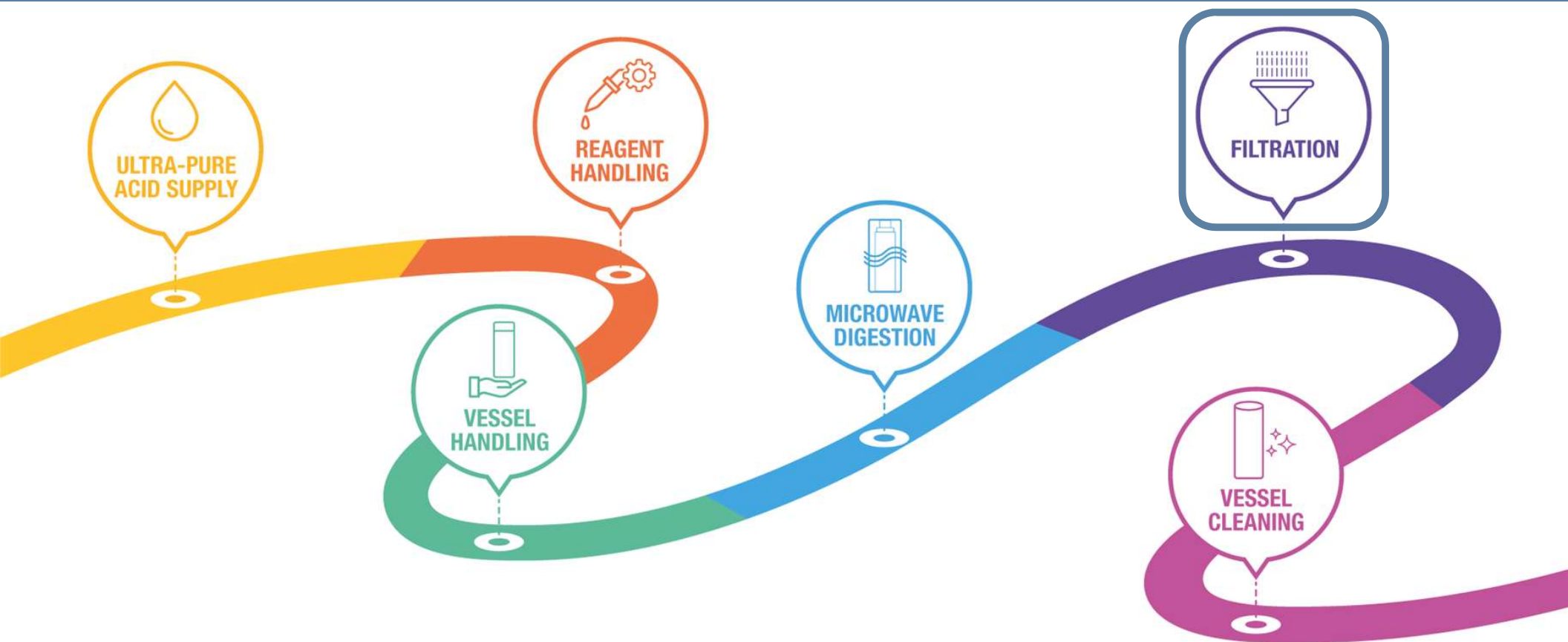
Simultaneous Filtration System



SFS-24



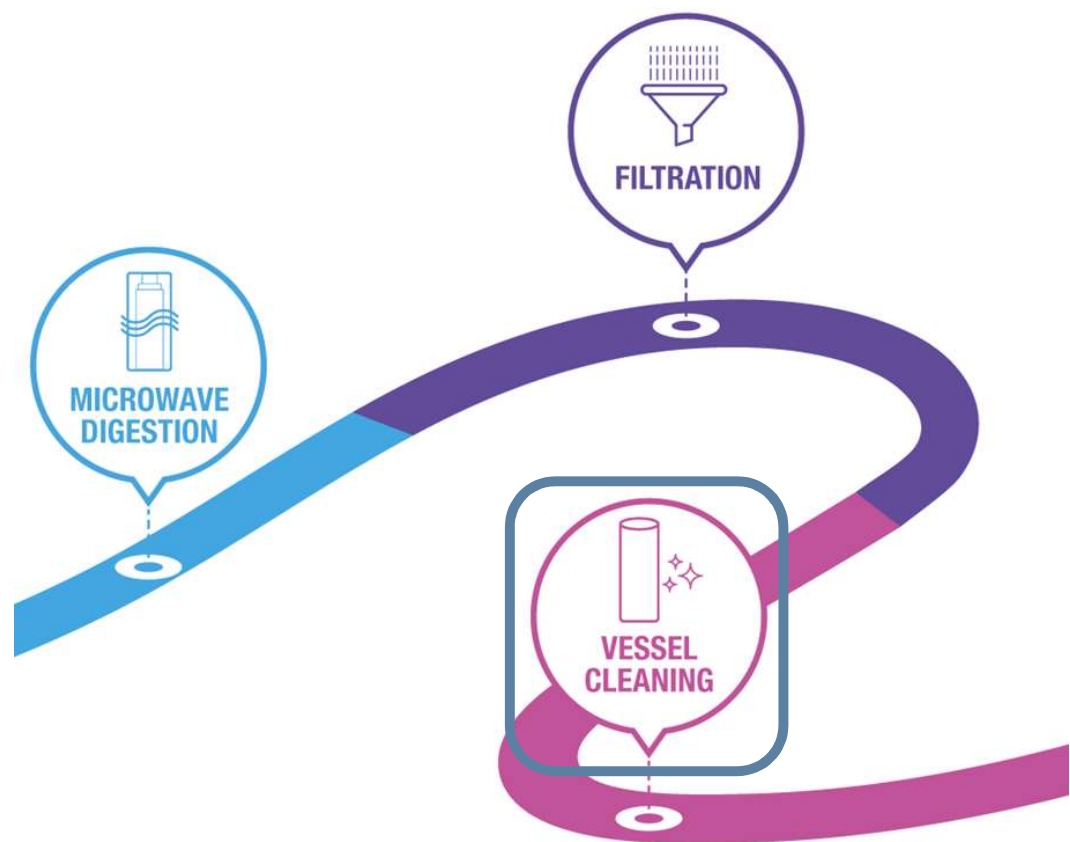
SAMPLE PREP WORKFLOW



VESSEL CLEANING

CHALLENGES

- Long procedure
- Productivity
- High blanks
- High acid consumption
- Safety

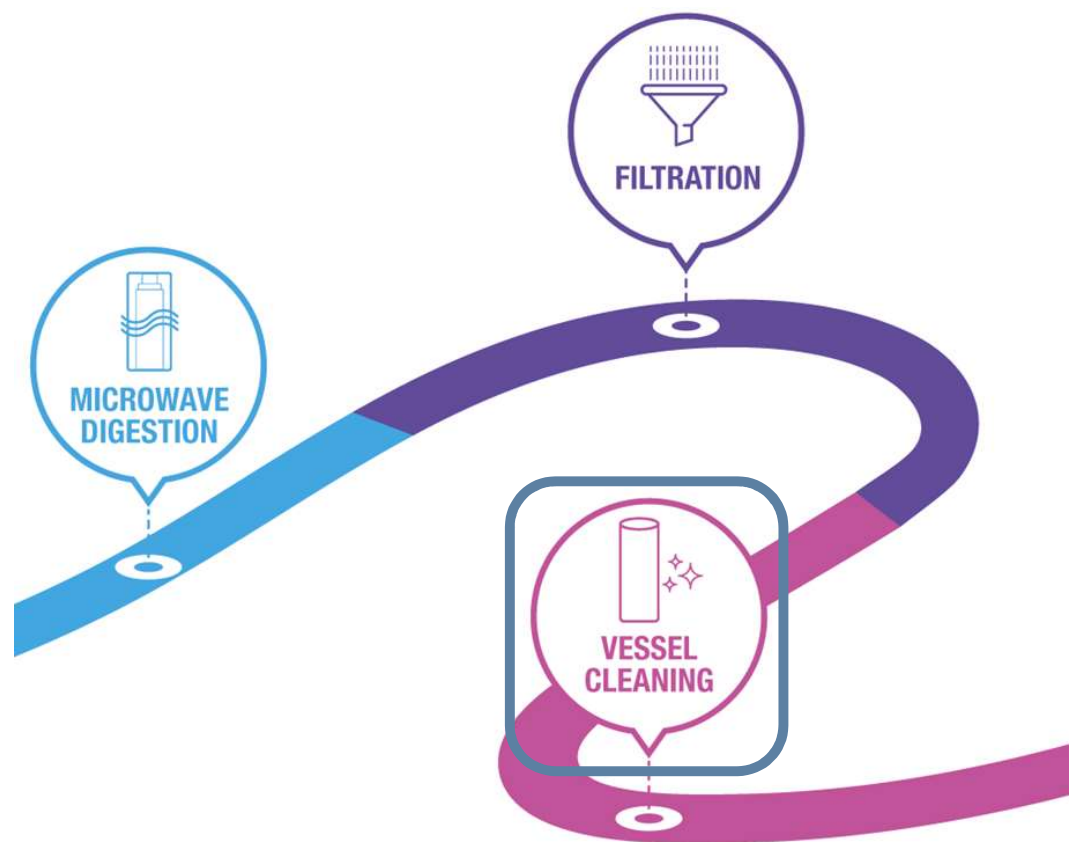


VESSEL CLEANING

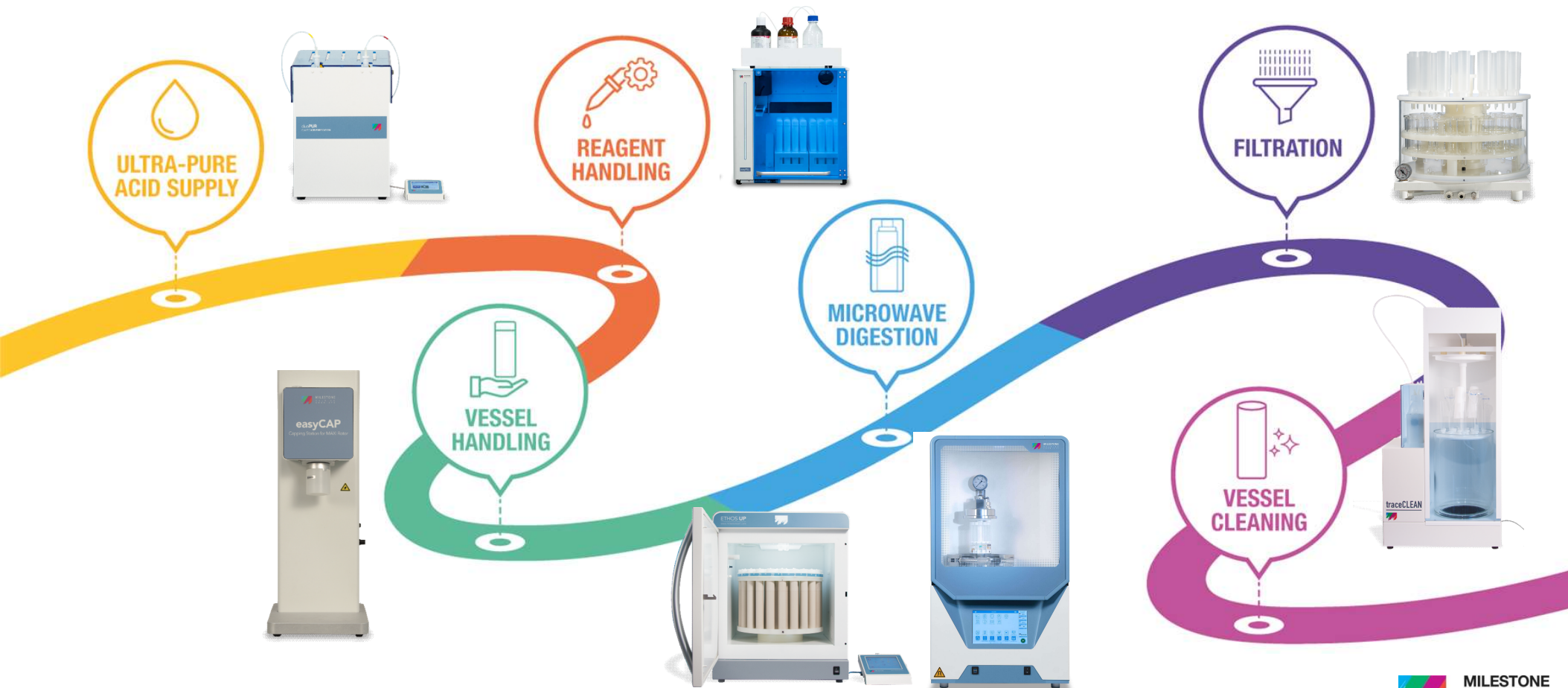
SOLUTION Automated Acid Steam Cleaning



traceCLEAN



SAMPLE PREP WORKFLOW



BENEFITS OF AN OPTIMIZED SAMPLE PREP WORKFLOW



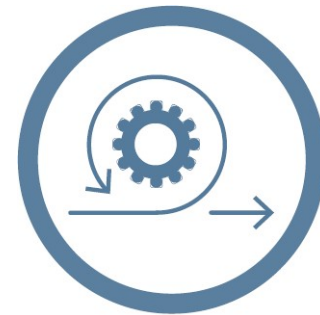
SPEED



QUALITY



EFFICIENCY



**MINIMIZE
DISRUPTIONS**



THANK YOU



MILESTONE
HELPING
CHEMISTS