

No one remembers a coward.....



Camilla Junggren

# Things to consider when selecting reference solutions



A photograph of various laboratory glassware, including Erlenmeyer flasks, beakers, and a graduated cylinder, arranged on a reflective surface. The scene is bathed in a soft, blue light, creating a clean and professional atmosphere. The glassware is partially filled with a clear liquid, and their reflections are clearly visible on the surface below.

# ***ClaraLab***

*Focusing on knowledge, competence and quality*



## Our values – and our core belief

ClaraLab and its subsidiaries differ from other companies in the laboratory supply industry, by having a Scandinavian based team of LAB-companies focusing on specific areas like research & development, production, routine analysis and quality control. We strive to always be accessible and flexible, which we accomplish by having each company stay focused on its specific customer base, applications and product areas.

### **LAB Noax**

Provides consumables, instruments for water analysis, sampling and sample preparation, and reference materials, to customers in research, hospital and industrial laboratories.

### **LAB Diagnostics**

Markets and sells diagnostic products primarily to hospitals and veterinarians. In addition to providing diagnostic and lab automation products.

### **LAB Education**

provides method development, validation, optimisation, service training, remote support, webinars and other educational services. We offer scheduled classroom training sessions or customised courses which may be performed on-site by customer request.

### **LAB Analytical**

Provides analysis instrumentation for both academic and industrial research, as well as for process and quality control. We focus on analytical techniques ranging from chromatography, molecular spectroscopy, inorganic analysis, thermal analysis to contact angle measurement, surface tension and quantification and study of nano-films.

### **LAB Sweden/Norway**

Focuses mainly on two areas - CLEAN and CELL/BACT – with customers primarily in research institutions, hospitals and industry. The product line includes autoclaves, washer-disinfectors, pure water systems, shaking incubators, bioreactors, and incubators.

# Clara**Lab**

 **Lab**  
education

 **Lab**  
s w e d e n

 **Lab**  
analytical

 **Lab**  
diagnostics

 **Lab**  
noax

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 **Lab**  
noax



70 years old....



## Offers products for:

- consumables
- Instruments for water analysis
- sampling
- sample preparation
- laboratory dishwashers
- reference materials



# Consumables

- Jars, containers
- Jerry cans
- Buckets
- Bottles
- Drums
- Tubing, connectors & couplings
- Gloves
- Filter paper
- and much, much more.....



# Instrument for water analysis

- Spectrofotometers – Merck
- Thermometers
- Conductivity
- pH
- Heat Cabinets
- Chamber Furnaces
- Magnetic Stirrers
- Dry block heaters
- and much, much more.....



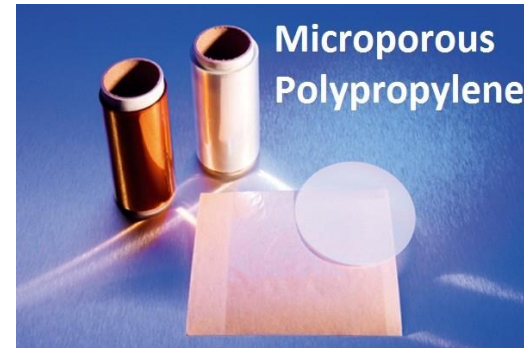
# Sampling

- Telescopic rods
- Pumps
- Scoops
- Liquid samplers
- Solid samplers
- Sampling spoons
- Disposable samplers
- and much, much more.....



## Sample preparation and consumables for XRF

- Sample cups and thin films
- Presses, manual and automatic
- Binding additives
- Fusion technology, electric and gas
- Reference materials, drift monitors and proficiency tests
- FLUXearch database
- Application services



# Sample preparation and particle analysis



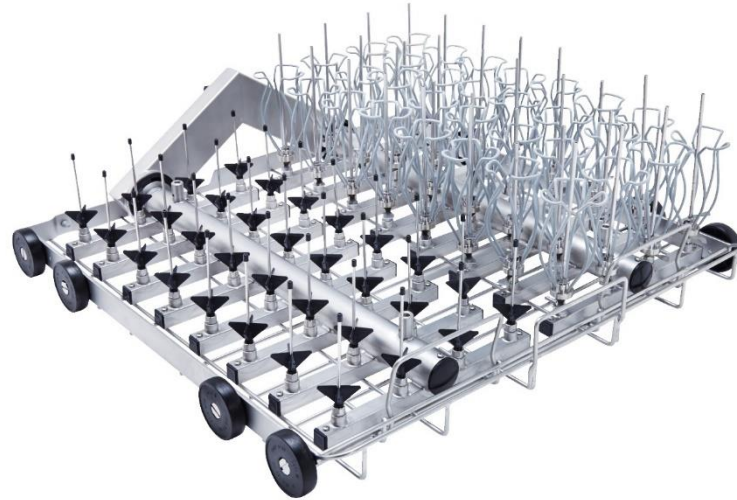
- Knife mills
- Ball mills
- Mortar grinder
- Rotor/Beater mills
- Planetary mills
- Jaw crushers
- Sieve shakers
- Sample dividers





# Laboratory dishwashers

- Dishwashers
- Cabinets and stands
- Accessories
- Cleaning agent
- Neutralising agent
- Dishwasher salt



# CRM – Certified Reference Materials

- ICP/AA/IC solutions
- Natural Waters
- Soils, sediments and sludges
- Metal Alloys
- Minerals
- Pesticides
- and much, much more.....



# Things to consider when selecting reference solutions



# Areas of use:

- Calibration of instruments
- Controlling the calibration
- Method validation
- Identification
- Internal Quality Control
- External Quality Control (PT)

# Selection of reference solution

- Single element

10, 100, 1000, 10 000 ppm

- Multi element

According to method, instrument or custom made

# Which volume?

- The bigger the better?

Yes, if you consider the expiration date first and to some extent purchase price per ml...but...what if all the volume is not consumed before the expiration date is passed?

- Less is more?

Not as good from Expiration Date view, probably more expensive but generates less waste.

# Whats the difference?

- Shelf Life
- Expiration date

# Expiration date

Depends on 3 factors:

- *The chemical stability of the solution*
- *The solutions losses through transpiration*
- *The human factor when using the solution*

# Chemical stability

- The form of the starting material*
- The matrix*
- Storage conditions, room temperature/refridgerator*
- The concentration of the solution*
- The bottle the solution is supplied in*
- Transpiration*

## The form of the starting material

- *Few sources/suppliers of high purity starting materials*
- *Manufactured with focus on chemical stability*
- *The same “trouble makers” for all  
Ag, As, Au, Ba, Cr, Hg, Na, Os, Pb*

# The matrix

- *HNO<sub>3</sub>*

- *HCl*

- *HF*



# Storage conditions?

- *Room temperature?*
- *Refridgerator?*

# The concentration of the solution?

- *10 000ppm*
- *1000ppm*
- *100ppm*
- *10ppm*
- *1ppm*
- *1ppb*

# *The bottle the solution is supplied in*

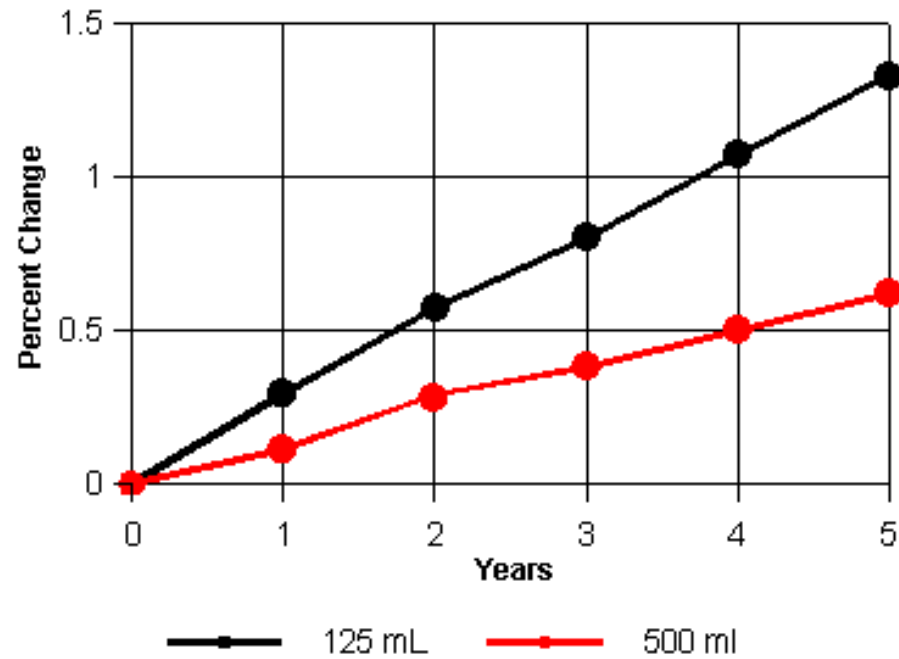
## LDPE - Low Density Polyethylene

- It's one of the cleanest plastics. By leaching empty bottles you remove any traces from the production of the bottles. By doing this the impurities from production is regarded as insignificant.
- Inexpensive

# Loss trough transpiration

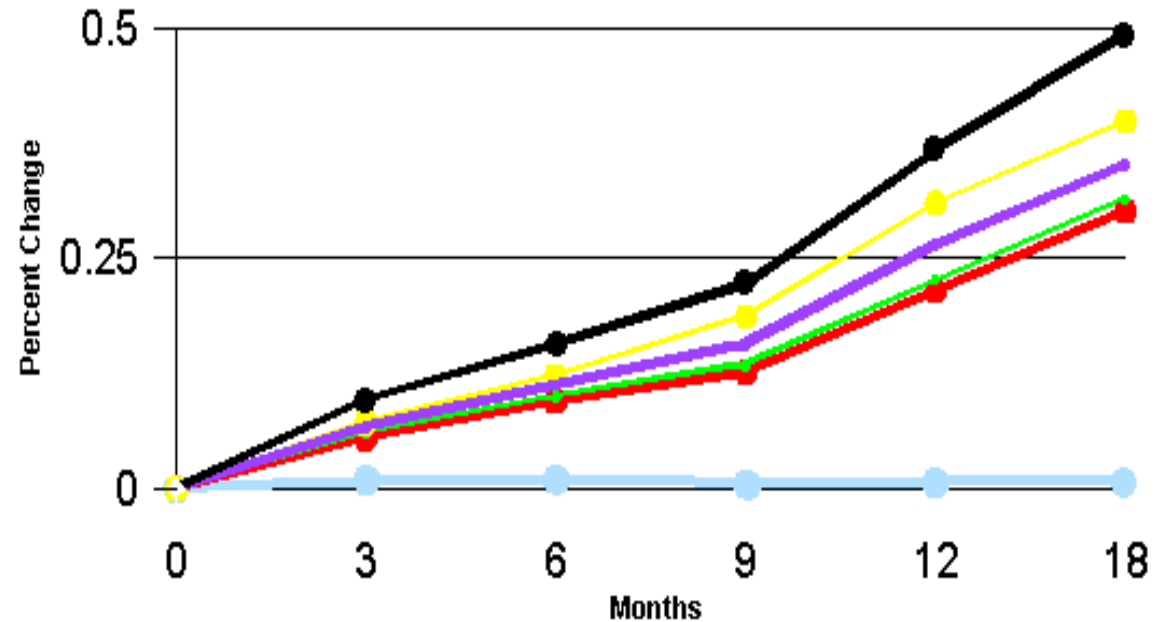
If one assumes that the chemical stability of the starting material is under control, the choice and concentrations of the matrix and element in the solution. All most all suppliers uses LDPE in the bottles, transpiration is the factor that effects the expiration the most.

No correlation of the transpiration rate to the bottle surface area?

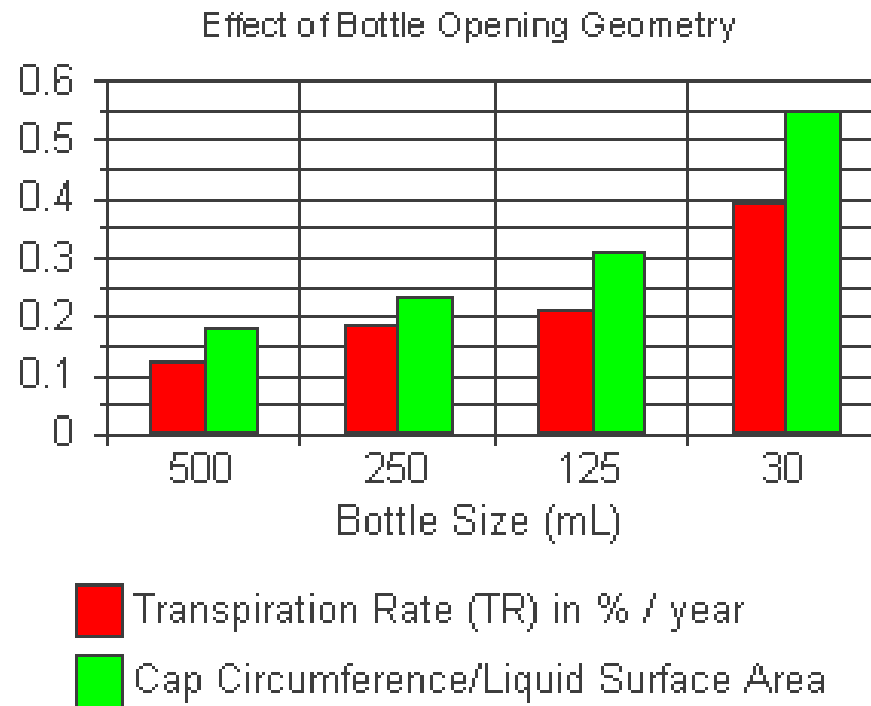


# Is there a correlation of the transpiration rate to the bottle opening (125ml)?

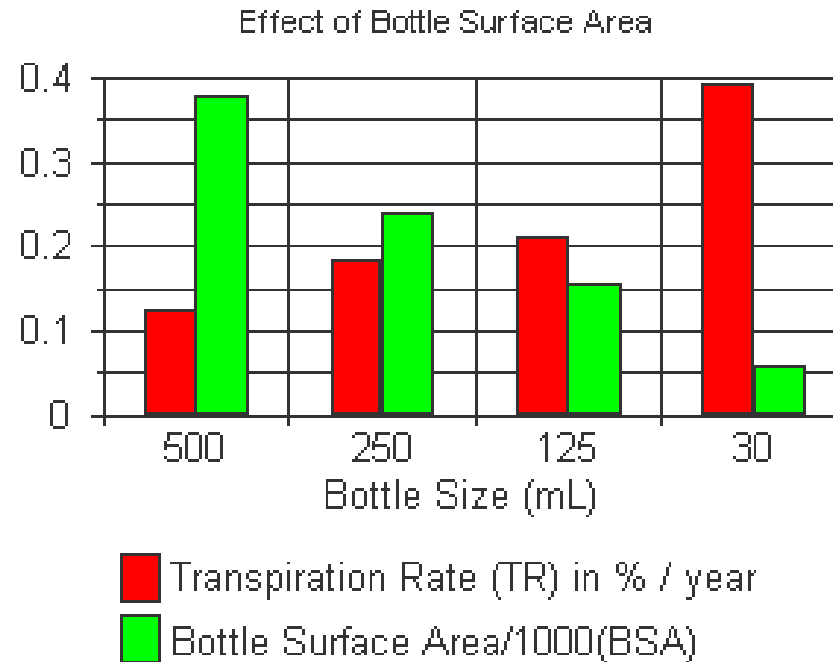
- No tape, never opened
- Tape sealed, never opened
- Tape sealed, öppnad periodiskt
- No tape, opened periodically
- No tape, half full, opened periodically
- Transpiration Controlled Technology™



# What effects transpiration proportionally?

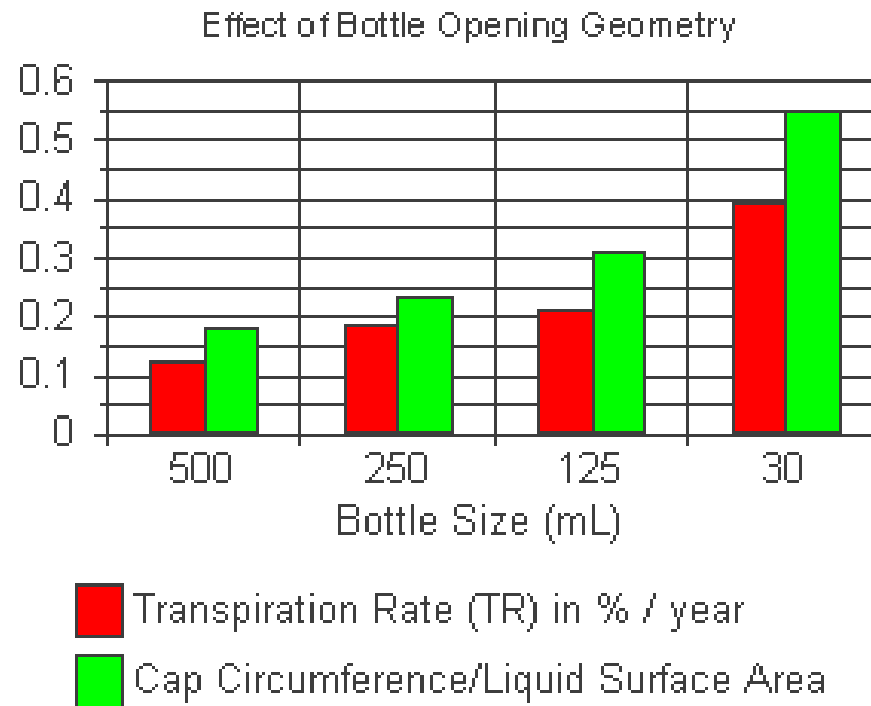


# What effects transpiration proportionally?





# What effects transpiration proportionally?



# Conclusions regarding transpiration

## Little or no influence:

- Taping the around the bottle cap has no influence upon the transpiration rate

## Big influence

- Smaller bottles transpire faster < 100ml
- Bottles that are half full and opened periodically have the highest transpiration rate.
- Opening the bottle periodically greatly increases the transpiration rate.
- Storage in refridgerator
- Transpiration Controlled Technology™ or tin foil vaccum bags reduces or eliminates transpiration.

# Conclusions

- Do not purchase bigger volume than you expect to use during one year. Regardless of the expiration date stated on the bottle
- Note date of arrival and when the bottle was opened for the first time
- Store the bottles in a refrigerator when they are not used
- Consider if using custom blends could help you save time and money



Thank you!

