CleanAcids

USER MANUAL

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Safety Warnings

When washing the elbows, ensure not to let any water get into the filters to prevent **pressure buildup** or a **vacuum**.

Do not inhale acid fumes! Analab strongly suggests using a fume hood to prevent any harmful vapors from escaping into the environment.

Do not overfill bottles! Maximum volume of contents must not exceed **70% of the total vessel volume** to prevent pressure build up.

Be careful when handling acids! Wear **protective gloves** and **equipment** to prevent any unnecessary contact with acid.

Connector elbows can get **hot**, be careful when handling and let cool before unscrewing bottles. **Always** wear protective gloves against heat when handling hot bottles and elbows.

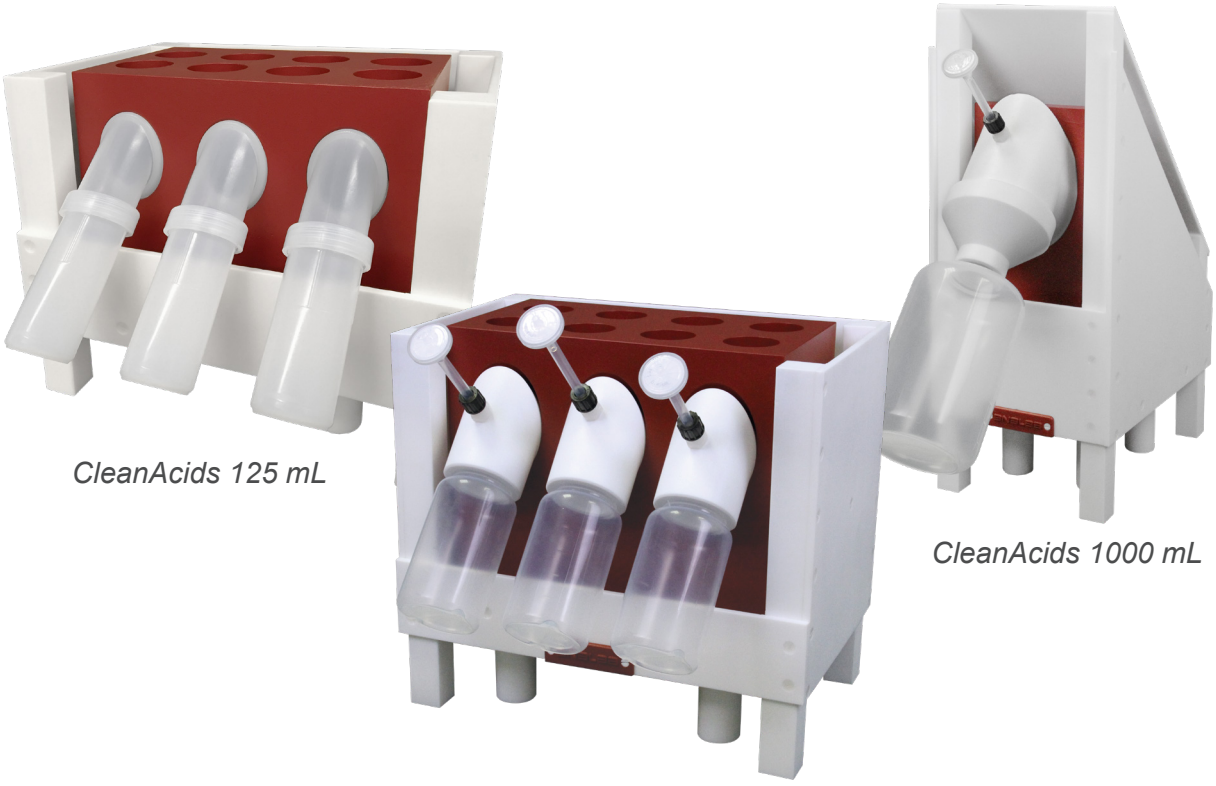
Ensure that bottles are screwed firmly on the elbows **without** damaging threads. Damaged threads can lead to acid leaks and possible contact with **harmful** corrosive acid droplets.

Overview

Analab CleanAcids is an easy-to-use acid purification system that produces high purity acid by sub-boiling distillation.

CleanAcids' simple design guarantees that your lab will have high purity acid without the worry of breaking fragile system parts. Additionally, the sub-boiling distillation method of the system produces ultrapure vapor without large mass transfer, leaving virtually all contaminants behind.

The high purity acid produced by CleanAcids will yield more accurate results and lower detection limits in your laboratory. CleanAcids will reliably produce high purity acid for your laboratory with little to no maintenance required.



CleanAcids 125 mL

CleanAcids 1000 mL

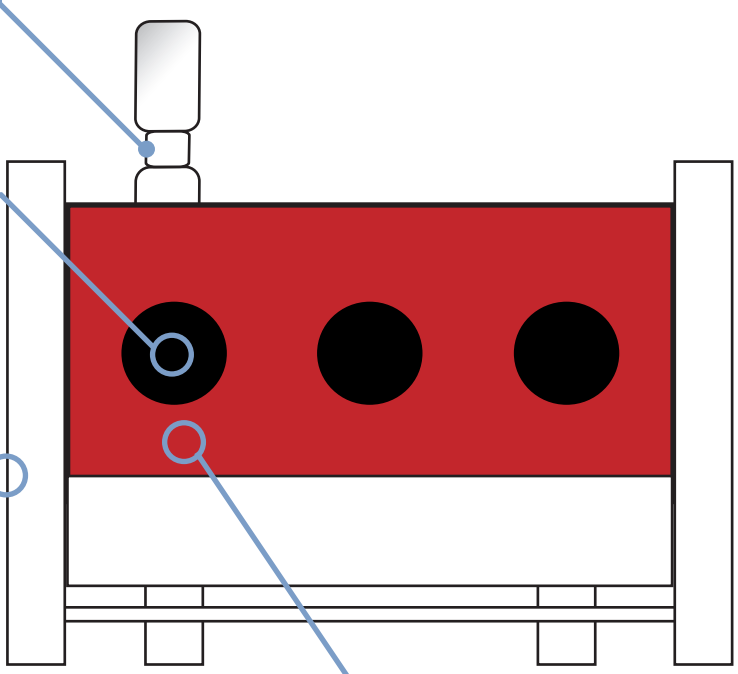
CleanAcids 500 mL

Features

CleanClever
Analab's patented attachment for conditioning individual bottles

Multiple Purification Ports
Able to purify multiple acids at once

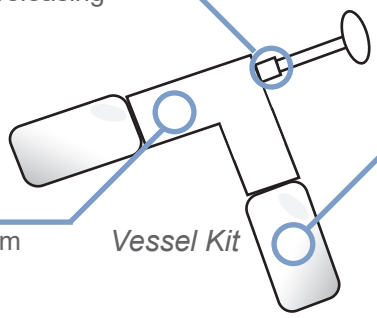
Thermal Protection
Complete thermal outer-shell made of PTFE material resists heat



CleanAcids 500 mL

Graphite Heating Block
PFA-coated graphite block is inert to acid corrosion and uniformly heats up acid

Semi-Permiable Filter
Relieves pressure without releasing acid vapor



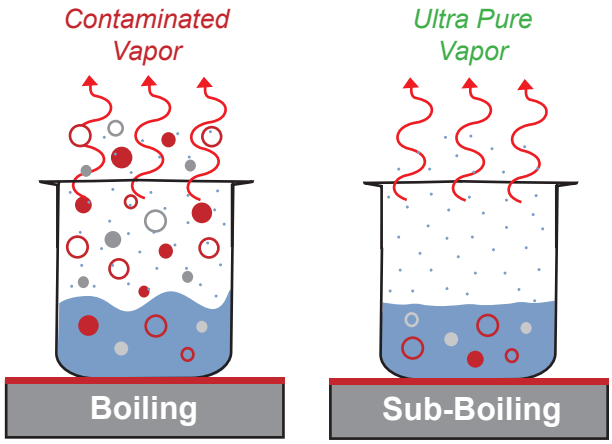
PFA Bottle
Inert to acid corrosion

PTFE Elbow
Completely enclosed system

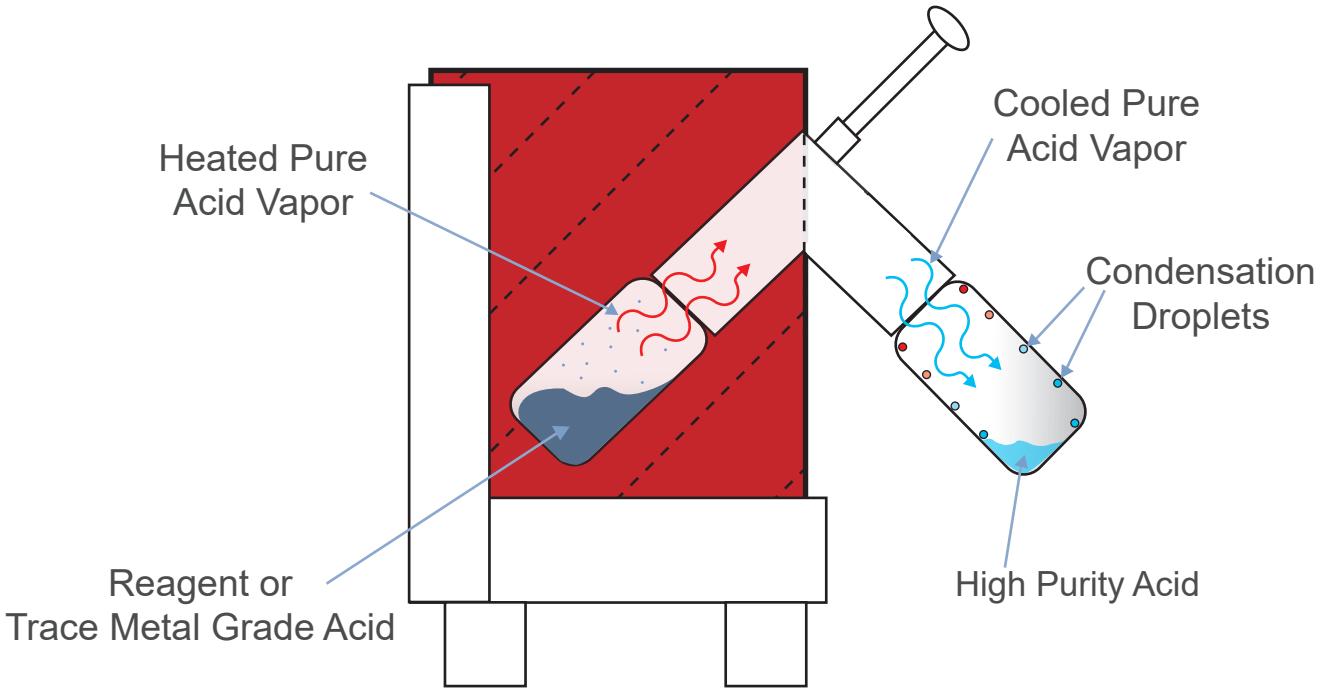
Vessel Kit

How CleanAcids Works

CleanAcids produces high purity acid by sub-boiling distillation. This process has been proven to be the most effective method of acid purification. Conventional distilation by boiling the feed acid results in large mass transfer. The bubbling surface of the feed acid ejects contaminates from the liquid phase in microdroplets, which can be transferred into the distillate. In contrast, sub-boiling distillation heats up the feed acid slightly below the boiling point, eliminating the bubbling effect. The process creates ultra pure acid vapor, and the contaminants are left behind in the original liquid.



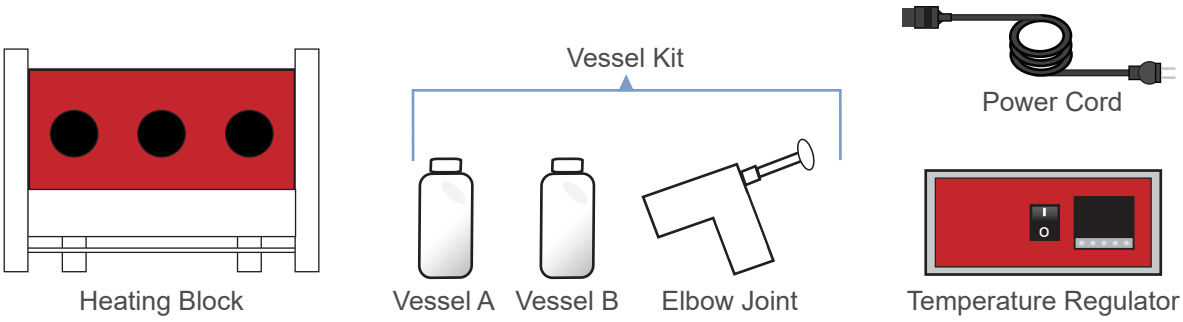
The heating block uniformly warms up the acid to a temperature slightly below the boiling point of the feed acid. Pure acid vapor then cools and condenses on the inside surface of the PTFE elbow. The newly formed high purity liquid drips down to the collection bottle resulting in high purity acid for your use.



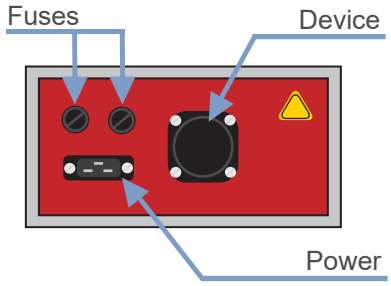
Questions? Contact Us!
CleanAcids@icpms.com | +33 (0)3 88 51 79 51

Set-Up Instructions

CleanAcids Parts List



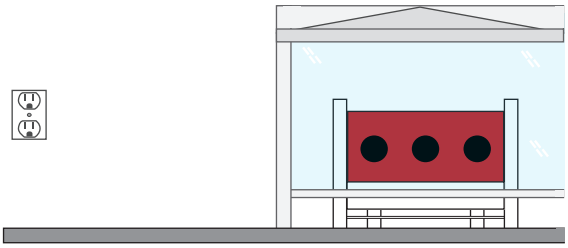
Back of Regulator



? For more information on your temperature regulator refer to the "**Regulator User Manual**".

Step 1

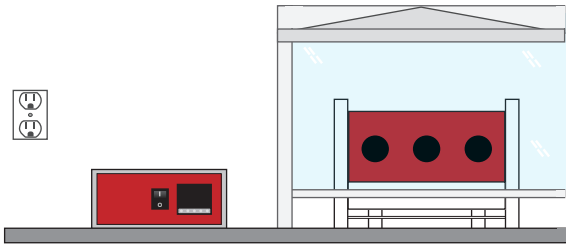
Place heating block at desired location.



Analab suggests that CleanAcids be placed under a fume hood for your safety.

Step 2

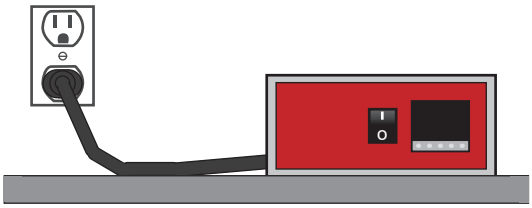
Place temperature regulator at desired location outside of fume hood.



i CleanAcids is compatible with all Analab temperature regulators

Step 3

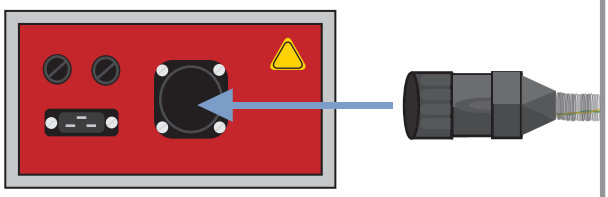
Plug regulator power cord into power port on controller and in power outlet.



Do not plug into power strip! Do not expose regulator to fumes! Do not place anything on top of regulator!

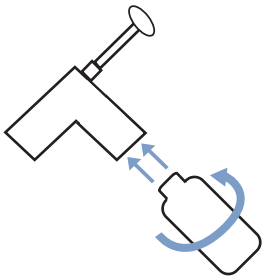
Step 4

Plug heating block power cord into device port on temperature regulator.



Step 5

Screw empty Vessel B on to elbow



Be careful not to damage the threads of the bottle by over-tightening.

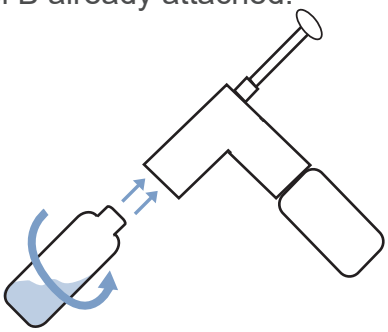
Step 6

Fill Vessel A with reagent or trace metal grade acid.

Do not overfill! The acid volume should not exceed 70% of the vessel volume.

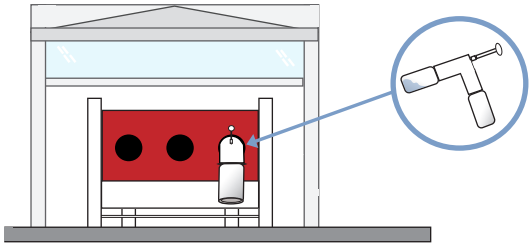
Step 7

Screw Vessel A onto elbow joint with Vessel B already attached.



Step 8

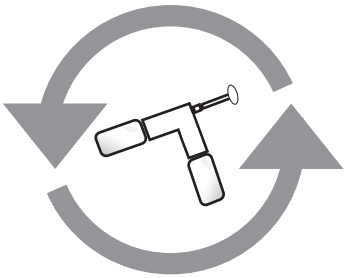
Place Vessel A into desired port with rest of vessel kit attached.



Be careful not to over-tilt bottle A!

Step 5-8

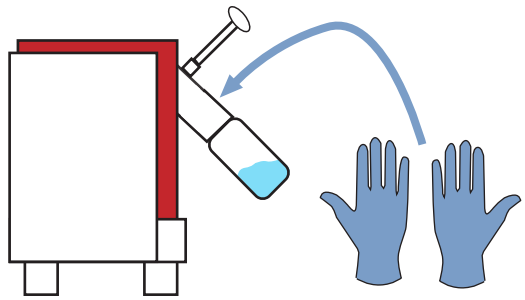
Repeat steps 5 - 8 for each vessel kit.



Acid Removal Instructions

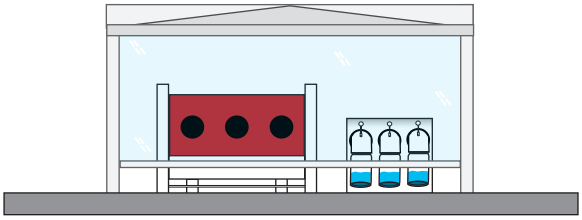
Step 1

Put on heat resistant gloves and grab the elbow between the filter and the bottle.



Step 2

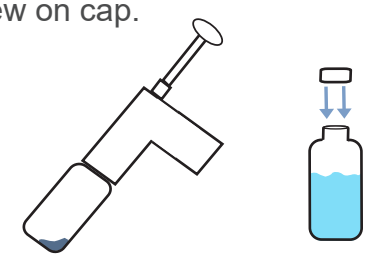
Transfer vessel kits to elbow stand in fume hood and let cool for 30 minutes.



ⓘ Analab elbow stand can be purchased at www.meinhard.com.

Step 3

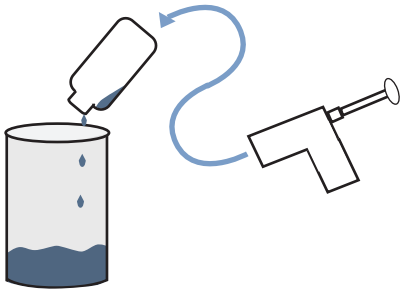
Remove Vessel B from vessel kit and screw on cap.



ⓘ If desired, some pure acid from Vessel B can be used for cleaning in step 5.

Step 4

Remove Vessel A from vessel kit and safely dispose of any leftover feed acid.



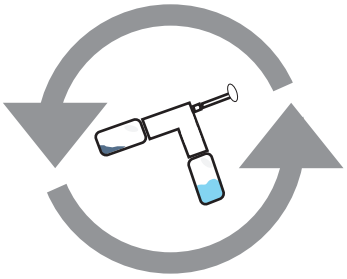
Step 5

Clean Vessel A by shaking a small amount of distilled acid in the bottle.

ⓘ Vessel B is already cleaned by the pure acid vapors produced by the process.

Step 1-5

Repeat steps 1-5 for each vessel kit.



Recommendations

See **Table 1.1** for a list of **recommended temperatures** for several types of acid at common reagent grade concentrations. See **Table 1.2** for recommended temperature for azeotropic acids.

Table 1.1- Reagents

	Boiling Point (°C)	Recommended Temp. (°C)
Hydrochloric Acid (HCl) 25%	107 °C	102 °C
Hydrofluoric Acid (HF) 48%	106 °C	101 °C
Nitric Acid (HNO3) 65%	122 °C	117 °C
Ammonia (NH4OH) 25%	36 °C	31 °C
Hydrogen Peroxide (H2O2) 30%	107 °C	102 °C

Table 1.2- Azeotropes

	Boiling Point (°C)	Recommended Temp. (°C)
Hydrochloric Acid (HCl) 20%	110 °C	105 °C
Hydrofluoric Acid (HF) 37%	120 °C	115 °C
Nitric Acid (HNO3) 68%	121 °C	116 °C

For the best results, **Analab recommends that azeotropic solutions be used as the feed acid** in CleanAcids because it will hold a constant boiling point during the evaporation process.

Use of the **temperature probe** with dual temperature regulators will give a more accurate reading of the actual temperature of the liquid. Be careful when inserting the temperature probe as it can contaminate the acid. Additionally, the probe may negatively impact the efficiency of acid production.

To increase the throughput of ultra pure acid, Analab recommends that you **keep the heating block running** between each purification cycle. CleanAcids is proven to be safe to leave running unattended for days on end. If the heating block is not left on, it is recommended that you turn it on an hour before you begin distillation.

Analab recommends that you **distill feed acid once or twice** after switching the type of feed acid. This process conditions and cleans the vessel kit for optimal results.

FAQ's

What acids can CleanAcids purify?

CleanAcids is able to safely purify HCl, HF, HNO_3, NH_4OH, and H_2O_2. Additionally, you are able to purify both reagent and trace metal grade acid.

How much acid can CleanAcids produce in a day?

The efficiency of production can vary greatly depending on temperature of operation, type of acid, and your size of CleanAcids. Refer to the table below for information on the typical efficiency of acid production for all three sizes of CleanAcids.

Table 1.3- System Efficiency per Position	Ultrapure Acid Production
CleanAcids 125 mL	6.5 mL/hr
CleanAcids 500 mL	9 mL/hr
CleanAcids 1000 mL	12 mL/hr

What safety features does CleanAcids have?

CleanAcids is fitted with several safety features to protect you and your laboratory. The PTFE protection on the heating block can be used to safely move the heating block while it is warm. Additionally, the vessel kits are completely enclosed and do not emit any harmful acid vapors. The temperature controller is also fitted with protection against unintended starting as well as an automatic shut off if the temperature exceeds 10°C of the set point. Additionally, there are two fuses that protect the system from overheating or short circuiting.

Can CleanAcids be run unattended?

Yes, CleanAcids is proven to be safe to leave unattended for days, weeks, and even months on end without compromising any performance.

At what temperature should I run CleanAcids?

A general rule of thumb is to set your temperature at 5°C below the boiling point of the feed acid. A table with recommended temperature for all acids supported by CleanAcids can be found on page 10.

Can I purify multiple types of acid at once?

Yes, but the two types of acid must have a similar boiling point to ensure that the liquid does not boil at the recommended temperature. For example, HCl (25%) and HF (48%) are safe to simultaneously distill with boiling points of 106°C and 107°C, respectively.

Can CleanAcids purify any organic chemicals?

Analab CleanACids is not safe to use for distilling organic chemicals, especially flammable solvents, due to relevant safety concerns.

What is the maximum temperature that CleanAcids can reach?

The maximum temperture that you can safely operate CleanAcids is 250°C.

Troubleshooting

If pressure is building up in the bottles...

- Be careful not to squeeze when unscrewing bottles from elbow joint! Doing so may spray hot acid out of filter.
- Reduce the amount of acid in the bottles.
- Check the semi-permiable filter for any blockage or damage.
- Decrease the temperature of the heating block.

If there are acid droplets on the outside wall of the bottles...

- Check if the bottles are screwed tightly to the elbow joint.
- The bottle threads may be damaged from overtightening, reorder at www.meinhard.com

If CleanAcids is not removing contaminants...

- Reduce the temperature of the heating block by a few degrees to prevent unnecessary boiling. (See page 10 for recommended temperatures)
- Consider altering your process of removing the bottles to eliminate any possible points of contamination.
- Clean the bottles and elbows of all contaminants. Be careful not to let any water into the semi-permiable filter on the elbow.

For support and assistance regarding CleanAcids...

- Email info@icpms.com
- Call 1 (402) 991-7800

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Questions? Contact Us!
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