

Rich Earth Summit Chat Conversation

Other Questions/Comments:

- **From Shrikant Navrekar:** Rich Earth, As I see most of the presentations focus on Urine separating toilets. However, the major source of urine can be URINALS from schools, public places & institutions. Has anyone exclusively worked on this ? That would be more interesting & worth exploring area
 - **From Dyllon Randall:** Shrikant, we only use urine collected from urinals. See here: <https://www.sciencedirect.com/science/article/pii/S2213343718306043>
 - **From Asfak Patel:** We have used urine from the urinals of railway station for water recovery and concentration of nutrients. Link: <https://www.sciencedirect.com/science/article/abs/pii/S221313882100134X>

- **From Hilda:** Can anyone give us recommendations on the best way to stabilize our urine on home scale? spray bottle with vinegar 6% concentration from the top in the bowl, or in small primary storage tank below before going into larger storage tank or treating with an alkaline base in the small primary tank. (presently we only have a large storage tank but want to stabilize our urine before it goes into large storage tank) All our urine is used in our food production and landscape.
 - **From Kai:** Acid can be a good solution, but you need to make sure that the pH in the urine is low enough. The pH should be at least 4 or even lower. For this, you might need considerable amounts of acetic acid.
 - **From Michel Riechmann:** To add to Kai's comment: The less hydrolyzed (stored) your urine is, the less acid you will need to reach a pH of 4.
 - **From Hilda:** how much 6% vinegar needed for a 5 gallon bucket of fresh urine
 - **From Renaud de Looze:** 4 tsp for 1 gallon
 - **From Doc Reiss:** Our vinegar is 5% how much of that? Or do you have to buy special vinegar?
 - **From Abe Noe-Hays:** Any strength of vinegar is fine. You just add 20% more vinegar if you're using 5% instead of 6%.
Re: acid -- Also, you can use less vinegar if you only need to stabilize if for days or a couple weeks, instead of long-term
 - **From Jenna Senecal:** Re Acid: curious any idea about how long fresh urine stabilized with acid can be stored for?
 - **From Michel:** This is very dependent on the acids you use. We did mid term test

and reaching several weeks was possible. I haven't yet examined the long-term tests.

- **From Abe Noe-Hays:** Re. acid: When our home urine donors stabilized urine using 25-50 mL 5% acetic acid per liter urine, it stayed acidic for about 1-2 weeks (hard to quantify because it was many home users). BUT--once we concentrated it by about 4x using RO, it stayed acidic for years.
- **From Greg Hostetler:** Hilda, 0.5 tsp citric acid/gallon also works. REI has info for home urine re-use on its website.
- **From Ole Eresson:** similarly, how much $\text{Ca}(\text{OH})_2$ to alkaline stabilize fresh urine? e.g. grams/liter
 - **From Michel Riechmann:** We found 62 mL/ L urine for 6% acetic Acid (Vinigar) and 6-10 g/L $\text{Ca}(\text{OH})_2$. (To reach pH4, respectively pH12.5)
- **From Nancy Love:** I want to make a shameful promotion to this group to consider publishing work in the new open access journal PLOS Water. (<https://journals.plos.org/water/>) I am section editor for the resource recovery section, and urine-centered work is very valid. The journal also has a firm commitment to co-publishing with community members or those outside of academia but whose space or land is the focus of the work. I am likewise committed in these kind of collaborative publishing approaches. Reach out to me at nglove@umich.edu if you want to learn more.