

PROCEDURES FOR NEUTRALIZING MAPLE WASH WATER

Wash waters resulting from the use of cleaning chemicals for reverse osmosis (RO) membranes and evaporator pans are often strongly basic or acid, and should be neutralized before disposal in order to comply with Vermont Department of Environmental Conservation regulations (see Vermont DEC fact sheet--Managing Spent Acid and Caustic Cleaners Used in Maple Sugaring Operations). Below are instructions for neutralizing maple wash water, developed by Tim Wilmot of UVM Extension with assistance from the Vermont Agency of Agriculture, Foods and Markets and the UVM Proctor Maple Research Center. Following these instructions will allow you to modify your used maple cleaner to a safe pH range; they can then be disposed onto the ground (at least 100 feet from a stream or other water source).

1. In all cases, **follow the manufacturer's directions for the correct quantity and type of cleaner** to use with your RO machine. Likewise, follow the directions on the container or from your dealer when using acids to clean niter from evaporator pans.
2. The chemicals straight from the container are very strongly basic (caustic) or acid, and capable of causing severe injury. **Always wear appropriate personal safety equipment** when opening and using these chemicals; this equipment should consist at a minimum of safety goggles or a face shield, nitrile gloves, and a chemical resistant apron.
3. **Neutralization of both basic and acid wash waters is best done with sodium bicarbonate**, or ordinary baking soda available from a grocery store. While it is well known that baking soda will neutralize acids, it also will neutralize caustic solutions to the point that they are no longer dangerous.
4. **Neutralize RO cleaners either in the wash tank, or drain the cleaner into a separate tank** and then neutralize. Do not circulate the neutralized wash water through the machine. **Neutralize pan cleaners in the pan before disposal**. For both evaporator pans and RO machines, thorough rinsing with clean water is required after cleaning and neutralization.
5. Based on laboratory tests performed on various maple cleaners dissolved in water, **the following amounts of baking soda are needed** to adjust the spent wash water into a pH range (between pH 6.5 and 9) that is safe for you and the environment. For neutralization, only the weight or volume of the cleaner that you used is important; the amount of water in which the concentrated cleaner was dissolved is unimportant. For the neutralization ratios shown in the table below, you can use either weight or volume; for example, if the ratio is 1:1, and you measured out ½ cup of the cleaner as either a liquid (example bio-membrane or HDA 1000) or a solid (example Ultrasil 10 or Oakite 84m) then add ½ cup of baking soda.
6. **Acidic and basic waste water should never be mixed**. Neutralize them separately.

Note: Add baking soda slowly to acids as strong foaming may occur. You do not need to keep adding soda until foaming stops to achieve these neutralizations. Adding baking soda to the caustic solutions will produce little or no foaming.

Wash Water Neutralization Ratios

| Cleaner | Ratio of baking soda to cleaner necessary for neutralization | Resulting pH (approximate) |
|------------------------------------|--------------------------------------------------------------|----------------------------|
| ACIDS | | |
| Citric Acid | 1:1 | 6.5 |
| Roby Acid (Hydrochloric Acid) | 1:1 | 6 to 6.5 |
| HDA1000 | 1:1 | 6.5 to 7 |
| Oakite 84 M | 1:1 | 6.5 |
| BASES (caustics or "soaps") | | |
| Ultrasil 10 | 2:1 | 9 |
| Sodium Hydroxide | 2:1 | 9 |
| Bio membrane | 2:1 | 9 |
| Sani membrane | 8:1 | 9 |

Managing Spent Acid and Caustic Cleaners Used in Maple Sugaring Operations

This fact sheet describes how maple sugaring operations can manage spent acid and caustic cleaning solutions used for pan cleaning and reverse osmosis units under Vermont's environmental regulations. Following the prescribed management practices in this fact sheet will allow these wastes to be managed in an environmentally sound manner with minimal regulatory burden.

How are waste acid and caustic cleaning solutions regulated under environmental regulations?

- Waste acid cleaning solutions with a pH of 2 or less and caustic cleaning solutions with a pH of 12.5 or higher are considered corrosive hazardous wastes and subject to the Vermont Hazardous Waste Management Regulations (VHWMR) (See section §7-206 of the VHWMR). Any person generating hazardous wastes must manage these wastes in accordance with the regulations.
- §7-502 of the VHWMR provides an exemption for the owner or operator of an elementary neutralization unit (including containers and tanks) used to neutralize corrosive hazardous wastes. In other words, neutralizing corrosive hazardous wastes in containers and tanks is allowable without a permit.

What conditions should be met in order for corrosive wastes from sugaring operations to be considered exempt from Vermont's environmental regulations?

- Spent corrosive cleaning solutions are required to be neutralized immediately after being generated following the procedures for neutralization developed by UVM Extension. If the corrosive waste is stored in a container or tank prior to neutralization it is subject to the VHWMR, including hazardous waste generator requirements such as container labeling, storage area requirements, and notification and reporting requirements (§7-307, §7-308, and §7-309 of the VHWMR).
- Neutralized corrosive solutions shall not be discharged to or near surface waters of the state, and at least 100 feet from any surface water or water source).

How do I respond to a spill of corrosive materials or wastes should a spill to the ground occur?

Refer to the *Hazardous Material Spill Response* fact sheet for more information about spill response and spill reporting.(see: http://www.anr.state.vt.us/dec/EAD/sbcap/pdf/fs_spills_wm.pdf)

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