# Saltwater or Reef Aquarium Refugiums: How They Work, Benefits, and Types

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What is a refugium?

A refugium is a small aquarium that either sits next to or hangs onto an existing saltwater or reef aquarium. This is used by a growing number of aquarists to continually cycle water into and out of the existing tank. A refugium typically contains aragonite live rock, macroalgae, and a deep sand or mud bed. A refugium is the best representation of how nutrients are handled in nature. It recreates, on a small scale, the seagrass beds that are commonly found in association with a natural reef.

How does a refugium work?

With a refugium, detritus and uneaten food settles within the rock and deep sand, where the micro crustaceans such as amphipods and copepods will feed upon it. As a result, aquarium water quality is maintained in a natural and efficient manner. As the micro crustaceans multiply, they provide a natural food source and increase biodiversity of the aquarium.

A macroalgae, usually of the *Caulerpa* genus, is grown above the rock and sand. As the macroalgae utilize the nutrients within the water it keeps these levels from becoming problematic to help reduce the number of water changes that are required.

When the refugium is illuminated on lighting schedule opposite of the main aquarium, it provides essential oxygen during the nighttime hours when the main aquarium is not illuminated, thereby reducing the nighttime pH fluctuations.

What are the benefits of refugiums?

Refugiums provide many benefits to saltwater or reef aquariums. They:

- Provide existing aquarium inhabitants with natural food sources such as phytoplankton and zooplankton
- Filter water naturally (dramatically lowering nitrate and phosphate levels) and decrease the frequency of water changes that are needed
- Stabilize water conditions (especially oxygen level and pH)
- Help control algae growth in the existing aquarium
- Add trace elements back into existing aquarium water
- Serve as temporary acclimation tanks for new inhabitants
- May possibly aid the immune systems of fish (it is speculated that many species of macroalgae release compounds into the water that boost immunity in fish)
- After development, provide considerable aesthetic value to the system

What are the types of refugiums?

A refugium can be incorporated into an aquarium system in many different ways. They can be located above, below, along the side, or even inside the aquarium.

1. Neighboring refugiums: These are stand-alone aquariums that are set up above, below or next to the main display aquarium. For an above the aquarium installation, simply install the refugium with the outlet above the water level of the main aquarium. The water from the main aquarium can then be simply pumped into the refugium and allowed to drain back into the aquarium via gravity. A below the aquarium installation works in the same manner as a sump style wet/dry filter. An overflow box on the main aquarium is used to feed the refugium below and the water is re-circulated with an independent water pump located below. The AquaFuge Pro system is an excellent choice for these applications.

   Eclipse System aquariums make great refugiums for an along-the-side application. Simply install the new aquarium next to the main display aquarium, and pump water from the main aquarium into the Eclipse system. Install a U-tube from the refugium to the display aquarium and draw the air from the tube which will start the siphon. It is ideal to provide over-flow protection by installing the refugium at a higher level than the display aquarium. Typically, installing the refugium a few inches higher than the main aquarium is sufficient depending on the size of both the main aquarium and the refugium. Make sure that the pump that is used to move the water from the main aquarium will run dry before the refugium overflows in the event of the U-tube loosing siphon.



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2. Hang-on and internal refugiums: These are either an acrylic box that hangs on the outside of the primary aquarium, such as the AquaFuge External Hang-on Refugium, or a small acrylic box that attaches to the interior wall of the primary aquarium, such as the In-Tank Refugium. Larger internal refugiums can also be built by using sheets of glass to partition part of the aquarium. The refugium can consist of a side of the aquarium, or a corner, or even the entire length of the aquarium against the back. Simply partition the desired location and if using glass, seal with an aquarium safe silicone sealant. Using a water pump, pump the water into the refugium, and provide either holes in the glass, or a U-tube design for the water to return to the main aquarium. Design the water flow through the refugium to maximize its contact with the live rock and macro algae.

REMEMBER: Refugiums are not a substitute for mechanical filtration, but can augment almost any system.



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