

CO₂ System Basics

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Introduction to CO₂ systems

The two basic requirements for healthy aquarium plants are light and proper carbon dioxide (CO₂) levels. Through a process called "photosynthesis," aquarium plants use light energy and CO₂ to produce food necessary for lush growth. As plants develop, they use up their existing supply of carbon dioxide. Installing a CO₂ system is essential to prevent low CO₂ levels and to maintain active plant growth. These systems are available in three basic styles to ensure a healthy environment for planted aquariums of all sizes.

Manual CO₂ Systems

Most manual CO₂ systems are essentially yeast fermentation systems. CO₂ is generated as a metabolic byproduct of yeast and stored within a fermentation canister. The accumulated carbon dioxide travels through a reaction chamber and is then mixed with the aquarium water by means of a diffuser or a powerhead. These systems are easy to use, budget-friendly, and well suited for smaller planted aquariums. Just as their name implies, these units must be turned on and off manually to maintain ideal CO₂ levels within your aquarium.

Example of Manual Systems:

- [Turbo CO₂ Bio-System](#)

Semi-automatic CO₂ Systems

Semi-automatic CO₂ systems involve a bit more effort to install initially, but are timer-operated to help simplify CO₂ injection. A CO₂ canister supplies carbon dioxide and the amount of CO₂ entering the aquarium is controlled by a series of components, including a pressure regulator with solenoid, a bubble counter, and a CO₂ diffuser. The timer-operated solenoid opens during a set period of time (i.e. when the lights are on) to supply plants with carbon dioxide. These systems are perfect for mid-size and larger planted aquariums that have a greater demand for CO₂.

Examples of Semi-automatic Systems:

- [Drs. Foster & Smith Semi-Automatic CO₂ System](#)
- [Fluval Pressurized CO₂ Kit](#)

Automatic CO₂ Systems

Automatic CO₂ systems share many of the same features as semi-automatic systems. The main difference is the addition of a pH controller and probe. This high tech upgrade constantly monitors aquarium pH. When the pH probe detects the pH level falling below the set point, the pH controller automatically shuts off the flow of CO₂. These automatic systems simplify CO₂ supplementation in aquariums of all sizes but their benefits shine in large systems or heavily planted aquariums that require a steady supply of CO₂.

Example of a fully automatic system:

- [Drs. Foster & Smith Deluxe Fully-Automatic CO₂ System](#)

No matter which style of CO₂ system you employ, it is important to routinely monitor aquarium pH and CO₂ levels. Excess CO₂ can create conditions harmful to fish including low oxygen levels and drops in aquarium pH.



Do I need a CO₂ system for my planted aquarium?

CO₂ supplementation is usually contingent upon light intensity. In general, heavily planted aquariums with high output light fixtures will require a CO₂ system to keep up with the greater plant demand for carbon dioxide.

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