

Aquaponics Lab

How to make pH control powder

pH powder consist of Eggshell powder mixed with potassium bicarbonate. It can be use to raise the system pH while adding calcium, potassium and some other nutrients

Written By: Paulo Marini



INTRODUCTION

Authors: **LEMOS-MARINI, P. CARIGAN, P. 2014**

Introduction

Aquaponics has a natural tendency of pH lowering with time as the processes of decomposition, mineralization and nitrification releases hydrogen ions in the water. And it also presents nutrient deficiency specially in regards to Calcium and Potassium.

To counter-balance this process maintaining pH stable at a optimal level for plants and aquatic animals the addition of hydroxides or carbonates are necessary. A range of products can be use to control pH and supplement the lacking elements:

- Calcium Carbonate
- Calcium Hydroxide
- Potassium Carbonate
- Potassium Bicarbonate
- Potassium Hydroxide

Explanation of the Technique

This guide describe how to obtain calcium carbonate from egg-shells by heating (to eliminate the risk of E. Coli and other pathogens) and by transforming it in powder (It's important to transform the eggshells into fine powder to increase the surface area and raise the rate of dissolution). The idea is not novel, the authors have refined the technique, tested it in real conditions and documented it.

We have established, empirically, that a mixture of weight 50% egg shell powder and 50% Potassium Bicarbonate is the ideal combination to control pH while adding necessary Calcium and Potassium. The practical experiments were performed at the Incredible AquaGarden System.

Potential benefits of the technique

The benefit of using Eggshell powder instead of Hydroxides and industrial grade Calcium Carbonate are:

- Use of a extensively available waste product at low or no cost.
- Safety in regards to the first
- Eggshell is composed of 95% +/- of calcium carbonate, 5% +/- calcium phosphate and magnesium carbonate and some trace elements: It may provide preventive broad spectrum supplementation of trace nutrients.

**TOOLS:**

- [Oven](#) (1)
- [Coffee Grinder](#) (1)
- [Ovenware](#) (1)

**PARTS:**

- [Container - Sealable](#) (1)
- [Eggshells](#) (1)
- [Potassium Bicarbonate](#) (1)

Step 1 — How to make pH control powder



- Collect a tray full of eggshell

Step 2



- Take it to the oven for one hour at a temperature between 150C to 180 C
- This will sterilize any micro-organisms and dry the eggshell

Step 3



- Crush the eggshells

Step 4



- Use a coffee grinder to turn it into a fine powder.

Step 5



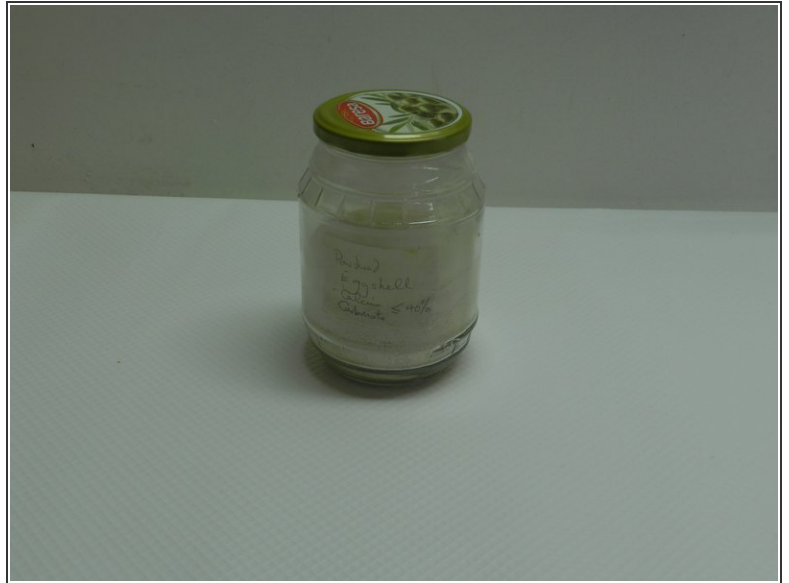
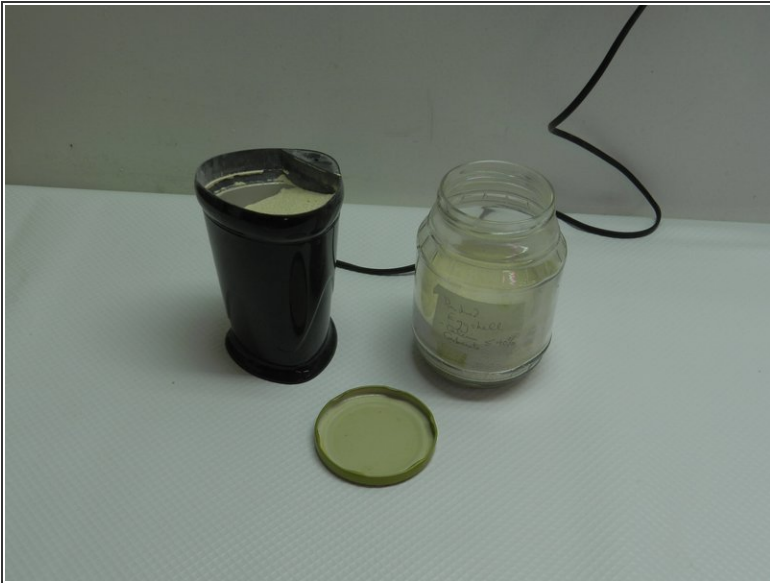
- Fine Powder appearance

Step 6



- Mix the eggshell powder with Potassium Bicarbonate at one to one ratio based on weight.

Step 7



- Store the mixture on an airtight container