Federal University of Lavras-UFLA
Department of Engineering-DEG
Nucleus of study in Agroecology, Permaculture and Innovative University Extension-NEAPE

Experimental Development of "Agroecological Water Filter" for poor communities.

INNOVATIVE EXTENSIVE UNIVERSITY PROJECT

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The agroecological sand filter, or slow sand filter, is a socioenvironmental technology of easy Access to all the population. It is built from simple and cheap materials (PVC pipe, sand, crushed stone or pebbles and coal). It owns good efficiency in the treatment of waters of natural springs.

-How it works

The agroecological filter works by using the action of gravity to cause water to descend naturally, passing slowly through the overlapping layers of sand, coal (activated or not) and crushed stones or pebbles.

Thus, the largest dissolved solid particles are retained in the first centimeters of the sand layer and are going to form an organic sludge, full up of biophagous microorganisms named “biofilm”.

Concomitantly, the smaller particles also dissolved, inclusive the coliforms, are digested by these microscopic biophagous organisms of the biofilm, which stick and reproduce naturally on the layers of the organic sludge.

Both the charcoal and the crushed stone/pebbles play an important role in this process, retaining some chemicals and leaving the fresh water, respectively.

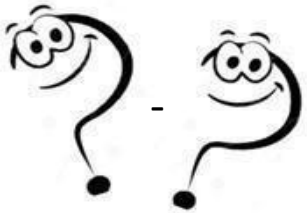
The water which past through the filter, then, is adequate for consumption.

-Materials utilized

-**PVC pipe** 300mm, 1m high;
-Fine sand, in layer of 25 cm;
-**Brita zero or pebbles**, in layer of 15 cm;
-**Fragmented coal** *(1x1cm < fragments > 0.5x0.5 cm),* in layer of 0.5 cm, if activated, in layer of 10 cm, if not;
-Commercial **bleach**;
-**Plastic films**;
-**Filter taps** ½ “;
-**Cleaning Shutoff Valve** ½ “;
-**PVC Lid** 300 mm;
-**Water** inlet bracket;
-Plastic **mosquito net**.
-Glue for plastic;
-Thread seal tape;
-Fine sandpaper (grit for plastic)

-How to mount:

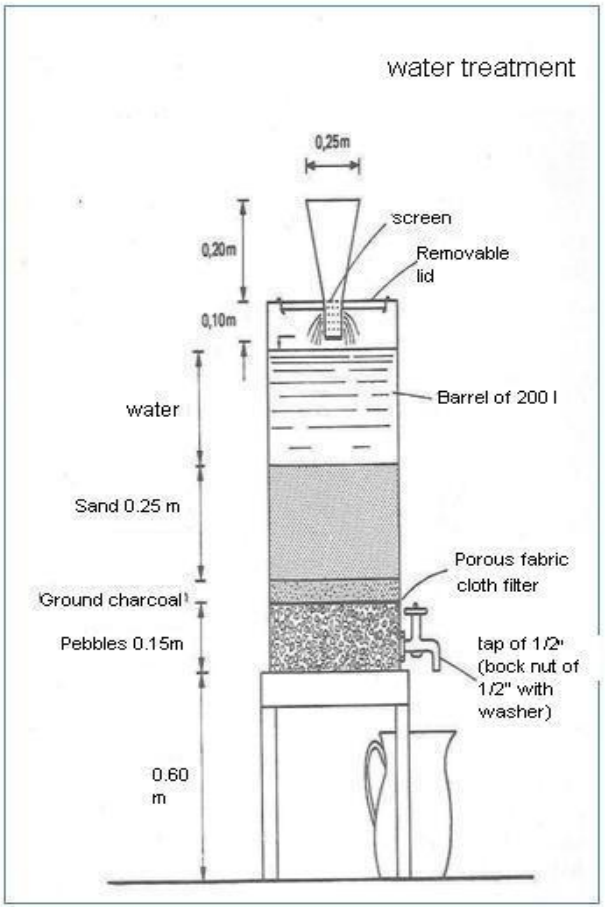
-FISRT PART



This step starts by the careful cleaning and disinfection of the components, washing the materials with a solution of bleach (1 spoonful of bleach to each liter of water).

After washing, dry all in the sun till the materials are completely dry.

**If the coal is activated, do not wash.*



*** Sketch**

in putting* the tap and the cleaning *at the lower base of the filter, check leakages.

-Second part:

- The design of a referential ruler for marking of the overlapped layers of the components becomes necessary and may be even a broomstick. Thus, markings are done, with the dimensions of the layers to warrant an increased accuracy at the moment of filling each filter with the components.
- The ruler would stay, then, with the following markings: the first, with 15 cm, fro the crushed stone/pebbles. The second with 10 cm or 05 cm for the charcoal, depending upon the type used. And finally, 25 cm, for the marking of the layer of sand.

- Third part

- **Understanding the mounting:**

1. Pierce the PVC pipe at the diameter of the tap, about 08 cm above the lower base of the filter and adapt the tap;

2. Stick the PVC 300mm lid at the lower base PVC of the filter (sandpaper carefully the two parts which will be stuck together).

3. Adapt the Cleaning Shutoff Valve at the Center of the lid;

4. Put 15 cm of crushed stone or pebbles, as first layer.

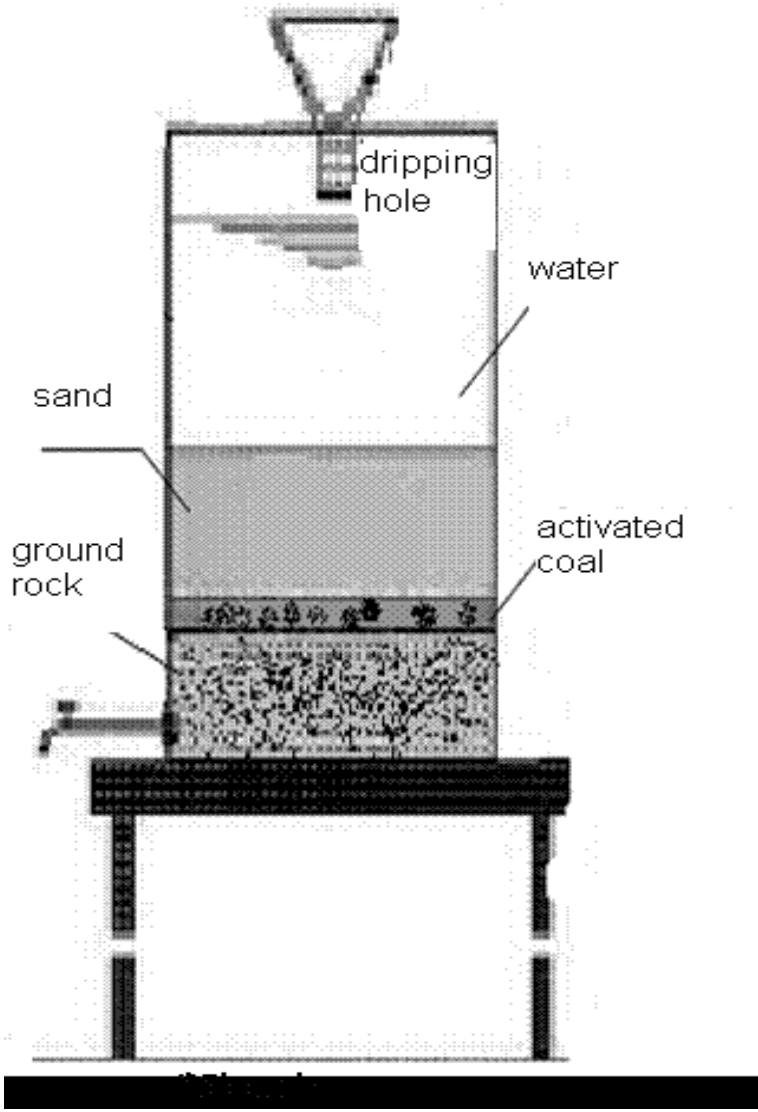
5. Cut out and allocate 3 disks of the mosquito net over the layer of crushed stone/pebbles;

6.
7. Put 5 cm of fragments of activated coal or 10 cm of
8. common coal as the second layer

9. Again, CUT and allocate 3 disks of the mosquito screen , now over the layer of charcoal;

10. Complete as the last layer, 25 cm of sand and further 4 layers of mosquito screen to conclude the column;

11. Adapt the water inlet bracket. The sealing of the upper part with opaque plastic bag is recommended to prevent the passage of light as well as of the insects.



Sand being washed with a solution of bleach

Sand and crushed stone /pebbles drying in the sun after they were washed with a solution of bleach

Pvc pipe, lower lid and screens, drying in the sun after they were washed with a solution of bleach

Cleaning dampers, at the base of the filter and at the center of the lower lid

-Cares:

In filling the filter with raw water, one must assure that this water will never hit abruptly the sand.

The, the raw water must be deposited softly through the bracket, in order that it does not revolve the sand surface.

One must also leave the water circulating always, this is, to drain the water present in the filter and fill it again every day. In addition, it is recommended to wait for 1 month after the first filling to warrant that the biofilm to be created, since it is fundamental in water purification. Only then, after one month, to consume the water!!

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