Disinfecting aquariums and equipment for the Classroom Aquarium Education Program (CAEP)

For the Classroom Aquarium Education Program (CAEP) it is important to reduce the amount of potential pathogens in the aquarium as much as is practical.

To protect the eggs and fish against disease causing bacteria and fungus, the aquarium and other related equipment that will be touching the aquarium water will need to be cleaned. This includes any thermometers, pumps, filters.

1. **Rinse dirt off of aquarium, related equipment and rocks.**
   Clean as much dirt and organic matter off of it as possible with plain water. Do not use soap or other chemicals. Organic "dirt" such as fish poop and rotting fish food can drastically reduce the germicidal effectiveness of the bleach you will use on the equipment.

2. **Boil gravel and rocks in plain water at a rolling boil for 10-20 minutes. Dry them completely before they are stored.**

   The rocks will not need to be treated with bleach. Instead, the rocks should be boiled to avoid introducing any parasites, fungus, or bacteria to the aquarium from the rocks and gravel you will be using. Boiling the rocks and gravel for 10-20 minutes in regular tap water that is at a rolling boil should kill any unwanted pathogens. **CAUTION**—rocks stay hot for a ***very*** long time. Let them cool a long time before you handle them. Spread them on a clean surface in the sun to finish drying.

3. **Make the bleach solution.**

Sodium hypochlorite is the active ingredient in household or chlorine bleach. Bleach is a solution of sodium hypochlorite (NaOCl) and water.

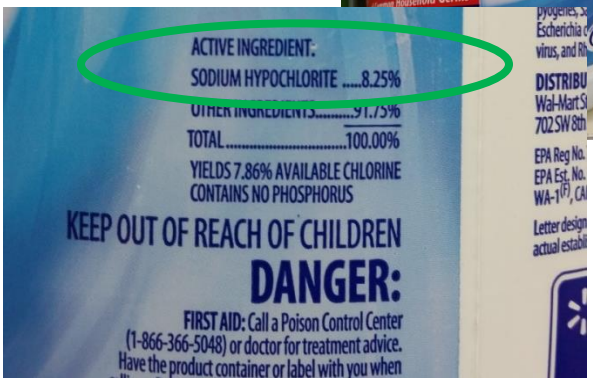
The strength of the bleach—

In 2012, some manufacturers, including the Clorox Company, increased their bleach formula to a strength of 8.25% from the former 5.25%. Most "regular" bleach available in the U.S. today is 8.25% sodium hypochlorite.

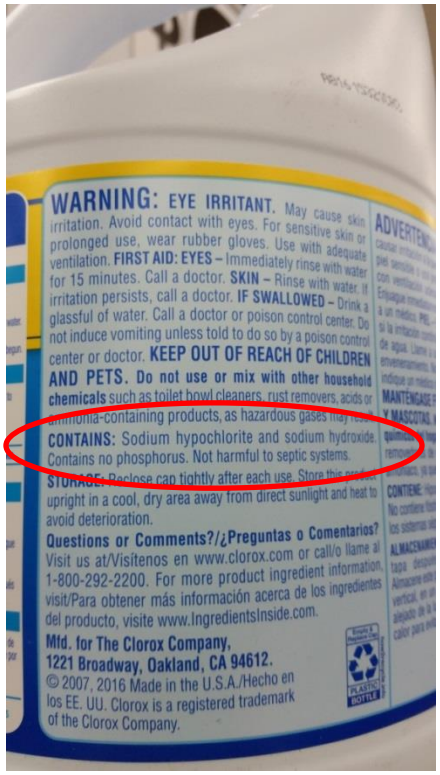
Some bleach that is sold commercially as a janitorial supply, is 6.15% sodium hypochlorite. Thickened or "splashless" bleach has only 1-5% sodium hypochlorite. Scented bleaches may also have lower sodium hypochlorite content. Many types of bleach do not state a percentage on the label.

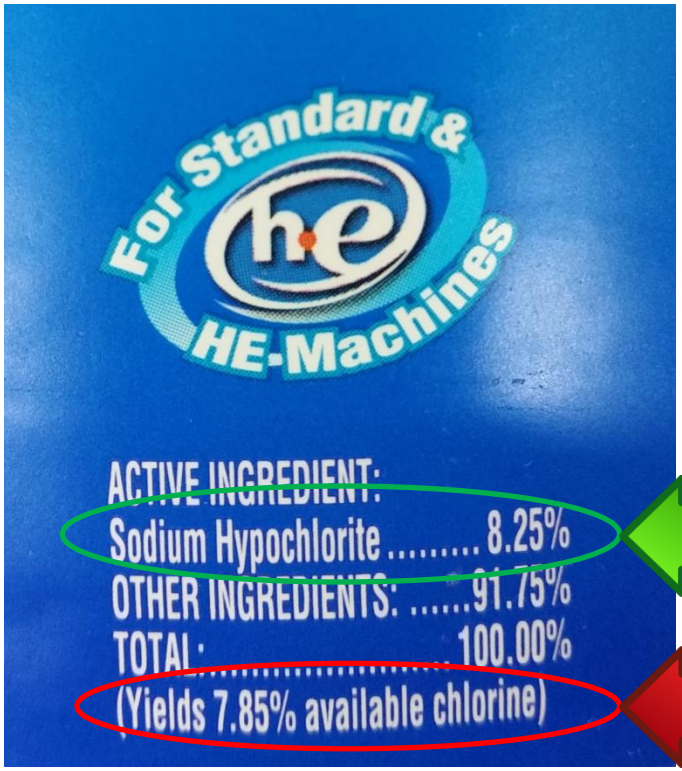
Read the label on the bleach bottle. It should list the percentage of sodium hypochlorite.

Only use bleach that states the percentage of sodium hypochlorite on the label.



Below are examples of bleaches that do not state a percentage of sodium hypochlorite. Do not use these bleaches to clean the equipment since the strength of the solution will be unknown.





Available chlorine

The percent of "available chlorine" is one way to indicate the strength of a bleaching agent. It is actually the ratio of the mass of Cl_2 to the mass of the bleach mixture expressed as a percentage. ***This is not the percentage we use for determining the bleach dilution used for the aquariums.***

Dilute the bleach according to the percent of sodium hypochlorite.

Do not use the percentage of available chlorine to calculate the bleach solution.

Bleach has a shelf life.

The active ingredient in bleach, sodium hypochlorite, naturally breaks down into salt and water. According to the Clorox Company regarding regular concentrated (8.25%) bleach, the rate of breakdown increases rapidly when bleach is stored in extreme hot or freezing temperatures, or when a bottle is more than one year old from the date of manufacture. Generally, bleach stored at room temperature (~70°F) has a shelf life of one year, but after that point it should be replaced.

According to the Clorox Company, if you don't know when the bleach was purchased and it has no bleach smell, it is definitely quite old. ***The missing bleach smell indicates that most of the active ingredients have converted to salt and water and it won't function much as bleach anymore.*** To dispose of it, The Clorox Company suggests that you add it to your toilet bowl and then flush—any small amount of sodium hypochlorite active that may remain will finish breaking down as it travels through your home's pipes and out to the sewer.

Read more at https://www.clorox.com/dr-laundry/shelf-life/#yxGz8YZJTil3tA0c.99

The concentration of the bleach solution to be used on the aquarium equipment—

Mark Adkison, Research Scientist Supervisor I for the California Department of Fish & Wildlife, CDFW, recommends a chlorine bleach solution of 200mg/L for fish tanks and the equipment. To obtain a solution of that strength, ***use only plain, unscented, regular, bleach*** with water in the quantities in the table below.

Water	**Bleach Strength = 8.25% sodium hypochlorite**	**Bleach Strength = 5.25-6.25% sodium hypochlorite**
1 quart	½ teaspoon	1 teaspoon
1 gallon	2 teaspoons	4 teaspoons

The temperature of the bleach solution
The hotter the bleach solution, the more active the chlorine will be against pathogens. Although 120°F is a recommended temperature for the bleach solution, it is very warm and can be uncomfortable to work in, so use the warmest water you can comfortably work with.

The duration of exposure of the equipment to the bleach solution
Mark Adkison recommends the chlorine bleach solution be in contact with the aquarium and equipment for one hour.

The bleach solution is very toxic to fish and should be rinsed off very thoroughly before using the equipment with the fish.

In summary--

☐ Rinse dirt off of aquarium, related equipment and rocks.

☐ Boil gravel and rocks in plain water at a rolling boil for 10-20 minutes. Dry them completely before they are stored.

☐ Make bleach solution according to the table above. Use the warmest water you can comfortably work with up to 120°F.

☐ Fill the aquarium with the bleach solution and put any other equipment you will be using in the aquarium (such as thermometers, filters, and pumps) into the bleach solution. Leave the bleach solution in contact with the equipment for at least one hour.

☐ Thoroughly rinse the bleach solution off of the equipment before setting up your aquarium for the fish.