



# THE FILTER



**Aulonocara sp.**  
**Red Dragon**  
**Blood Peacock**

**December 2019**  
**Volume 29 Issue 5**



# TAMPA BAY AQUARIUM SOCIETY

## “THE FILTER”

Tampa/St. Pete, Florida

# TBAS **TABLE** of **CONTENTS** TBAS

Click on Title to go Directly to Item

3) Editor’s Moments	Mike Jacobs
4-7) Another View on Permanganate KMNO <sub>4</sub>	Joe Gargas
8) <b>Membership Dues TBAS</b>	
9-10) TBAS ANNUAL AUCTION - Photos	
11) <b>Angelfish Laying Eggs . . . Video</b>	
12-13) Patty Talks	Patty Moncrief
14) <b>Angels Plus Videos</b>	
15) <b>Spawning German Blue Rams . . . Video</b>	
16) Random Shots	
17-20) TBAS Supporters	TBAS
21) TBAS Officers	TBAS
22) TBAS Information	TBAS

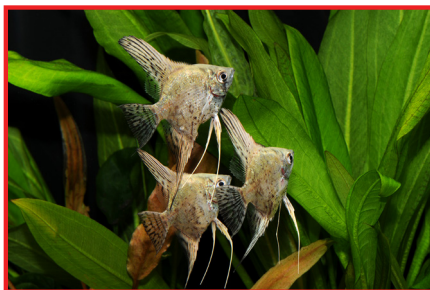


Ok folks . . . remember, the December TBAS meeting is a **HOLIDAY PARTY** - Monday 12/9/2019!!!!

TBAS will buy the main food - Ham and Stuff . . . but you guys have to bring all of the side dishes. It doesn't really matter what you bring, just bring **SOMETHING . . . THANK YOU!!!**

There will be no presentation but there is a **FUN PARTY** all planned! Be sure to put this on your calendar and be sure to be on time or I WILL EAT EVERYTHING . . . ☺ ☺ ☺!!!

## SEE YOU GUYS THEN!



Mike

Mike Jacobs, Editor TBAS Filter

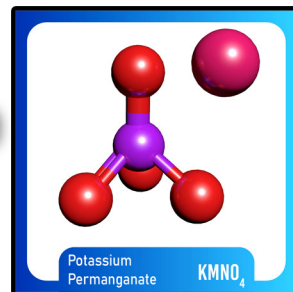
*Pterophyllum scalare*  
**PINOY LEOPARD SMOKEY ANGELFISH**

Photo by Mike Jacobs 2019



# Another View on Permanganate $KMnO_4$

by  
Joe  
Gargas [www.aquaresearchcenter.com](http://www.aquaresearchcenter.com)



This month's column is on permanganate, a substance that I refer to as the aquarists's double-edged sword thanks to its ability to act as both an oxidant and a biocide.

In aquaculture, permanganate is usually encountered as potassium permanganate. It is easily recognized as an intensely purple colored solution when dissolved in water. Even in very low dilutions it can be easily observed by its purple color.

As an oxidizing agent, permanganate rapidly oxidizes organic compounds down to oxygenated products that are non-toxic and readily biodegradable. As permanganate is expended in the oxidation reactions, it will turn into the inert brown precipate of manganese dioxide,  $MnO_2$ .

The presence of dissolved organic compounds increases the Chemical Oxygen Demand (**COD**) of the water, which in turn elevates the amount of permanganate required to oxidize these compounds. When using permanganate, the **COD** of the water should be low. This is best done using new water free of organic compounds. Stable permanganate concentrates are easily maintained in water with a low **COD**.

If the **COD** of the water is high, it will require more permanganate to oxidize the organic compounds before a stable permanganate concentration can be achieved.

This will produce much of the dirty brown precipitate of manganese dioxide, which must then be filtered out. It is best to avoid this by reducing dissolved organics as much as possible before permanganate treating.

**Never use permanganate if fry are present.**

If new water cannot be used, then carbon filtration should be employed to reduced dissolved organic compounds as much as possible before permanganate testing begins.

Particulates must also be filtered out since permanganate cannot reach pathogens buried within dirt or detritus particles.

## Redox Potential

As a strong chemical oxidant, permanganate immediately raises the redox potential and reduces the chemical oxygen demand by rapidly oxidizing any organics, cyanides, phenols, nitrites, inorganic and organic sulfides or any other reductants present, as well as the toxins produced by pathogenic bacteria.

Permanganate can be added to existing tank water to oxidize dyes (such as malachite green drugs) or chemical reducing agents, (reductants such as

ppm $\text{KMnO}_4$ Based On the Addition of 1% $\text{KMnO}_4$		
ml of 1% $\text{KMnO}_4$	volume of tank water	ppm $\text{KMnO}_4$
1	10 gallons	2.4
2	10 gallons	4.7
3	10 gallons	7.1
4	10 gallons	9.4
5	10 gallons	11.8

formaldehyde) to inert non-toxic oxygenated compounds.

This very quickly improves the water quality, so that in the pond culture offish it is primarily used as an oxidant and only secondarily as a biocide.

Beyond this, permanganate is so reactive that it oxidizes organic matter on contact; this means that even where it does find an opening large enough to accept the hydration sphere, it reacts before it can travel very far down the pore.

The oxidation of organic material produces carboxylic acids which will cause the pH to fall if the water is inadequately buffered. The oxidation products themselves are non-toxic and are generally biodegradable.

Permanganate does not raise the dissolved oxygen (**DO**), but what it does is to reduce the Biological Oxygen Demand (**BOD**) and it slightly reduces the **COD**.

This reduces the amount of dissolved oxygen required by bacteria to satisfy the BOD. Potassium permanganate added at four ppm does not inhibit nitrification.

## Low Diffusivity

An ion must disperse its electrostatic charge through a large surrounding sphere of attached water molecules called the "hydration sphere." The hydration

sphere surrounding the ion is generally too large to penetrate through any pores in cellular membranes.

For these reasons, permanganate is not capable of diffusing through cellular membranes of pathogens, or of entering into dirt or detritus particles.

Pathogens embedded within particulate matter are thus protected from permanganate, and the water must therefore be well filtered to remove particulates before permanganate can be used as a disinfectant.

## Monitoring Concentration

Permanganate concentrations can be monitored by means of a commercially available colorimeter, which can be purchased from suppliers of water testing equipment.

As permanganate quickly reacts with any organic matter present, turning into a brown suspension of manganese dioxide, declining permanganate concentrations can be observed by loss of the purple color.

At concentrations less than 0.5 ppm, the purple color is not so easily visible. However, the orthotoluidine test kit which is used for chlorine can still be used to test for permanganate at concentrations less than 0.05 ppm. The manufacturer will provide a correction factor to convert from chlorine to permanganate concentrations upon request.

## Neutralization

Excess permanganate concentrations can be instantly reduced by any of the reducing agents used for dechlorination, such as sodium thiosulfate. Reduction or neutralization of permanganate produces the inert brown precipitate of manganese dioxide,  $MnO_2$ , which can be filtered out by a particulate filter.

Permanganate reacts with carbon on contact, so that carbon filtration will both reduce permanganate and remove the brown  $MnO_2$  precipitate. If a high concentration of permanganate is being used, some salt should be added to the water to assist the fish in osmoregulation in the event that body slime is lost during the treatment.

## Toxicity

The toxicity of permanganate to fish increases as the temperature drops, and as the pH and hardness increase. Additionally, a given species of fish will be more resistant to permanganate toxicity as its size increases.

The smaller the fish are, the less their tolerance to permanganate. And so, permanganate is not recommended with small fry of any species.

## A Simple Test to Determine Your Water Quality

1. Remove one gallon of water.
2. Add one level tablespoon of fresh baking soda (sodium bicarbonate) to the water sample and stir to completely dissolve.
3. Add one drop of a four percent solution of potassium permanganate to the water sample. Stir. A pinkish color will be produced in the water.
4. Note the time. Remove approximately one glass cup of water from the gallon sample.
5. Place on a white piece of paper and allow the sample to stand undisturbed while observing the time.
6. If permanganate-oxidizable substances are present in the water sample, the color will change from its original pinkish hue to brownish, to yellowish and sometimes to colorless. The time it takes for the color to change is directly dependent upon the concentration of oxidizable substances in the water. The information below determines the appropriate action that must be taken:
  - *Color changes to yellow or colorless in less than five minutes.*  
Oxidizable substances are at a dangerous level. Use potassium permanganate. Do at least a 50 percent water change. Clean filter and replace carbon. Retest water after 24 hours.
  - *Color changes to yellowish or colorless in five to 10 minutes.*  
Oxidizable substances are at a stressful level. Use potassium permanganate. Do at least a 25 percent water change. Clean filter and replace carbon.
  - *Color changes to yellowish or colorless in 10 to 15 minutes.*  
Oxidizable substances are low and pose no immediate threat. Perform a small water change, clean the filter and replace the carbon.
  - *No color change for at least 25 minutes.*  
Oxidizable substances are low, requiring no action. Continue with your normal maintenance procedure.

Since prolonged exposure to high permanganate concentrations is damaging to the slime layer, fish should not be exposed to high permanganate concentrations in water of low ionic strength.

# Aqua Research Center

Water Analysis & Interpretation  
[www.aquaresearchcenter.com](http://www.aquaresearchcenter.com)

by Joe Gargas

Ph: (813)645-1717

# MEMBERSHIP DUES!!!!



**Membership Dues for TBAS are due on the anniversary of your sign-up date every year. Please make sure you check the “sign-in” list on the table at every meeting to check your “Dues-Date” . . . Thanks!!!**

**USE PAYPAL ON THE TBAS WEBSITE . . . TBAS1.COM . . . !!!!!**





# 2019 TBAS Annual Auction

Saturday, Nov. 17, 2019

What a **WONDERFUL, FUN DAY** this was!!!



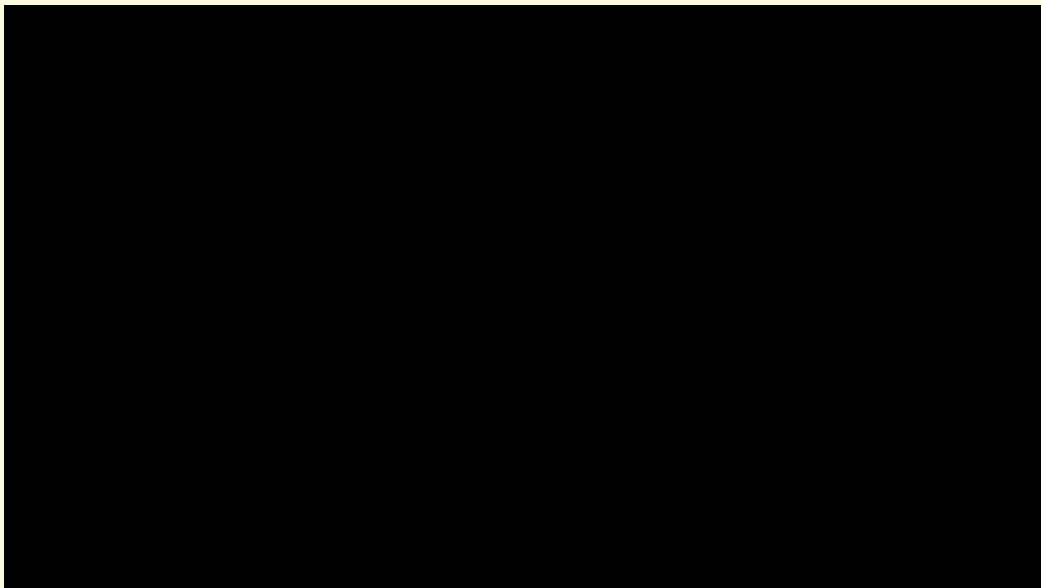
[To Table of Contents](#)



# Angelfish & Eggs



Angelfish & Eggs Video [Click on the](#)  [to See Video](#)





The afternoon high is a very pleasant 65 degrees with low humidity. We opened our windows to air out the house from the long summer of 24 hours-a-day air conditioning. By late evening, the temperature dropped into the mid 50s . . . great sleeping weather . . . and the windows were closed for the night. What

a beautiful day it had been! A couple of days later, we noticed that our fish were covered in little white spots. They have the DREADED ICK! Testing shows that the water quality was good and no new fish were added. How could this have happened? How do we save our fish?

Fish get sick for a reason, so what happened? The temperature in the tank dropped several degrees in less than 24 hours and no doubt severely stressed the fish. The temperature in larger bodies of water is much more stable and usually doesn't drop more than a degree or two a day . . . it that. But in much smaller bodies of water, like our fish tanks, the temperature is not as stable. Unless there is a heater in the tank, the temperature can drop very rapidly. When this happens the fishes' immune systems are depressed and the nasty little ick parasites take hold. If something is not done very quickly, many of the fish will die.

Freshwater ick is characterized by small, white, rounded spots (the size of the period at the end of a sentence) on the body and fins of the fish. The spots visible on the fish are actually a combination of cyst (caused by an immune reaction by the fish (and the parasite). The parasite penetrates the skin and gills of the host. This form of the parasite cannot be killed by medication. Later in their life cycle, the ick parasite drops off their host (the fish) and matures further in the substrate or on the surface of plants or other structures in the tank. They then reproduce, each ick, parasite releasing up to 1,000 free swimming forms, known as tomites, into the water. These tomites must find a fish host with 48-72 hours at 75-79 degrees F or they will die. This free swimming tomito stage is the for that can be killed by medication.

The first thing to do is put a heater in the tank to maintain a stable water temperature. Any infected fish should be removed to a hospital tank whenever possible. The best course of action is to treat the fish with a formalin-malachite green combination. However, this treatment is also the harshest medication for the fish to tolerate. Formalin alone is the next best treatment and less stressful.

These two medications must be used cautiously for fine-scaled or scale-less fish. In every case, be sure to read the directions for dosage. If for some reason, medicating is inappropriate, increasing the salinity of the treatment tank (for fish species that can tolerate the higher levels) often works because the salinity disrupts the ick life cycle.

If you are using a hospital tank, raise the temperature to about 80-84 degrees F. This will cause the parasites to drop off faster and reproduce. Remember, the medication only kills the free swimming tomites. Be sure to do a water change after the first 48 hours to improve water quality and vacuum the gravel to reduce the number of maturing parasites. When the spots are all gone, don't celebrate yet . . . often three to five treatments, every other day are necessary to control and eliminate the disease. When you're pretty sure the disease is gone, bring the temperature down one to two degrees a day until it matches the main tank. Then return the fish to the main tank. Don't forget to keep a heater in the tank to maintain temperature stability.

If a hospital tank can't be used and you must treat the main tank, raise the water temperature to 80-82 degrees F. Be sure to remove all carbon. Add the medication to the tank (follow the dosage instructions!). Unfortunately, your plants and invertebrates may suffer. So, if possible, move them to another tank for at least three to four days. This will also break the life cycle of the parasites living on the plants. Don't forget to do a water change after treatments to prevent water quality problems.

Everyone's tank gets ick sometime, but if we do everything we can to prevent problems like sudden temperature drops and the introduction of un-quarantined fish, then an "ick-disaster" will happen far less often and fewer fish will be lost. Until next month, keep those fish happy and keep those questions coming.

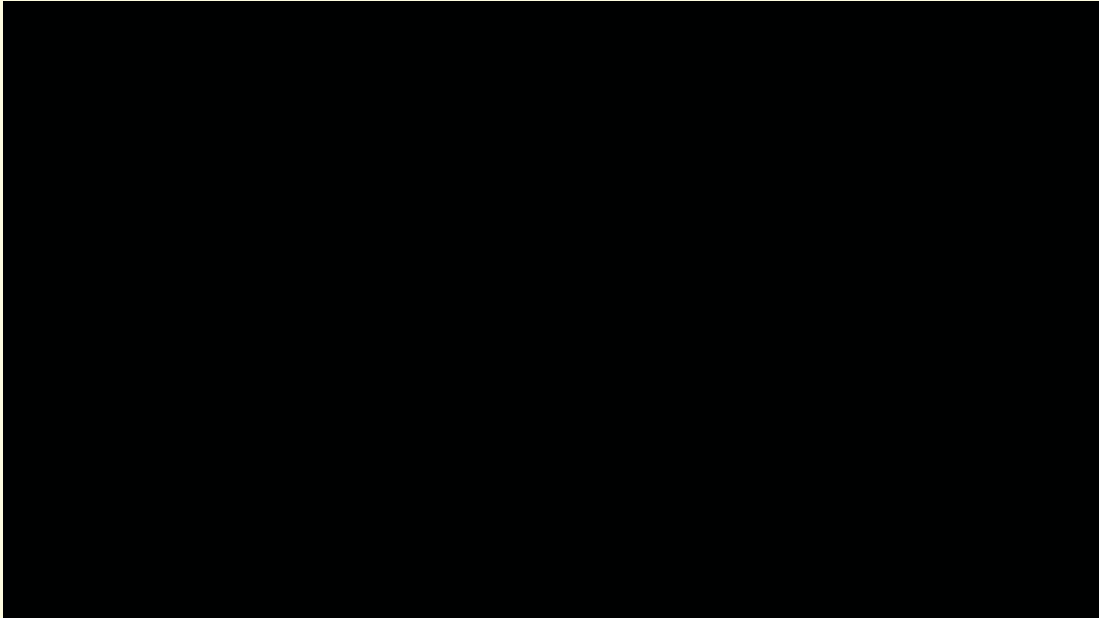
**Note:** The preceding advice was for freshwater fish only. The rules are different with marine tropicals and reef tanks. These will be discussed next issue.

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The logo for Aqua Research Center features the text "Aqua Research Center" in a stylized, glowing cyan font with a white outline. The word "Aqua" is larger and more prominent, with a small arrow pointing downwards from the letter 'a'. The background is black, and the entire logo is enclosed in a red border.

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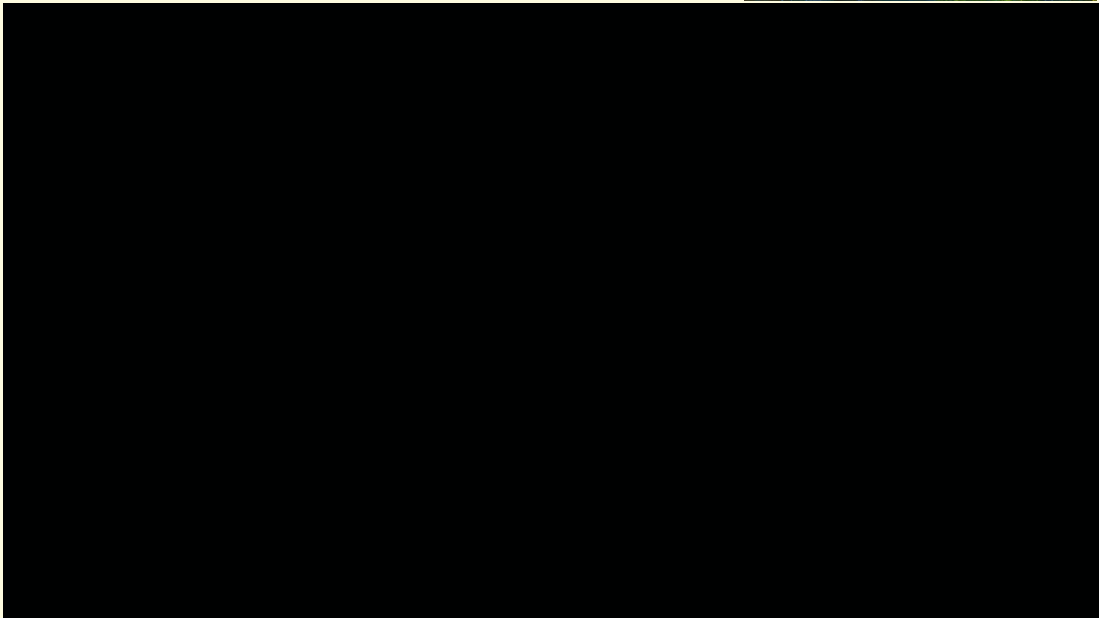
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**THE BEST KOI ANGELFISH IN THE UNIVERSE**

To Table of Contents

# GERMAN BLUE RAMS

## with EGGS/FRY

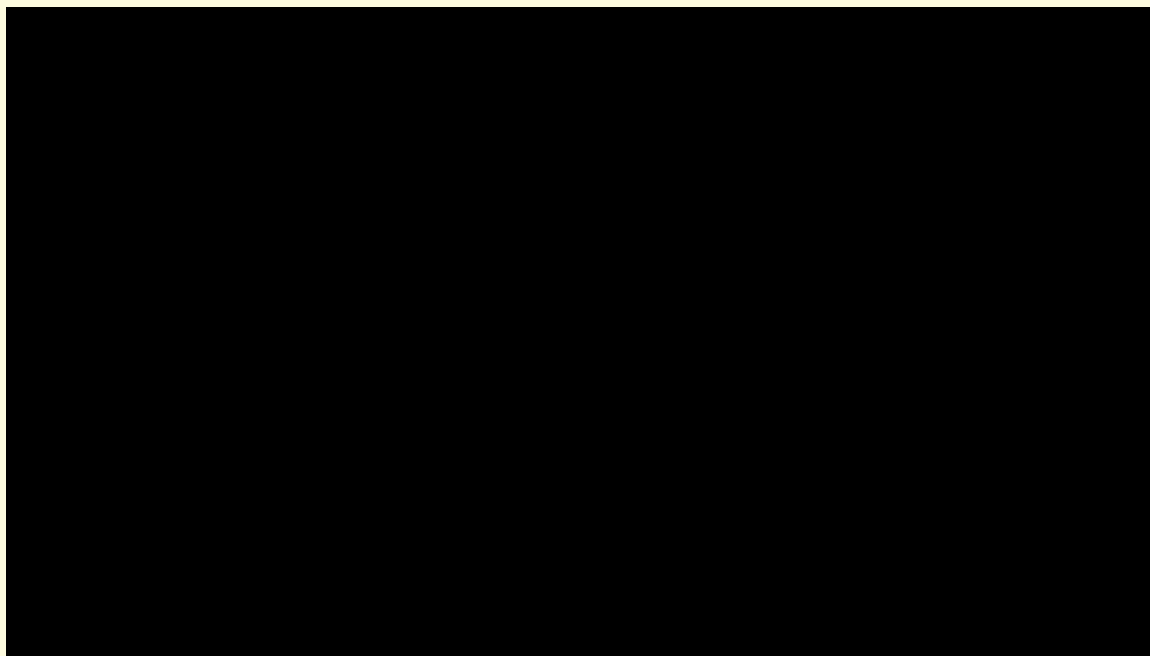
*Mikrogeophagus ramirezi*

[Click on the](#)



[to See Video](#)

15-30 second  
"load" the **FIRST**  
time!!!





***Mikrogeophagus ramirezi* . . . Black Ram**

photo: Mike Jacobs 2019

To Table of Contents



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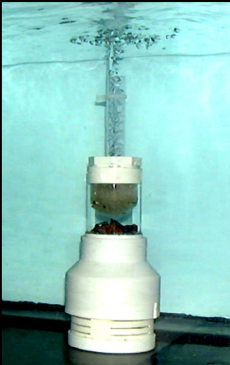


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To Table of Contents