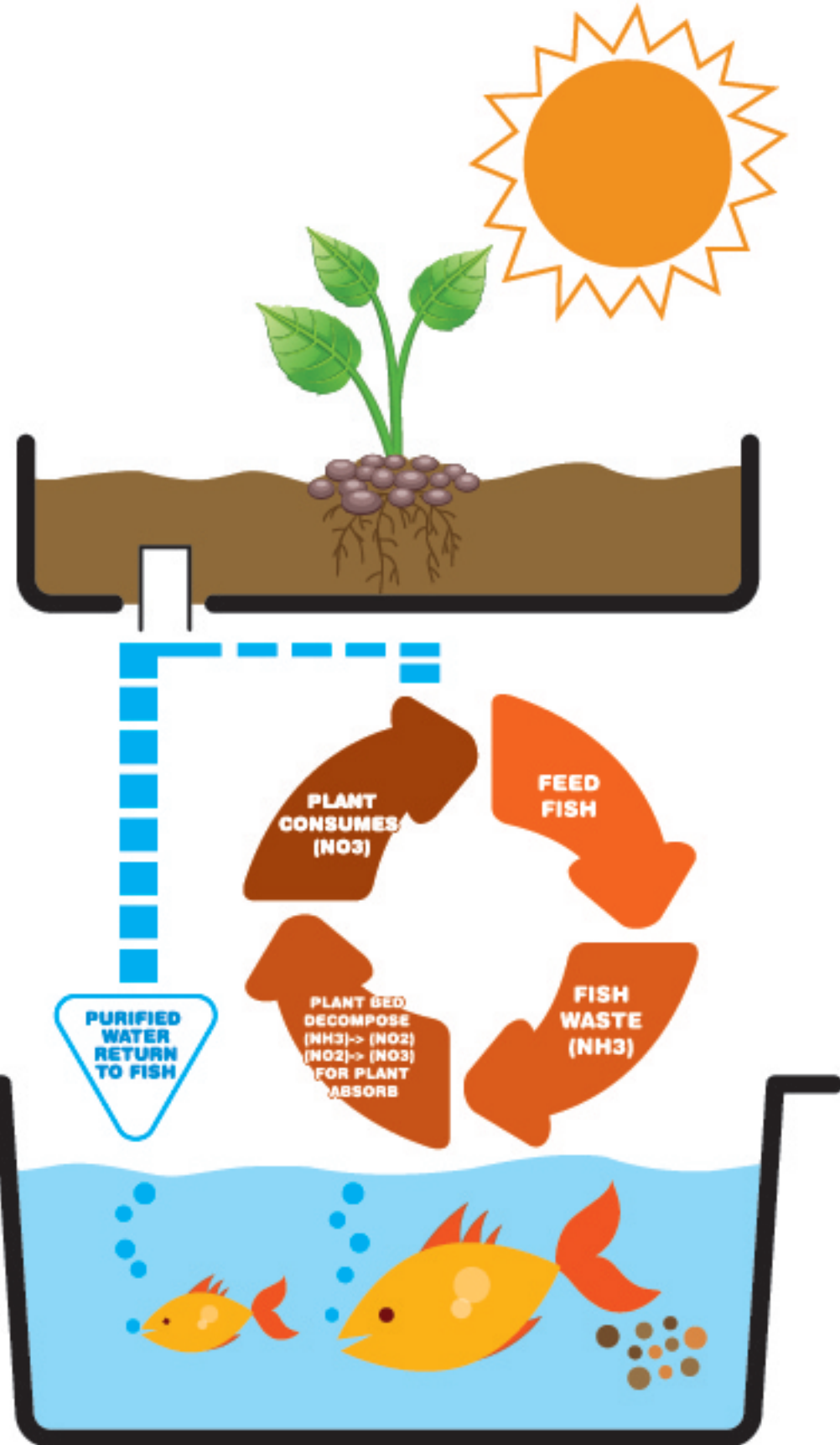


# AQUAPONICS

AQUAPONICS IS THE SYMBIOTIC CULTIVATION OF FISH AND PLANTS IN A RE-CIRCULATING WATER SYSTEM. THE WORD "AQUAPONICS" IS A COMBINATION OF THE WORDS AQUACULTURE AND HYDROPONICS. AQUAPONICS SYSTEMS CAN BE AS SMALL AS A HOUSEHOLD FISH TANK, OR AS LARGE AS A FOOTBALL FIELD.

IN ALL CASES, THE PRINCIPLES OF AQUAPONICS ARE THE SAME:

1. HUMANS FEED FISH.
2. FISH EXCRETE WASTE INTO WATER. (NH<sub>3</sub>)
3. NITROBACTERIA IN THE PLANT BED DECOMPOSE (NH<sub>3</sub>) INTO NITRITE (NO<sub>2</sub>), (NO<sub>2</sub>) BECOMES NITRATE (NO<sub>3</sub>) THAT PLANTS CAN ABSORB.
4. PLANTS CONSUME THE NUTRIENTS FROM WATER, SO THE WATER IS CLEAN WHEN IT RETURNS TO FISH TANK.



**RE-CIRCULATING WATER SYSTEM**



## Product Components:

- planting pot
- water tank
- marble stones (for tank)
- water container
- PH test paper
- PH chart
- temperature sticker
- dropper
- plant tool
- spoon
- 3 piece record sheets
- instruction sheet/ backdrop

## Features:

- Build your own Aquaponic set
- Learn the re-circulating water system
- Acquire knowledge about the effect of PH value on plant and sea creatures
- Observe the effect of temperature change on fish and plant
- Learn to take responsibility through pet care

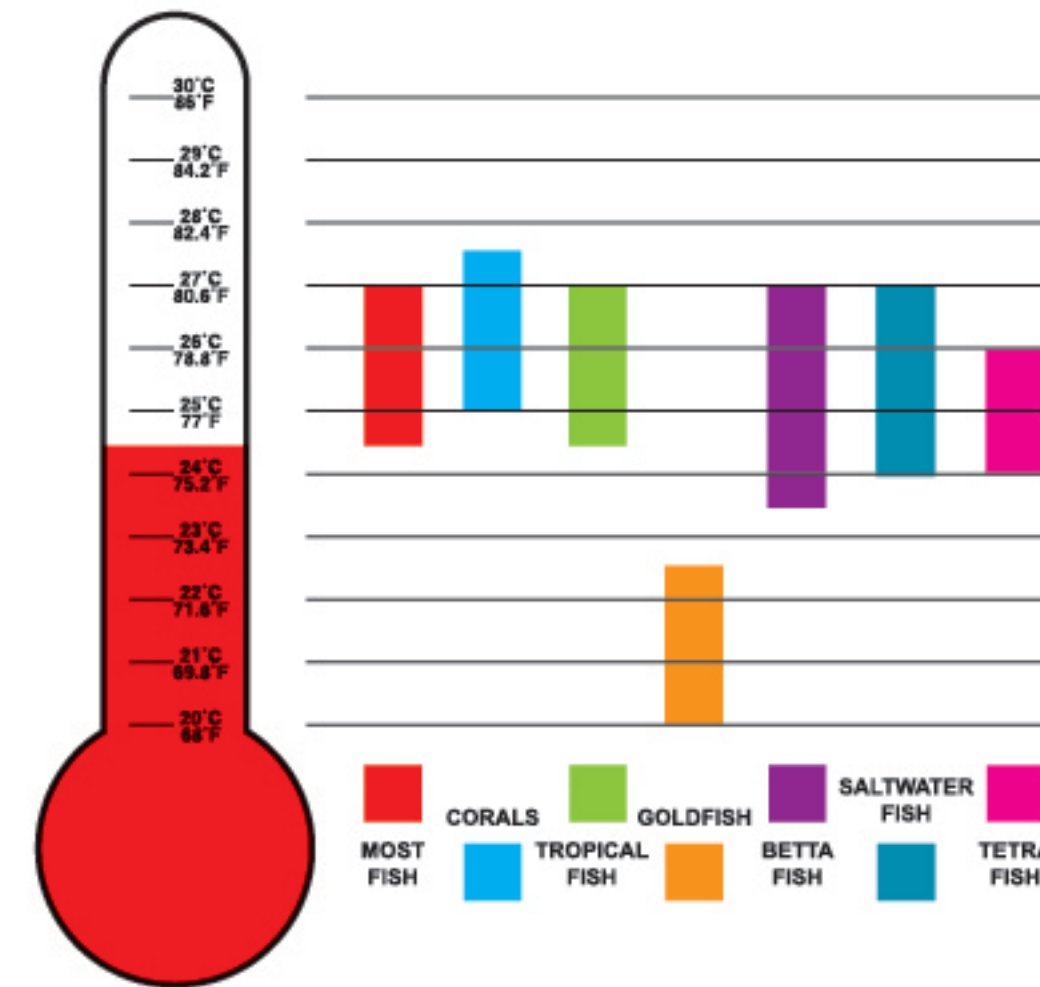
**1** Add water to tank, and place plants onto planting pot.



**2** Check PH Value and place fishes into tank when within PH 7-9.

**3** Keep on recording PH and temperature, water plants, feed fish. When PH <7, change water.

## FISH TEMPERATURE



## FISH WATER PH

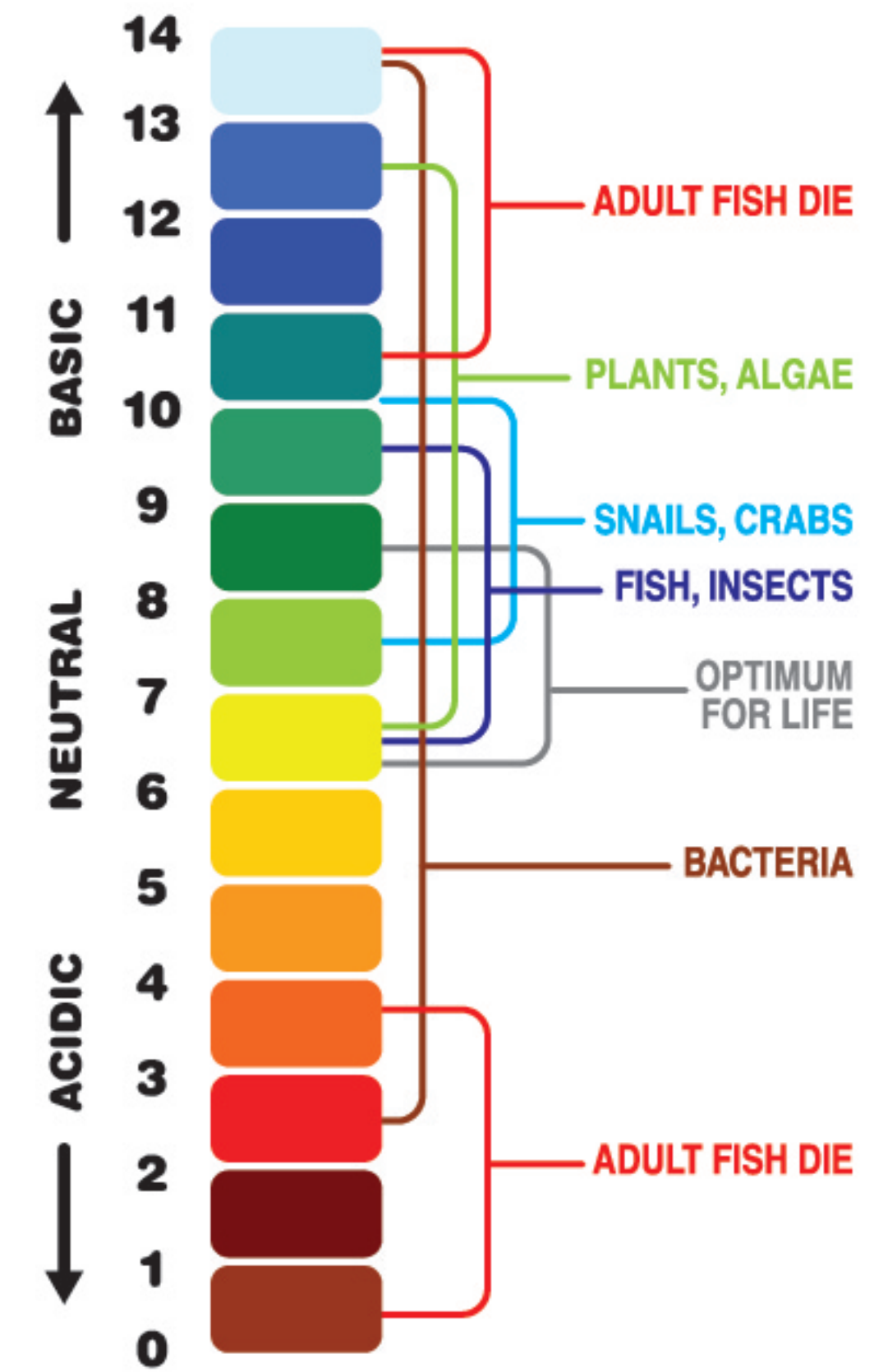
FISH THRIVE WHEN THE TANK WATER IS THE SAME PH AS THE WATER FOUND IN THEIR NATURAL ENVIRONMENT. DIFFERENT SPECIES REQUIRE DIFFERENT PH LEVELS. SOME PLANTS AND AQUATIC ANIMALS CAN TOLERATE A HIGHER ACIDITY CONTENT OR PH THAN OTHERS. FOR INSTANCES, KOI THRIVE IN WATER THAT HAS A PH OF 7.5 AND CAN TOLERATE WATER THAT IS AS HIGH AS 8.2 PH. OSCAR FISH PREFER WATER THAT IS MORE ACIDIC WITH A PH OF 6.5 OR 7. AFRICAN CICHLIDS PREFER WATER THAT IS MORE BASIC WITH A PH OF 8.5. IDEALLY, THE GOAL IS TO HAVE FISH TANK WATER THAT HAS A NEUTRAL PH OF 7.

### HARMFUL PH LEVELS

TANK OR FISH POND WATER WITH A LOW PH IS HIGHLY ACIDIC AND CAN BURN A FISH'S SKIN. TANK OR POND FISH WATER WITH A HIGH PH IS HIGHLY BASIC OR ALKALINE, AND CAN CHAP OR CHEMICALLY BURN A FISH'S SKIN. YOUNG FISH ARE MORE SENSITIVE TO HIGHER ACIDIC WATER THAN ADULT FISH. FISH WATER THAT HAS A PH OF 5 IS TOO ACIDIC AND WILL KILL OFF FISH EGGS, THEY WILL NOT HATCH.

### CHANGING PH LEVELS

USE A PH PAPER TO TEST YOUR WATER. IF YOUR FISH TANK WATER PH LEVELS ARE TOO LOW, THE WATER IS TOO ACIDIC. TO RAISE THE PH LEVEL UP TO 7 YOU CAN ADD LIMESTONE OR CRUSHED CORAL TO THE WATER, AERATE THE TANK WATER WITH AN AIR PUMP TO ELIMINATE EXCESS CARBON DIOXIDE THAT HAS FORMED IN THE LOW PH WATER, OR USE AN ALKALINE BUFFER TO NEUTRALIZE THE ACID AND MAKE IT A MORE NEUTRAL PH. IF YOU LIVE IN AN AREA WITH HARD WATER, OR WATER THAT HAS A HIGH PH, LOWER IT BY ADDING AN ACID BUFFER, USE A WATER SOFTENER OR FILTER THE WATER OVER PEAT MOSS.



## CHECK PH VALUE

**1**

COLLECT WATER FROM TANK INTO CONTAINER WITH DROPPER. THE WATER SAMPLE MUST BE DEEP ENOUGH TO COVER THE TEST STRIP.

**2**

DIP A TEST STRIP INTO YOUR SAMPLE. JUST A FEW SECONDS OF EXPOSURE WILL SUFFICE. THE PAPER WILL BEGIN CHANGING COLOR WITHIN A FEW MOMENTS.

**3**

COMPARE THE TEST STRIP WITH THE COLOR CHART THAT CAME WITH THE PAPER. THE COLOR(S) ON THE CHART SHOULD MATCH THE COLOR(S) OF YOUR TEST STRIP. THE CHART SHOULD CORRELATE COLOR PATTERNS TO PH LEVELS.