

# the whitewater co

Effects of Portable Nano Bubble  
Hydrotherapy

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Brochure



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## Introduction

Micro / Nano Bubbles are gas-containing cavities in an aqueous solution. Nano bubbles are under excess pressure as the surface tension causes a tendency to minimize their surface area, and hence volume. The gas in Nano bubbles is in constant flux with the Nano bubbles growing or shrinking by diffusion according to whether the surrounding solution is over-saturated or under-saturated with the dissolved gas relative to the raised cavity pressure. As the solubility of gas is proportional to the gas pressure and this pressure is exerted by the surface tension in inverse proportion to the diameter of the bubbles, there is increasing tendency for gasses to dissolve as the bubbles reduce in size. The internal gas pressure increases greatly at very small bubble diameters and so accelerating the process.

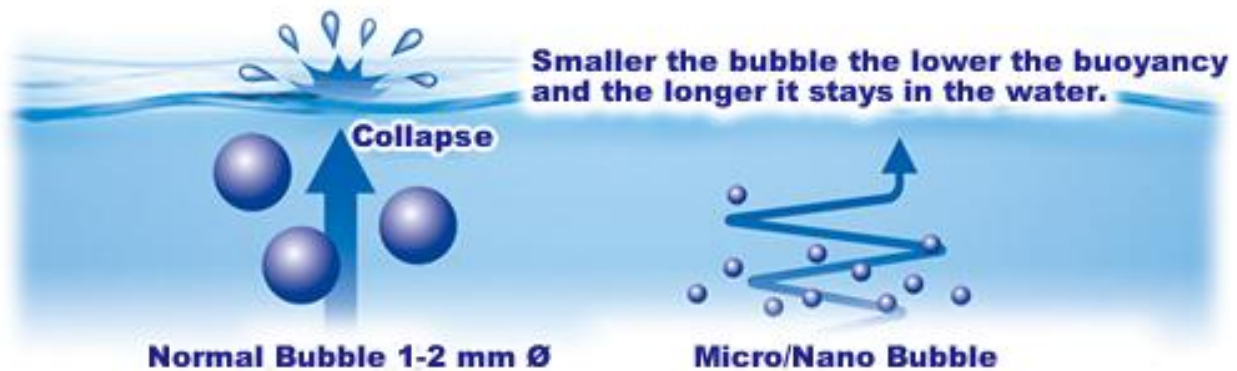
**The excellent redox of the bubbles and the large amount of energy generated in the course of imploding bubbles are employed for the application of disinfection and sterilization.**

# What are Micro / Nano Bubbles?

- "Micro/Nano Bubble" is a phrase combining "Micro Bubble" with "Nano bubble"
- Micro Bubble is a fine bubble with 10 $\mu$ m - 100 $\mu$ m diameter
- Nano Bubble is a ultra fine bubble with less than 0.2 $\mu$ m diameter

## Micro / Nano Bubbles have longer retention

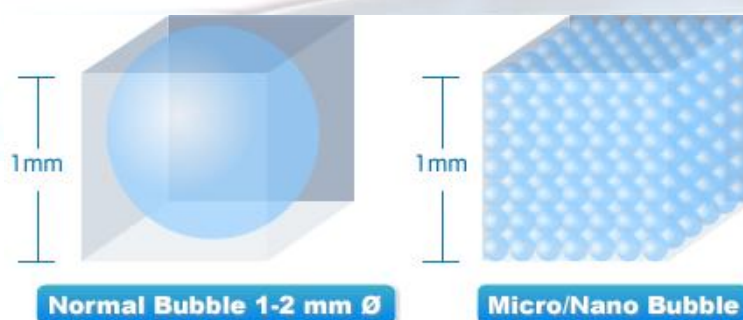
In water, 1mm Bubbles rise @ 0.361 fps or 3,610 times faster than the Micro/Nano Bubbles which rise @ 0.0001 fps and remain in water for extended period.



$$\text{Flotation } F = pVG \quad (p: \text{ density, } V: \text{Volume, } g: \text{gravity})$$

## Micro / Nano Bubbles have a larger surface area

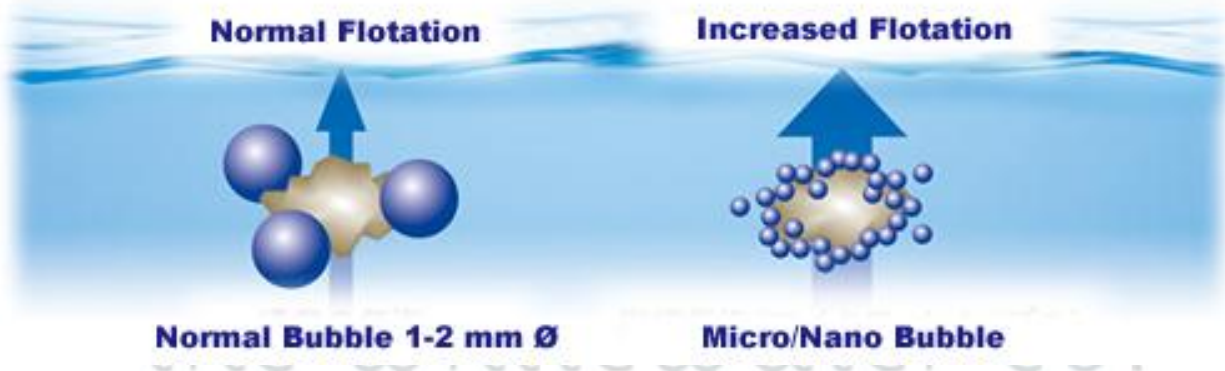
Promotes improved oxygenation efficiency for higher COD (chemical oxygen demand) and BOD (biochemical oxygen demand) reduction



1 cubic mm volume of Micro / Nano Bubbles has 10,000 times greater surface area than 1 cubic mm of normal air bubbles

## Air Flotation Efficiency

Greater volume of smaller bubbles achieve maximum separation of solids



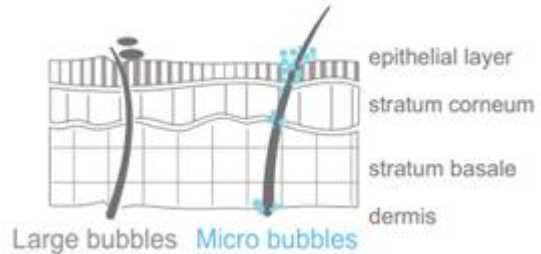
*Increased time of dissolved oxygen due to decrease in bubble rising speed*

High temperature (heating effect) - Telangiectasia  
Micro-vibration ultrasonic  
- Penetration into body by as deep as 4 cm (vibration)  
- Heat generated by vibration  
- Power generated by micro vibration is strong  
- Massage and cleansing effect  
O<sub>2</sub> - Increase in amount of dissolved oxygen (Body activated)  
O<sub>3</sub> - Sterilizing effect

# Principles applied to Skin

- Gentle, Full-body massage
- Deep clean your skin Pores
- Removal of Keratin and Sebum
- Removal of Acarus Folliculorum
- Oxygen supplied into pores

Deep clean your skin pores



OZONE

KILLS BACTERIA

Ozone is non-toxic and colorless. It can efficiently remove odors and bacteria sterilizing effect

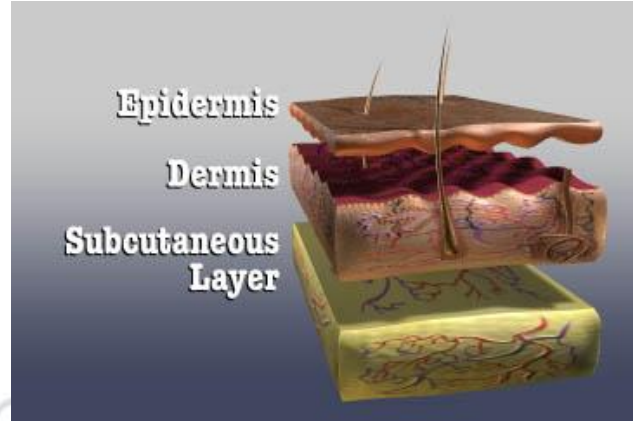
Nano / Micro Bubble

ANION PRODUCTION

The Water will become milk white because of billions of micro / Nano bubbles are dispersed in the water. Micro/ Nano Bubbles will simultaneously create anions or negative ions

## Anions and Atopic Dermatitis

The skin may be divided into three tissues, the epidermis, derma and subcutaneous. When an allergic pollutant material reaches the epidermal cells from the corny layer, a microphage which is one kind of white blood cell (white corpuscles) captures and disintegrates the allergic pollutant materials.



However, if there is too much bacteriophage and cannot be treated, the microphage hands over part of argen to T cell ( a type of white corpuscles). The T cell transfers the information to eosinophil, (another white corpuscle) and collects the eosinophil dispersed in the blood to an argen-seeped place. The inflammation is the result in which the eosinophil collected on the affected part discharges the chemical transmitter out of the body.

If the inflammation occurs too often, this creates problems, the hard tissues of corny layer lie on the epidermis which is protected by a film like natural cream, which is so-called the skin. The corny layer prevents the moisture on the skin from evaporating and keeps the skin moisturized and also prevents the skin from being invaded by bacteria or germs. Atopic dermatitis is a disease where the corny layer is peeled off. Patients suffering from atopic dermatitis greatly lack the fatty substance known as ceramides necessary for the corny layer.

## **The anion effect on Atopic Dermatitis contributes to cleaning of active oxygen emitted to the argen when the microphage collects the argen.**

If the microphage produces too much active oxygen the corny layer is destroyed by the active oxygen to make the skin rough and to destruct the sebaceous gland that synthesizes the ceramides, whereby the secretion of the ceramides is rather prevented.

**In order to prevent this the best way to remove the active oxygen is by stimulating the corny layer using electrons.**

**Furthermore, the inflammation caused by eosinophil can be avoided by the supply of electrons. The anion is the very substance that supplies the electrons.**

# What are Anions?

**Independent SGS testing has shown that the White Water Co. Portable Nano / Micro Bubbler Pump can create over 1,236,000 ANIONS PER CC**

Anions float around in the air and moisture in the atmosphere.

Anions are absorbed through respiration or through the skin, whereby the anions promotes the metabolism of cells, increases vitality, cleans the blood, helps recover from fatigue, promotes appetite, it's no wonder that the anions are known as the "vitamins in the air".

Anions are absorbed into the body through the skin and respiration, anions react with hemoglobin to transport Oxygen to the blood and to cells of each organ through the circulation, whereby various nutrients and energy are produced through the metabolism. The anions promote the health, vitalize the immune system and promote the natural curing of diseases.

## Asthma and Anions

Asthma suffered by many people these days is considered to have been caused by polluted air and inhaled air containing a large amount of cations, thereby changing the body to acid constitution, or by overdosed cations, thereby markedly shrinking the vascular or bronchus.

If an anion generator is capable of generating 100,000 anions or more /cc at a distance of 1m, the asthma can be alleviated.

Use of anions in sleep helps decrease the hydrogen ion concentration in vascular to decrease the hydrogen ions and to reduce the active oxygen because the anions acts on vitamins C, E, and beta carotene oxidized in the body to become the ascorbic acid ( vitamin C ).

The mineral portions in the blood or in the cells receive the electrons to be in the status of having many electrons.



## References

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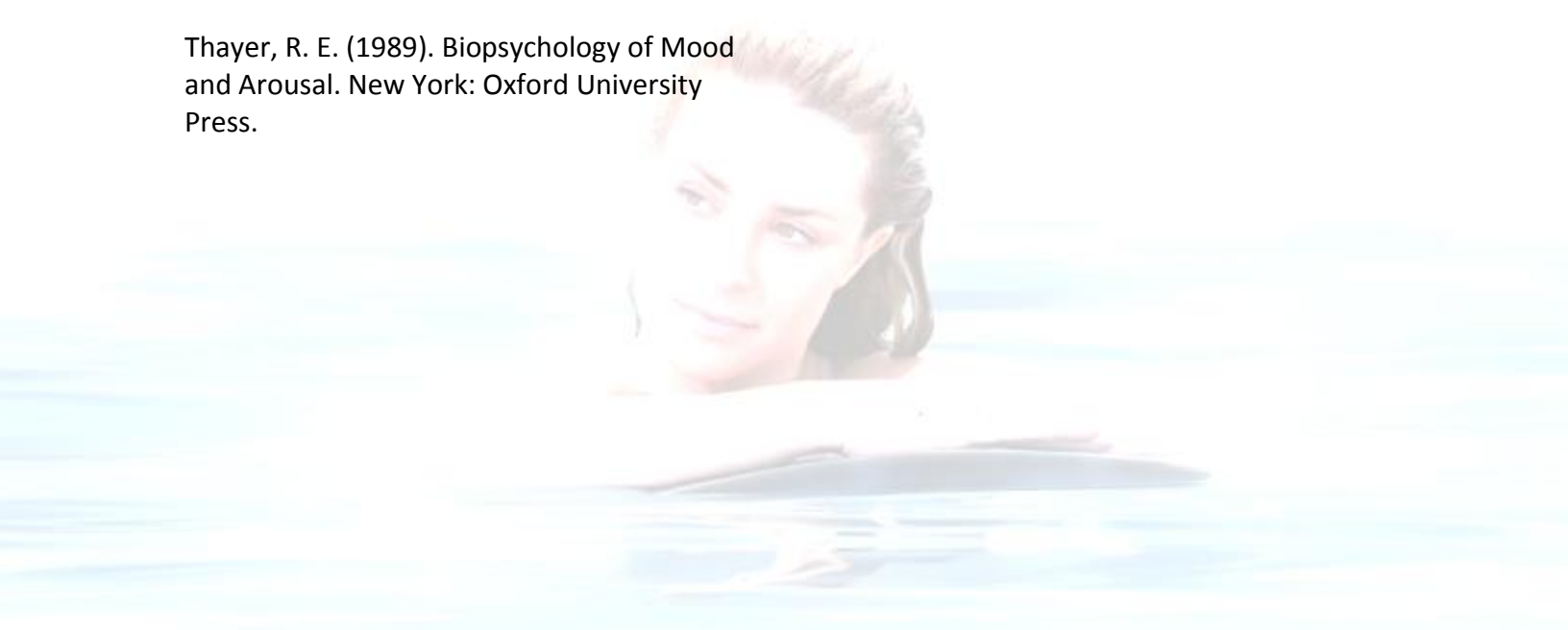
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## Appendix

### 1) Stokes' law

In 1851, George Gabriel Stokes derived an expression for the frictional force — also called drag force — exerted on spherical objects with very small Reynolds numbers (e.g., very small particles) in a continuous viscous fluid. Stokes' law is derived by solving the Stokes flow limit for small Reynolds numbers of the generally unsolvable Navier–Stokes equations:

$$F_d = 6\pi \mu R V$$

Where:

- $F_d$  is the frictional force acting on the interface between the fluid and the particle (N),
- $\mu$  is the fluid's viscosity ( [kg m<sup>-1</sup> s<sup>-1</sup>]),
- $R$  is the radius of the spherical object (m),
- $V$  is the particle's velocity (m/s).

If the particles are falling in the viscous fluid by their own weight due to gravity, then a terminal velocity, also known as the settling velocity, is reached when this frictional force combined with the buoyant force exactly balance the gravitational force. The resulting settling velocity (or terminal velocity) is given by:

Where:

$$V_s = \frac{2(\rho_p - \rho_f)}{9\mu} g R^2$$

- $V_s$  is the particles' settling velocity (m/s) (vertically downwards if  $\rho_p > \rho_f$ , upwards if  $\rho_p < \rho_f$ ),
- $g$  is the gravitational acceleration (m/s<sup>2</sup>),
- $\rho_p$  is the mass density of the particles (kg/m<sup>3</sup>), and
- $\rho_f$  is the mass density of the fluid (kg/m<sup>3</sup>).

### 2) Van der Waals forces

In physical chemistry, the **van der Waals force** (or **van der Waals interaction**), named after Dutch scientist Johannes Diderik van der Waals, is the attractive or repulsive forces between molecules (or between parts of the same molecule) other than those due to covalent bonds or to the electrostatic interaction of ions with one another or with neutral molecules.

The term includes:

- force between two permanent dipoles (Van der Waals-Keesom force)
- force between a permanent dipole and a corresponding induced dipole (Van der Waals-Debye force)
- force between two instantaneously induced dipoles (London dispersion force or Van der Waals-London force)

Van der Waals forces include attractions between atoms, molecules, and surfaces. They differ from covalent and ionic bonding in that they are caused by correlations in the fluctuating polarizations of nearby particles a consequence of quantum dynamics.

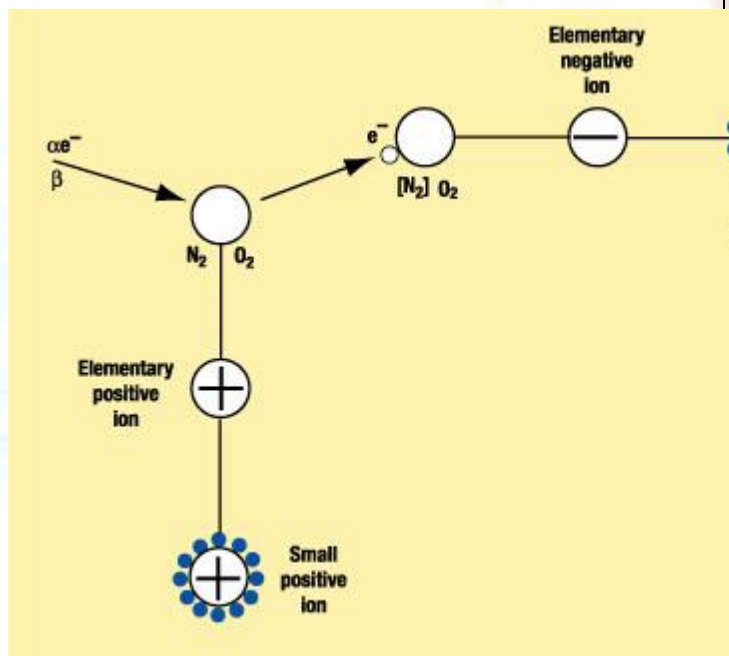
### 3) Henry's Law

At a constant temperature, the amount of a given gas dissolved in a given type and volume of liquid is directly proportional to the partial pressure of that gas in equilibrium with that liquid.

An equivalent way of stating the law is that the solubility of a gas in a liquid at a particular temperature is proportional to the pressure of that gas above the liquid. Henry's law has since been shown to apply for a wide range of dilute solutions, not merely those of gases.

Gaseous ions - Although ions may be formed in most gases, we will restrict ourselves here to discussion of those types of ions that may be formed and found in atmospheric air, the so-called air ions or atmospheric ions.

The formation of an air ion starts with an electron being knocked off a neutral air molecule, as shown in Figure 1. The now positive molecule (oxygen or nitrogen) will rapidly attract a number of polar molecules (10–15), mostly water, and this cluster is called a positive air ion. The electron will probably attach to an oxygen molecule (nitrogen has no affinity for electrons), and this negative molecule will attract a number of water molecules (maybe 8–10), forming a cluster called a negative air ion. It is important to note that ions are always formed in pairs, and always the same number of positive and negative ions.



**Figure 1** How air ions are formed

It takes certain energy, about 34 eV ( $\sim 5.4 \times 10^{-18}$  J) to knock off the initial electron. This energy may be delivered by shortwave electromagnetic radiation (x-rays or gamma rays), or more often from a colliding particle.

Natural ionization - Most of the ionization in the lower atmosphere is caused by airborne radioactive substances, primarily radon and its short-lived daughters. In most places of the world, ions are formed at a rate of 5–10 pairs per cm<sup>3</sup> per second at sea level. With increasing altitude, cosmic radiation causes the ion production rate to increase. In areas with high radon exhalation from the soil (or building materials), the rate may be much higher.

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It is primarily alpha-active materials that are responsible for the ionization. Each alpha particle (for instance, from a decaying radon atom) will, over its range of some centimeters, create approximately 150,000–200,000 ion pairs. (Niels Jonassen, MS, DSc, retired from the Technical University of Denmark)

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## Research

<p>Micro-bubble drag reduction on a high speed vessel model  <a href="http://link.springer.com/article/10.1007/s11804-012-1136-z">http://link.springer.com/article/10.1007/s11804-012-1136-z</a>  Ship hull form of the underwater area strongly influences the resistance of the ship. The major factor in ship resistance is skin friction resistance. Bulbous bows, polymer paint, water repellent paint (highly water-repellent wall), air injection, and specific roughness have been used by researchers as an attempt to obtain the resistance reduction and operation efficiency of ships</p>	<p>Exploding nanobubbles can kill cancer cells  <a href="http://www.sciencemag.org/news/2016/02/exploding-nanobubbles-can-kill-cancer-cells">http://www.sciencemag.org/news/2016/02/exploding-nanobubbles-can-kill-cancer-cells</a>  Clusters of gold atoms can detect and kill cancer cells commonly left behind after tumor-removal surgery, according to a study of a new nanotechnology technique. For now, the approach has only been tried in a handful of mice. But the researchers are designing a clinical trial that could begin testing the therapy in humans in the next 2 years. If the technique proves successful in people, it could dramatically improve the odds for cancer patients, particularly in cases where surgically removing an entire tumor is impossible.</p>
<p>Nanobubbles turn heated water into power  <a href="http://www.digitaljournal.com/science/nanobubbles-turn-heated-water-into-power/article/469467">http://www.digitaljournal.com/science/nanobubbles-turn-heated-water-into-power/article/469467</a>  <b>Yale</b> - Scientists have worked out how to generate energy from the low-temperature wasted heat produced by factories and power plants. This promises a new wave of low cost energy.</p>	<p>Microbubble Testimonials   Helping Treat Pets Skin &amp; Fur - Thera-Clean  <a href="http://www.thera-clean.com/testimonials">www.thera-clean.com/testimonials</a></p>
<p>Development of micro bubble aerator for waste water treatment using aerobic activated sludge  <a href="http://www.sciencedirect.com/science/article/pii/S0009250911001382">http://www.sciencedirect.com/science/article/pii/S0009250911001382</a></p>	<p>Research on the Cleaning Efficacy of Micro-bubbles on Dental Plaque  <a href="http://www.sciencedirect.com/science/article/pii/S2351978915001031">http://www.sciencedirect.com/science/article/pii/S2351978915001031</a></p>
<p>Effects of Micro Bubble on Oyster Cultivation  <a href="https://www.jstage.jst.go.jp/article/prohe1990/46/0/46_0_1163/_article">https://www.jstage.jst.go.jp/article/prohe1990/46/0/46_0_1163/_article</a></p>	<p>DO-increasing effects of a microscopic bubble generating system in a fish farm  <a href="http://www.sciencedirect.com/science/article/pii/S0025326X07003700">http://www.sciencedirect.com/science/article/pii/S0025326X07003700</a></p>
<p>Can I Afford a Micro bubble Tub?  <a href="http://blog.firstskinfoundation.org/?p=1876">blog.firstskinfoundation.org/?p=1876</a></p>	<p>Micro bubbles For Biomedical Applications in Wound Care  <a href="https://www.youtube.com/watch?v=rhh4Aliz47Q">https://www.youtube.com/watch?v=rhh4Aliz47Q</a></p>