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Integrated Mechanism for Water Purification, Usable for Household Use & Drinking

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ABSTRACT
Today's water crisis is widespread& a highly challenging one, and if we continue with current policies for drinking water management, it will only widen and deepen the crisis. Water quality is the biggest emerging problem in the industrial world of today, with traces of chemicals and pharmaceuticals not removed by conventional drinking water treatment processes. These are now recognised as carcinogens and endocrine disrupters.2-dimensional graphene oxide membrane with their ultrafast permanence, outstanding mechanical properties, high chemical stability is increasingly emerging as promising candidate for water purification process.

***Keywords*:**Biotron; Blue Water; Epoxy Resin; Graphene, Green Water, Groundwater treatment

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I. INTRODUCTION

In the 20th century the population of world increased dramatically, while water use for different human purposes increased up to six-fold. The most needed uses of water are drinking, cooking, bathing, cleaning, etc. Worldwide, industries use about twice as much water as households. Far more water is needed to produce food and fibre and maintain the natural environment. An unacceptably large portion of the world population doesn't have access to safe and affordable drinking water. Each year at least 3–4 million people die of waterborne diseases, including more than 2 million children who die of diarrhoea, according to World Health Organization statistics (WHO 1996).

Rapidly declining surface and groundwater quality in all major urban centres in the world threatens human health and natural values. Users do not value water, as a result they waste it. Unregulated access to groundwater, leading to over-pumping of groundwater for irrigation and rapidly falling groundwater tables in key aquifers. A key characteristic of the world's freshwater resources is their uneven distribution in time and space. Almost, water resource management should be focused exclusively on redistributing water, a supply-side (engineering) approach.

II. TOTAL AMOUNT OF WATER IN WORLD

Blue water or renewable water resources is the portion of rainfall that enters into streams and recharges groundwater,

- Ocean water: 97.2 percent
- Glaciers and other ice: 2.15 percent
- Ground water: 0.61 percent
- Fresh water lakes: 0.009 percent
- Inland seas: 0.008 percent
- Soil Moisture: 0.005 percent
- Atmosphere: 0.001 percent
- Rivers: 0.0001 percent.
- Blue or renewable water -- 40,000 km^3
- Withdrawals for irrigation -- 2,500 km3
- Withdrawals for industry -- 750 km3
- Withdrawals for municipalities -- 350 km3
- Withdrawals consumed -- 55%
- Drainage and wastewater, much of it polluted -- 45% Green water or soil water is the portion of rainfall that is stored in the soil and then evaporates or is incorporated in plants and organisms.

- Green, or soil, water -60,000 km3
- Source for rain fed agriculture -- 60% of food production
- Primary source for terrestrial ecosystems

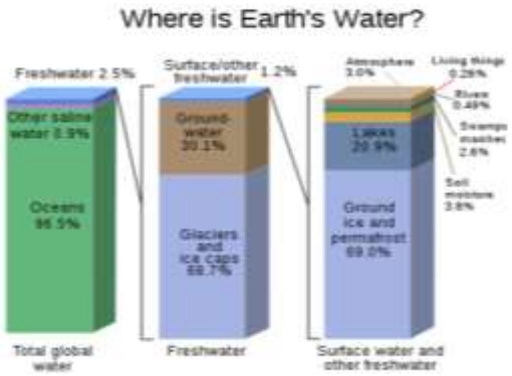

Fig.1 Distribution of Globally Available Water

Usable water resources represent the water that could be used if all economically and technically feasible storage and diversion structures are built. The primary water supply is the amount of water that can be consumed as per the current state of development of the water resource. Water diverted to a use that is not consumed either flows to a sink or re-enters the river or human made flow network and is recycled. Total deliveries, often reported as withdrawals, comprise primary water plus recycled water.

III. AMOUNT OF FRESH USABLE &UNUSABLE WATER IN WATER BODIES

Earth is known as the "Blue Planet" because 71% of the Earth's surface is covered with water. Water also exists below land surface and as water vapor in the air. Water is a finite source. The bottled water that is consumed today might possibly be the same water that once trickled down the back of a woolly mammoth. The Earth is a closed system, meaning that very little matter, including water, ever leaves or enters the atmosphere; the water that was here billions of years ago is still here now. But, the Earth cleans and replenishes the water supply through the hydrologic cycle.

Body of Water	Area (10^6 km^2)	Volume (10^6 km^3)	Mean Depth (m)
Atlantic Ocean	82.4	323.6	3,926
Pacific Ocean	165.2	707.6	4,282
Indian Ocean	73.4	291.0	3,963
All oceans and seas	361	1,370	3,796

Table 1 Water distribution table

IV. AMOUNT OF WATER USED PER PERSON

Each person uses about 80-100 gallons of water per day. One may be surprised to know that the largest use of household water is to flush the toilet, and after that, to take showers and baths.

1) Bath -- A full tub varies, of course, but 36 gallons is good average amount.
2) Shower -- Old showers used to use up to 5 gallons of water per minute. Water saving shower heads produce about 2 gallons per minute.
3) Teeth brushing -- 1 gallon. Newer bath faucets use about 1 gallon per minute, whereas older models use over 2 gallons.
4) Hands/face washing -- 1-gallon Face / leg shaving 1 gallon
5) Dishwasher -- 6-16 gallons. Newer, Energy Star models use 6 gallons or less per wash cycle, whereas older dishwashers might use up to 16 gallons per cycle.
6) Dish washing by hand -- About 8-27 gallons. This all depends on how efficient you are at handwashing dishes. Newer kitchen faucets use about 1.5-2 gallons per minutes, whereas older faucets use more.
7) Clothes washer -- 25 gallons/load for newer washers. Older models might use about 40 gallons per load.
8) Toilet flush -- 3 gallons. Most all new toilets use 1.6 gallons per flush, but many older toilets used about 4 gallons.
9) Glasses of water you drank -- 8 small glass. Also, note that you will be using water for cooking.
10) Outdoor watering -- 2 gallons per min, depending on the force of outdoor faucet. This may not sound like too much but the large size of lawns & yards means outdoor water use can be a significant use of water.

V. HOW LONG FRESH WATER WILL LAST???

All the water on Earth, only about 2.5% is fresh water, two thirds of that is locked up in glaciers and ice caps. Less than one hundredth of one percent of Earth's water is fresh and renewed each year by the solar-powered hydrologic cycle. Water has no substitutes. And unlike oil and coal, water is much more than a commodity: It is the basis of life. A human being can only live for five to seven days without water. Deprive any plant or animal of water, and it dies. Our decisions about water—how to use, allocate, and manage it—are deeply ethical ones; they determine the survival of most of the planet's species, including our own. clean drinking water is still incredibly hard to have in many parts of the world.

The UN predicts that by 2025, 14 percent of the world's population will encounter water scarcity. In modern times, water management has focused on bringing water under human control. Since 1950, the number of large dams worldwide has climbed from 5000 to 45000. As we face the pressures of climate change & growing water demands, by some estimates the volume of water moved through river transfer schemes could more than double globally by 2020.

VI. WATER TREATMENT PROCESSES OF WATER VIA (GRAPHENE + BIOTRON) SYSTEM

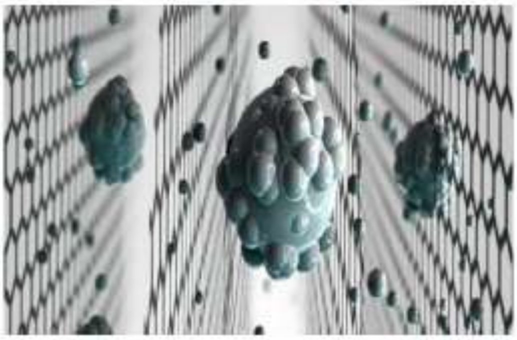

Fig.2 Graphene-oxide membrane that sieves salt right out of seawater

Realisation of scalable membranes present in water with uniform pore size down to atomic scale is a significant step and will open new possibilities for improving the efficiency of present desalination technology. Although many researchershave developed membranes that could sieve large particles out of water, but getting rid of salt requires even at smaller sieves so that desalination could occur at very basic & atomic level that scientists have struggled to create.

A group overcame this by building walls of epoxy resin on either side of the graphene oxide membrane, stopping it from swelling up in water. This allowed them to precisely control the pore size in the membrane, creating holes tiny enough to filter out all salts from seawater. Not only did this leave seawater fresh to drink, it also made the water molecules flow way faster through the membrane barrier. Graphene oxide is also a lot easier and cheaper to make in the lab than single-layers of graphene, which means the technology will be affordable and easy to produce.

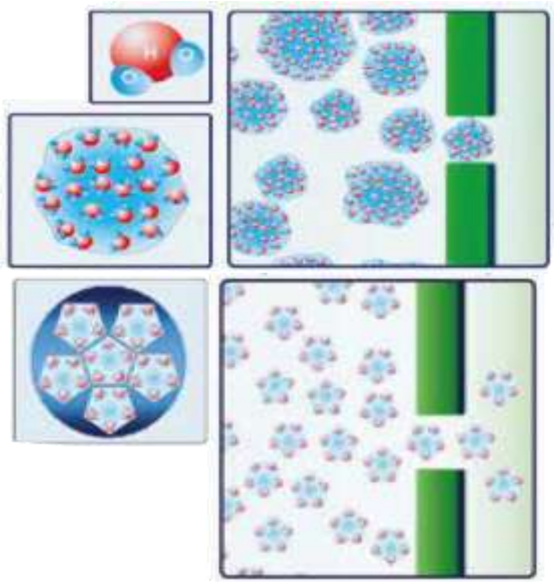

Fig. 3 Breaking of inter molecular bonding of water molecules

This mechanism breaks complex water molecules into fine micro-clusters, making water more bio-available. Water molecules tend to cluster together, making them hard to penetrate a cell wall. It doesn'tallow to completely purify water to larger & complete extent. Biotrontechnology helps break them into small micro-clusters making it easier to penetrate a cell wall.

This penetration again helps to water purifying elements to rich up to target sites completely to destroy the microbes &disease-causingbacteria's completely. It can be just related to the inter molecular spaces & bonding between the materials.

VII. CONCLUSION& RESULTS

People use only a small fraction of renewable water resources globally; this fraction is much higher in many arid and semiarid river basins where water is scarce. In many temperate zone river basins, adequate water resources are evenly distributed over the year, but they are used so intensively that surface and groundwater resources become polluted and good-quality water becomes scarce. There are already several desalination plants around the world using polymer based membranes to filter out salt, but the process is still largely inefficient & expensive. Therefore, A centralised integrated system that provides low-cost drinking water could be adopted to ensure adequate safe drinking water availability.

One of the promising aspects of graphene-based materials for water purification is the relatively low quantity of material required to achieve high adsorption or filtration capacity. In the short term, the combination of existing carbon materials (ACs) with other, emerging nanomaterials or chemistries will be highly relevant in developing the next generation of water filtration and purification materials and devices.

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