SaferEx - MULTIACTION WATER PURIFIER
PRODUCT INFORMATION SHEET

PRODUCT DESCRIPTION

INNOVATIVE FEATURES

- *Safe in water purification*
- *Kills pathogens.*
- *Disinfects salt and fresh borehole/well and containerized water.*
- *Sediments suspended particles.*
- *Sediments heavy metals and salts.*
- *Clarifies the water.*
- *Removes colour, taste and odour.*
- *Keeps sediments at the bottom for easy filtration/decantation.*
- *Brings high acidity and alkalinity of water to pH7.*
- *Can be used preliminarily to detect safe water.*
- *Keeps water safe.*
- *Non-flammable*
- *Non-toxic*
- *Can be used in small and medium scale water purification.*
- *Easy to use without formal training.*
- *Reduces high soap and stain-remover consumption in Laundry.*
- *More economical and efficient.*

SaferEx treatment for safer water!

SaferEx - Multi-action Water Purifier is an innovative multi-action and safe colourless liquid that purifies contaminated borehole/well and containerized water, makes it safe for drinking and other hygiene and sanitation uses. It effectively and economically purifies contaminated fresh and salt borehole/well water; disinfects/kills pathogens, sediments particles, heavy metals and salts, on single application, for easy removal by decantation and/or filtration. It is formulated from refined and regular potable water treatment chemical raw materials. It has been confirmed efficient in disinfecting/killing pathogens (bacteria, viruses, protozoa, etc) in water; sedimenting suspended particles, metals that cause water hardness (Calcium and Magnesium) and staining (Iron and Manganese), and salts, removing colour, odour, and taste, among others, "in a single application", like never before, by simply mixing it with the unsafe water and decanting/filtering after 1-6 hours (depending on contamination level) at cost-efficiency and less time compared with combinations of other treatments (disinfectants, alum, filters, etc) in use to achieve same but without getting desired results. SaferEx is an invented chemistry and innovation as a time and cost-efficient "multi-action single liquid" that works in a "single application" (a unit process), and easy to use with only simple instructions like never done before. It brings the pH of highly acidic and alkaline water to towards/close pH7. It forms a cloudy solution with certain impure water (sediments impurities later) and clear solution with pure water (without sediments), therefore can be used to preliminarily detect safe and certain unsafe water instantly.

USERS AND ADVANTAGES.

It is used in households, organizations, farms, mines, hospitals, hotels, schools, etc, for borehole/well and containerized water purification. Users and reputable laboratories/public analysts' water analysis reports have confirmed the SaferEx-treated water safe according to WHO standards and Nigeria Industrial Standards(NIS) parameters. It eliminates, for users, waterborne diseases (typhoid fever, diarrhea, cholera, etc), salt-activated high blood pressure/hypertension from constant drinking of salt water, skin problems, deaths from these diseases, high medical bills, high cost of soap consumption in laundry and shortened lifespan of clothes by use of hard/staining water. In large scale water treatment plant, SaferEx as a pure liquid, eliminates huge maintenance costs associated with cleaning and repairs of filters, pumps and valves clogging, lining of pipe networks with debris of solids that reduces pressure, among others as result of using solid chemicals. Also eliminates the use of coagulants, flocculants, disinfectants, clarifiers, and in most cases use of pH adjusters.

PACKAGING: 250ml : 500ml : 1 Litre : 4 litres : 10 Litres : 25 Litres. (in low and High Density Polyethylene containers).

APPLICATION INFORMATION:

SaferEx - Multiaction Water Purifier safely treats contaminated water by mainly physical and chemical reactions/means and most of the reactions are reversible as most sediments can be dissolved back totally into the water solution to give the previous colour appearance and some properties.
It can be used both in;
(A) Simple household and small scale water treatment using containers/vessels.

(B) Installed water treatment facility for household, organizations and medium/large scale water treatment.

How SaferEx functions in purification of unsafe water that makes it better than existing solutions.

When added and mixed with the unsafe water to be treated in a container;

(1). It disinfects the water by disinfecting/killing the harmful microbes/pathogens.

(2). Coagulates (gather) physicochemical and organic contaminants in the water solution.

(3). Sediments gathered contaminants; suspended particles, metals (Iron, Manganese, Calcium, Magnesium, etc), salts and other impurities to the bottom.

(4). Clarifies the water by removing colour, odour, taste and impurities.

(5). Keeps the sediments at the bottom of the container for easy decantation and/or filtration.

(6). Brings the pH of purified water towards or close to pH 7, for highly acidic and alkaline water.

(7).May leave effective antimicrobial residue (in acceptable range/trace) in the filtrate (pure and safe water) to keep it safe from evading pathogens before covering or when opened. This depends on the level of contaminants and quantity added.

(8). It is effective in fresh and salt water.

(9). SaferEx can be used in small and medium scale water treatment in the right quantity on due analysis of the raw/unsafe water .

(10). Can be used to preliminarily test and know the purity of certain water by visual means on addition and mixing: Adding 3 - 5 drops of SaferEx to a 25 Cl of water and mixing forms a cloudy solution if the water has certain contaminants then sediments between 1- 6 hours, depending on the type of contaminants. While adding same drops (3 - 5) or any quantity of SaferEx to a 25 Cl of water and mixing maintains a clear water appearance indicating the water is safe and forms no sediments at all.

HOW TO USE

(1) Simple household and small scale water treatment using containers/vessels.

A. Mix one capful or 5ml of SaferEx with 20 litres of the unsafe water or
B. 1 parts SaferEx to 1000 parts of water for high contamination.
C. Drop or add into empty container then pour in the unsafe water (where stirring may be difficult).
D. Cover and ensure proper mixing by stirring or shaking.
E. Allow to stay still for about 1- 6 hours for full noticeable sedimentation, disinfection and clarification (duration determined by contaminant type and level).
F. Pour off (Decant) or filter the top clear water part and dispose of the bottom.
G. Keep filtered purified water covered for drinking and other uses.

(2). Installed water treatment facility for household, organizations and medium/large scale water treatment.

A. Add 1 part of SaferEx to 1000 parts of unsafe water in the raw water tank or mixing tank.
B. Allow to be agitated to mix properly, or add in an empty raw water tank and then allow the unsafe to follow into the tank, or use a dozing pump to introduce SaferEx into the mixing tank.
C. Simple allow the SaferEx-treated water to pass through filtration systems to remove the coagulated contaminants.
D. Store in the treated water tank for use.

PLEASE NOTE:

(1). SaferEx has been confirmed effective when used to purify agro/food-processing wash-and-rinse wastewater.
(2). SaferEx is also effective when used to disinfect and clarify wastewater from mines and quarries.
(3). SaferEx is formulated and produced from refined regular non-toxic water treatment chemicals/ingredients used for private and public potable water treatment.
(4). SaferEx functions efficiently at temperatures where the water maintains uniform liquid state (no part solid formation).
(5). The borehole/well and containerized water should be analyzed prior to treatment to determine the water contaminants.
(6). SafeEx is safe in treating and purifying water for drinking, bath, washing, cleaning, laundry and other sanitation uses.
(7). SaferEx is not toxic in its unadulterated state and in water.
(6). SaferEx can be used for small and medium/large scale water purification.
(7). It is being tested in water contaminated with heavy organic solvents and pesticides (under study).
(8). Has not been tested in water with radionuclide/radioactive contaminants.

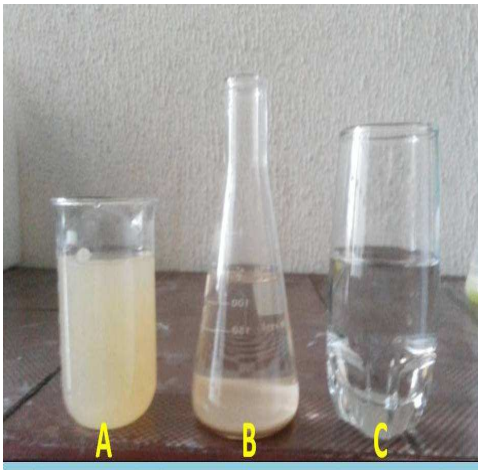
PHOTO OF MACJAMES® SaferEx - MULTI-ACTION WATER PURIFIER.

PRACTICAL AND LABORATORY DEMONSTRATIONS OF SaferEx - MULTI-ACTION WATER PURIFIER IN BOREHOLE AND WELL GROUNDWATER TREATMENT.

Typical household borehole unsafe salt water analyzed and contains pathogens, metals and salts.
A - Before treatment with SaferEx -Water Purifier.
B - After treatment with SaferEx - Water Purifier with sediments; rid of pathogens, salts and unwanted metals (2- 6 hours later).

SaferEx – Multi-action Water Purifier used in treatment and recovery of safe water from muddy, heavy metal and pathogen infested raw borehole water from Okposi Town, Ohaozara L.G.A, Ebonyi State, Nigeria (In situ treatment).

1. Raw and heavily contaminated borehole water from Okposi town, Ebonyi State, Nigeria.
2. Raw water after treatment with SaferEx Multi-action Water Purifier with sediments (<1hr)
3. Purified water in a cup after SaferEx treatment and decantation (>80% of safe water recovered)



Well water Sample from Enugu State (South-East Nigeria).
(A) Raw well water sample (groundwater).
(B) Raw well water treated with SaferEx, and sediment formation.
(C) Purified well water after SaferEx treatment and filtration.

SaferEx USED TO REMOVE IRON AND MANGANESE FROM RAW BOREHOLE WATER

Raw borehole water at Oyigbo town, Rivers State, Nigeria analyzed to contain high Iron and Manganese but remains clear in appearance (Collected from a water packaging factory).

1. Raw borehole water analyzed to contain Iron and Manganese but clear in appearance.
2. Raw borehole water after adding 5ml SaferEx -Multi-action Water Purifier (after <10 minutes).
3. Borehole water with Iron and Manganese sedimented after treatment with SaferEx to remove Iron and Manganese.

SaferEx in situ treatment of household borehole water from LEKKI, Lagos State, Nigeria analyzed and contains pathogens, metals and salts.
A -Before treatment with SaferEx
B -After treatment with SaferEx with sediments; rid of pathogens, salts and unwanted metals prior to filtration (after < 45 minutes).

SUMMARY OF TECHNICAL AND APPLICATION INFORMATION OF SaferEx

PHYSICAL PROPERTIES			
Appearance:	colourless	Foaming Tendency:	None
Odour:	Slightly chlorite	Concentration Monitoring Techniques:	Titration
Specific Gravity @ 20ºC :	1.02	Water solubility:	Complete
Viscosity:	Light	Corrosivity:	None
pH: (Temp dependent)	5.8 - 6.8	Flash Point:	none
Freezing Point:	Approx. -5ºC	Boiling Point:	Approx. 100 ºC

RATIO OF MIXING FOR PURIFICATION	
DEGREE OF IMPURITY	REQUIRED SaferEx : H_2O
Very Heavy	1.5 parts : 1000 parts
Heavy	1 part : 1000 parts
Medium	0.5 part: 1000 parts
Light (for locals)	I capful or (5mil.) : 20 Litres

HOW TO USE IN SMALL SCALE WATER PURIFICATION

Ratios:

- One capful to 20 litres of water or
- 1 part: 1000 parts of water for high contamination

- Drop or add into empty container then pour in the water where stirring may be difficult.
- Cover and ensure proper mixing by stirring or shaking
- Allow to stay still for about 1- 6 hours for full noticeable sedimentation (determined by contamination type)
- Pour off or filter (with cloth) the top clear water part and dispose the bottom.
- Keep filtered purified water covered for use.

PRECAUTIONS:

- Keep away from children
- Do not drink.
- Avoid contact with eyes, otherwise flush with water.
- If swallowed, drink much water.
- Use in pure state; Do not adulterate.
- Use as directed (see "How to use")

NB: For more information on ***SaferEx - Multi-action Water Purifier,*** email; chemicalinfo@macjamesglobal.com

- ✓ SaferEx purifies borehole/well and containerized water, makes it safe for drinking and other hygiene and sanitation uses.

RESULT OF THE SALTY BOREHOLE WATER ANALYSIS AFTER TREATMENT WITH SaferEx

Test	Result	NIS values	Remark	Test	Result	NIS values	Remark
Temperature	Ambient	Ambient	Satisfactory	Mercury (Hg)	Nil	0.001mg/L	Satisfactory
Characteristics	Clear,Colourless,	Clear,Colourless,		3,4-Benzpyrene	Nil	0.0002mg/L	Satisfactory
	Odourless,and	Odourless,and	Satisfactory	11,12-Benzpyrene	Nil	0.0002mg/L	Satisfactory
	tasteless liquid	tasteless liquid		Free Residual Chlorine	0.01mg/L	0.2mg/L	Satisfactory
Taste	Unobjectionable	Unobjectionable	Satisfactory	2-Chlorophenol	Nil	0.01mg/L	Satisfactory
Odour	Unobjectionable	Unobjectionable	Satisfactory	2,4-dichlorophenol	Nil	0.04mg/L	Satisfactory
Colour	3.0 TCU	3.0 TCU	Satisfactory	Trihalomethane	Nil	0.1mg/L	Satisfactory
Turbidity	5.0 NTU	5.0 NTU	Satisfactory	Pesticides	Nil	0.005mg/L	Satisfactory
pH	6.8	6.5 - 8.5	Satisfactory	Mineral Oil	Nil	0.01mg/L	Satisfactory
Total Dissolved Salts (TDS)	34.00mg/L	500mg/L	Satisfactory	Ammonia	Nil	0.05mg/L	Satisfactory
Total Hardness (as $CaCO_3$)	41.00mg/L	100mg/L	Satisfactory	Phenol	Nil	0.001mg/L	Satisfactory
Conductivity	66.00µS/cm	1000 µS/cm	Satisfactory	Detergent (Lauryl Sulphate)	Nil	0.01mg/L	Satisfactory
Hydrogen Sulphide (H_2S)	Nil	0.01mg/L	Satisfactory	Radionuclides (Bq/L)	Nil	0.1mg/L	Satisfactory
Sulphate	7.00mg/L	100mg/L	Satisfactory	MICROBIOLOGICAL			
Chloride (Cl	6.24mg/L	100mg/L	Satisfactory	ANALYSIS			
Fluoride (F)	Nil	1.0mg/L	Satisfactory	Total Viable Count	4cfu/ml	100cfu/ml	Satisfactory
Nitrate	4.87mg/L	10mg/L	Satisfactory	Yeast/Mould	Nil	Nil	Satisfactory
Nitrite	Nil	0.1mg/L	Satisfactory	Coliforms			
Copper (CU)	Nil	1.0mg/L	Satisfactory	E.Coli	Nil	Nil	Satisfactory
Iron (Fe)	0.02mg/L	0.3mg/L	Satisfactory	Clostridium			
Magnesium(Mg)	0.20mg/L	2.0mg/L	Satisfactory	Perfringens	Nil	Nil	Satisfactory
Manganese (Mn)	Nil	0.05mg/L	Satisfactory	Chromobacterium			
Zinc (Zn)	0.42mg/L	5.0mg/L	Satisfactory	Violaceum	Nil	Nil	Satisfactory
Lead (Pb)	Nil	0.01mg/L	Satisfactory	Faecal Streptococci	Nil	Nil	Satisfactory
Cyanide (CN)	Nil	0.01mg/L	Satisfactory	Klebsiella aerogenes	Nil	Nil	Satisfactory
Cadmium (Cd)	Nil	0.003mg/L	Satisfactory	Staph. Aeurus	Nil	Nil	Satisfactory
Arsenic (As)	Nil	0.01mg/L	Satisfactory				
Barium (Ba)	Nil	0.05mg/L	Satisfactory				

These NIS Values for potable water also conforms with WHO acceptable limit values

Analyzed by Yemac Consulting and Analytical Services: Institute of Public Analyst of Nigeria (IPAN) Practice Licence No.:00069
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P.S:

2016: ***Selected among top 1000 innovations in Africa, from 54 African Countries, by TEEP 2016.***

2016: Winner, Unilever Foundry ideas "Clean Water Challenge", 2016.
(https://cleanwaterchallenge.ideas.unilever.com/Page/Home)

2016: ***Qualified in the "Create the Future Design Contest 2016" by COMSOL and Mouser Electronics, U.S.A.***
(http://contest.techbriefs.com/2016/entries/consumer-products/6350)

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