

SaferEx - MULTI ACTION WATER PURIFIER

PRODUCT TECHNICAL DATA SHEET

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.
- Reduces costs of treating water and facility maintenance by 35% as pure a liquid.
- 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!

PRODUCT DESCRIPTION

SaferEx - Multiaction Water Purifier (NUPRC Approval No.: DPR/HSE.04/003.700/2018/038 and ISO 9001:2015 Cert. No.: N1683535) 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 Fluoride, Nitrate, 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 and unit process", and easy to use with only simple instructions like never done before. It reduces the costs of treating water and facilities maintenance by at least 35% by reducing unit processes and chemicals, clogging, scales, among others as a pure multi-action liquid. SaferEx can be used in small, medium and large-scale municipal water treatment. 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.

PACKAGING SIZES:

1 Litre : 4 litres : 10 Litres : 20 Litres : 25 Litres : 200 Litres drum in HDPE Containers.

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.

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 water containers/vessels for household and small-scale water treatment.
- (B) Installed water treatment facility for household, organizations and medium scale water treatment.

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, Fluoride, Nitrate, 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

- A. Mix one capful or 5ml of SaferEx with 20 litres of the unsafe water or
- B. 1 part SaferEx for 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 (determined by contaminant type and level)
- F. Pour off (Decant) or filter the top clear water part and dispose the bottom.
- G. Keep filtered purified water covered for drinking and other uses.

❖ FOR MEDIUM AND LARGE-SCALE MUNICIPAL WATER TREATMENT

In an installed water treatment facility for medium and large-scale municipal water treatment, add appropriate amount of SaferEx by dosing into the coagulation/flocculation chambers/tanks, and simply allow to pass through the filtration systems, check if pH adjustment is needed, before storing purified water in the treated water tank for use/distribution.

PLEASE NOTE:

- (1). SaferEx is also used to purify wastewater from agro/food-processing and other industrial wash/rinse water.
- (2). SaferEx is used to disinfect and clarify wastewater from mines and quarry processes.
- (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.
- (8). SaferEx can be used for small, medium and large-scale water purification.
- (9). It is being tested in industrial wastewater with heavy organic solvents and pesticides (under study).
- (10). Has not been tested in water with radionuclide/radioactive contaminants.

TYPICAL PHOTOS OF PACKAGE SIZES OF SaferEx - MULTIACTION 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).

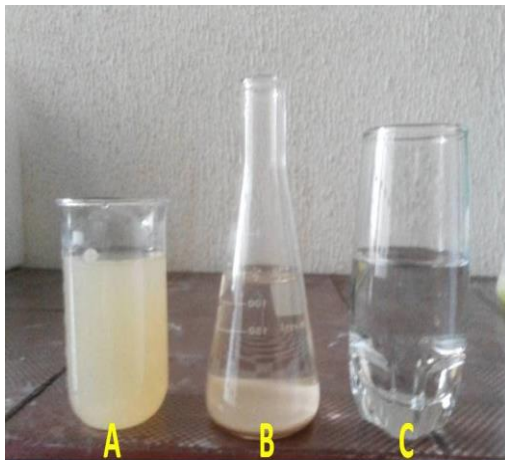


SaferEx treatment of raw borehole water from Okposi Town, Ohaozara L.G.A, Ebonyi State, Nigeria (In situ treatment).

1. Raw borehole water from Okposi town, Ebonyi State, Nigeria.

2. Raw water after treatment with SaferEx Multi-action Water Purifier (<1hr)

3. Purified water in cup after SaferEx treatment and decantation.



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.



Salty shallow borehole water from Port Harcourt (South-South Nigeria).

(1) Raw borehole water sample (groundwater).

(2) Treated raw borehole water with SaferEx, and Sediment formation.

(3) Purified borehole water after treatment with SaferEx and filtration.



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 @ 20°C :	1.02	Water solubility:	Complete
Viscosity:	Light	Corrosivity:	None
pH: (Temp dependent)	5.8 - 6.8	Flash Point:	none
Freezing Point:	Approx. -5°C	Boiling Point:	Approx. 100 °C

RATIO OF MIXING FOR PURIFICATION	
DEGREE OF IMPURITY	REQUIRED SaferEx : H ₂ O
Very Heavy	1.5 parts : 1000 parts
Heavy	1 part : 1000 parts
Medium	0.5 part: 1000 parts
Light (for locals)	1 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,	Satisfactory	3,4-Benzpyrene	Nil	0.0002mg/L	Satisfactory
	Odourless and tasteless liquid	Odourless and tasteless liquid		1,1,2-Benzpyrene	Nil	0.0002mg/L	Satisfactory
Taste	Unobjectionable	Unobjectionable	Satisfactory	Free Residual Chlorine	0.01mg/L	0.2mg/L	Satisfactory
Odour	Unobjectionable	Unobjectionable	Satisfactory	2-Chlorophenol	Nil	0.01mg/L	Satisfactory
Colour	3.0 TCU	3.0 TCU	Satisfactory	2,4-dichlorophenol	Nil	0.04mg/L	Satisfactory
Turbidity	5.0 NTU	5.0 NTU	Satisfactory	Trihalomethane	Nil	0.1mg/L	Satisfactory
pH	6.8	6.5 - 8.5	Satisfactory	Pesticides	Nil	0.005mg/L	Satisfactory
Total Dissolved Salts (TDS)	34.00mg/L	500mg/L	Satisfactory	Mineral Oil	Nil	0.01mg/L	Satisfactory
Total Hardness (as CaCO ₃)	41.00mg/L	100mg/L	Satisfactory	Ammonia	Nil	0.05mg/L	Satisfactory
Conductivity	66.00µS/cm	1000 µS/cm	Satisfactory	Phenol	Nil	0.001mg/L	Satisfactory
Hydrogen Sulphide (H ₂ S)	Nil	0.01mg/L	Satisfactory	Detergent (Lauryl Sulphate)	Nil	0.01mg/L	Satisfactory
Sulphate	7.00mg/L	100mg/L	Satisfactory	Radionuclides (Bq/L)	Nil	0.1mg/L	Satisfactory
Chloride (Cl)	6.24mg/L	100mg/L	Satisfactory	MICROBIOLOGICAL 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	Nil	Nil	Satisfactory
Copper (CU)	Nil	1.0mg/L	Satisfactory	E.Coli	Nil	Nil	Satisfactory
Iron (Fe)	0.02mg/L	0.3mg/L	Satisfactory	Clostridium	Nil	Nil	Satisfactory
Magnesium (Mg)	0.20mg/L	2.0mg/L	Satisfactory	Perfringens	Nil	Nil	Satisfactory
Manganese (Mn)	Nil	0.05mg/L	Satisfactory	Chromobacterium	Nil	Nil	Satisfactory
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. Aureus	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>

