



AquaSoar™

WATER HYGIENE MIXING AND DOSING INSTRUCTIONS



This document provides an Acepsis™ WATER HYGIENE user with the information necessary to establish a WATER HYGIENE program on their farm. The Acepsis WATER HYGIENE program provides a range of options that allow the producer to adapt the right approach for their needs. The information provided outlines two Acepsis™ AquaSoar™ mixing options, and the AquaSoar™ Concentrate dosing instructions for the individual farm water systems.

- **PRE-BLENDING AquaSoar™ DILUTE ACTIVATOR and AquaSoar™ DILUTE BASE 1000:** Pre-blending off-site in a DILUTE form, where the AquaSoar™ Concentrate is then mixed on-site in a traditional 1 : 1 chlorine dioxide mixing process. AquaSoar™ Concentrate is produced to provide 5,000 PPM of total titratable chlorine dioxide.

- **TOTAL ON-SITE BLENDING:** Blending on-site (on farm) with the AquaSoar™ ACTIVATOR and AquaSoar™ BASE 1000 concentrated precursors. AquaSoar™ Concentrate is produced to provide 5,000 PPM of total titratable chlorine dioxide.

The Acepsis™ AquaSoar™ WATER HYGIENE System provides a set of highly concentrated **precursors** that dramatically reduces the operational costs associated with fully / semi diluted formations. Less freight. Less packaging. Less handling. In addition to the operational cost savings, the AquaSoar™ WATER HYGIENE provides higher solution activity values (measured in ORP – mV) vs. other common water treatment formulations by providing higher chlorine dioxide yields and chlorite conversions.

The terms **PRE-BLENDING** and **TOTAL ON-SITE BLENDING** are terms used to identify the process for creating ready-to-use, AquaSoar™ Concentrate solution(s) at its point of use – on farm. Regardless of the method, both mixing systems produce AquaSoar™ Concentrate at the same product strength, 5,000 PPM of total titratable chlorine dioxide. The solution will also be measured by its ORP value, at the source and throughout the water system, in millivolts (mv).



WATER QUALITY AND WATER TESTING

The concentrated AquaSoar™ Precursors are pre-blended using an **on-site water source**. This water source must be free of minerals / chemicals that may affect the outcome of the blending process. To ensure that the AquaSoar™ Concentrate provides the same level of hygiene capabilities, the water used to dilute the precursors must be tested to prior to dilution.

Water is the largest component that is added to the Precursor DILUTE formulations. It is essential that the water used in dilution process meets the requirements of the formulations. Acepsis™ is partnering with AgSource to provide a complete water analysis of the water source being used to produce AquaSoar™ Concentrate and the water source to be treated.


Water Analysis

Submitted By: **MFO00013** Submitted For:

Date Received: **03/07/2019** Date Processed: **03/12/2019**

Date/Time Collected: **03/06/2019 11:15 AM** Sample Location: **Cold Liquor Tank**

Sample Collector: **LG**



Laboratory Sample #
BL35271
0162-03
Information Sheet #
DW030719-33

WDNR Lab Certification Number: **737109450**
WDATCP Lab Certification Number: **55-424**

Test Name	Method	Results	Units	MCL	LOD/LOQ	Dilution Factor	Prep Date	Test Date	Analyst
Total Calcium	SM3111 B	22	mg/L	NA	1.6/5.5	1	NA	3/8/2019	SH
Chloride	EPA 300.0	1.62	mg/L	250 mg/L	0.22/0.74	1	NA	3/7/2019	JA
Total Copper	SM3111 B	<0.04	mg/L	1.3 mg/L	0.04/0.14	1	NA	3/8/2019	SH
Total Iron	SM3111 B	<0.07	mg/L	0.3 mg/L	0.07/0.24	1	NA	3/8/2019	SH
Total Hardness (calculation)	SM3111B/2340B	98	mg/L	NA	0.1/0.3	1	NA	3/8/2019	SH
Total Potassium	SM3111 B	<1.0	mg/L	NA	1.0/3.3	1	NA	3/8/2019	SH
Total Magnesium	SM3111 B	10	mg/L	NA	0.1/0.3	1	NA	3/8/2019	SH
Total Manganese	SM3111 B	<0.05	mg/L	0.05 mg/L	0.05/0.2	1	NA	3/8/2019	SH
Total Sodium	SM3111 B	<0.81	mg/L	NA	0.81/2.71	1	NA	3/8/2019	SH
Nitrate as N	EPA 300.0	0.67	mg/L	10 mg/L	0.10/0.34	1	NA	3/7/2019	JA
Lab pH	SM4500-HB	7.4	S.U.	6.5-8.5 mg/L	NA	1	NA	3/7/2019	TK
Sulfate	EPA 300.0	2.77	mg/L	250 mg/L	0.15/0.51	1	NA	3/7/2019	JA
Total Dissolved Solids	SM2540 C	320	mg/L	500 mg/L	NA	NA	NA	3/11/2019	JB
Total Zinc	SM3111 B	<0.02	mg/L	5.0 mg/L	0.02/0.08	1	NA	3/8/2019	SH

Sample Comments: Sample was received at laboratory outside of proper temperature parameters.

[Bracketed results] specify values greater than or equal to the LOD but less than or equal to the LOQ and are within a range of less-certain quantitation. Results greater than the LOQ are considered to be in the range of certain quantitation. LOD/LOQ units are the same as Result units.

LOD = Limit of Detection
LOQ = Limit of Quantitation

All LODs and LOQs are adjusted to reflect dilution

RL = Reporting Limit
NA = Not Applicable

MCL = EPA Maximum Contamination Limit
(see link below for more information)

The water source used to dilute the AquaSoar™ ACTIVATOR and AquaSoar BASE 1000 Precursors must be made of soft water, and not contain hardness elements that can affect the yield of the chlorite solution.



PRE-BLENDING AquaSoar™ PRECURSORS

AquaSoar™ Precursors are produced at the highest concentrations allowable. This provides a number of advantages:

- It dramatically reduces packaging, freight and handling costs;
- The solutions can be easily diluted to standard package size configurations:
 - o One gallon of AquaSoar™ ACTIVATOR produces 55 gallons of the dilute ACTIVATOR solution;
 - o One gallon of AquaSoar™ BASE 1000 produces 55 gallons of the dilute BASE solution;
 - o These concentrations can be mixed at a 1 : 1 ACTIVATOR to BASE ratio to produce 110 gallons of 5,000 PPM of chlorine dioxide! This means that one gallon of the AquaSoar™ ACTIVATOR Precursor and 1 gallon of AquaSoar™ BASE 1000 can treat **1,100,000 gallons** of water at a maintenance treatment level of 0.5 PPM per gallon!
 - o The following table shows the Precursor and water dilution amounts:

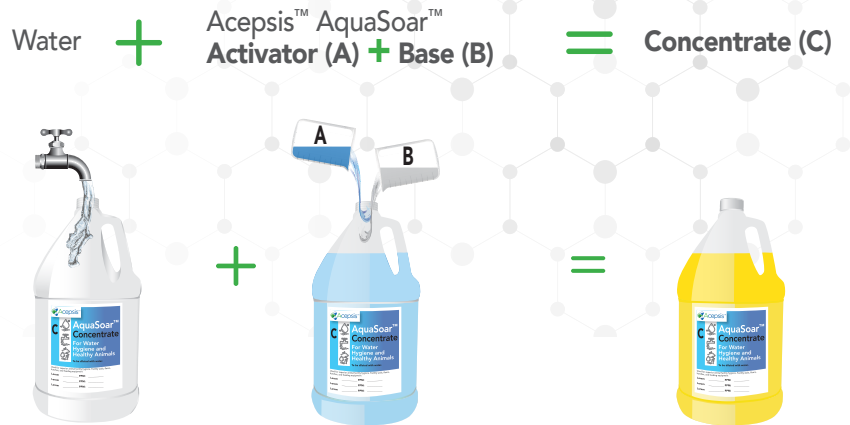
AQUASOAR™ PRECURSOR MIXING GUIDE (1:54)

PRECURSOR	PRECURSOR AMOUNT	WATER AMOUNT	TOTAL AQUASOAR™ DILUTE PRODUCED	AQUASOAR™ CONCENTRATE (A + B) TOTAL AMOUNT	ClO ₂ PPM PRODUCED (TOTAL TITRATABLE)
AQUASOAR™ ACTIVATOR (A)	1.0 OZ.	54 OZ.	55 OZ.	110 OZ.	5000
	1.0 GAL.	54 GAL.	55 GAL.	110 GAL.	
	5.0 GAL.	270 GAL.	275 GAL.	550 GAL.	
AQUASOAR™ BASE 1000 (B)	1.0 OZ.	54 OZ.	55 OZ.	110 OZ.	5000
	1.0 GAL.	54 GAL.	55 GAL.	110 GAL.	
	5.0 GAL.	270 GAL.	275 GAL.	550 GAL.	

PRODUCTS



PROCEDURE



1. Always mix solutions into a **clean, well labeled empty container (C)**.
2. Fill empty container (C) with proper amount of **cold, soft water**.
3. Add proper amount of **AquaSoar™ Activator** to container as directed.
4. Add proper amount of **AquaSoar™ Base 1000** to container as directed. Cap container immediately after mixing.
5. Allow to activate for **approximately one hour** prior to use.
6. Test solution with LaMotte ClO₂ high range **test strips** prior to use.

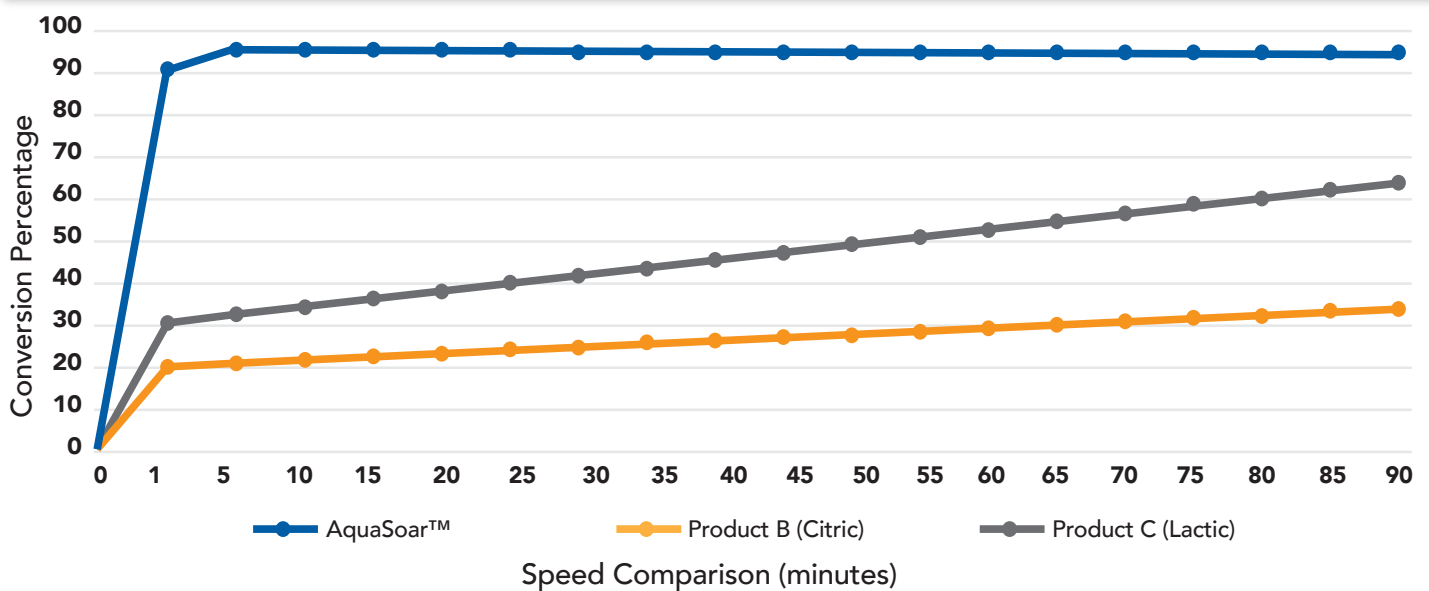
PRODUCTS

- Pre-dilute AquaSoar™ ACTIVATOR (A) and AquaSoar™ BASE (B) in separate, well labeled containers;
- Per the AquaSoar™ PRECURSOR MIXING GUIDE, add the proper amount of water to the individual containers while adding the concentrated PRECURSORS. Do not mix the undiluted PRECURSORS together. Mix the ACTIVATOR and BASE formulations only in diluted form. Mix the diluted ACTIVATOR (A) and diluted BASE (B) at a 1 : 1 mixing ratio.



- The diluted AquaSoar™ ACTIVATOR / BASE combination will convert to chlorine dioxide immediately.
- The mixed solution is labeled AquaSoar™ CONCENTRATE and provides 5,000 PPM of total titratable chlorine dioxide at the above mixing ratios.

AquaSoar™ Speed Comparison (minutes) | Conversion %



WATER HYGIENE DOSING

Water usage on a dairy farm will vary greatly. For our purposes we will divide the water usage into 3 separate areas: 1) direct usage by dairy animals, 2) usage required for the general operation of the dairy facility, and 3) crop water usage. Direct usage by the livestock is dependent on the type and number of animals and the ambient conditions. While an average amount of water per cow per day may be 30 gallons, it can vary greatly based upon the amount and type of feed consumed, stage of lactation and ambient temperature. Since there is a wide variation of usage, we suggest that the dosing system be controlled by a water meter that provides actual numbers of the water volume and flow rates.

Once we've determined the volume of water used, we will be dosing based upon the individual water quality conditions. The Water Analysis chart will provide the necessary information required for dosing requirements. Typical water systems that have not been treated have mineral and biofilm build ups that may take an extended period to remove. The average recommended "maintenance" dosing level used for water systems is 0.5 mg / L (.5 mg / Qt.) (0.5 PPM – total titratable). The dosing amount will range from 10 PPM at the start of the process to the targeted maintenance level of 0.5 PPM. The correct amount will be verified by the water's ORP level, measured in millivolts (mV).

Follow the AquaSoar[™] WATER HYGIENE PROPOSAL for suggested treatment levels at the startup of the system:

AQUASOAR[™] WATER HYGIENE PROPOSAL INFORMATION

INPUTS		OUTPUTS	
NUMBER OF COWS MILKING	1,000	COST PER RTU TREATMENT GALLON	\$ 1.45
ESTIMATED GALLONS PER COW PER DAY	35.0	COST PER RTU PPM	\$ 0.00029091
TOTAL WATER VOLUME TREATED PER DAY (GALLONS)	35,000	WATER HYGIENE COST PER DAY	\$ 5.09
AQUASOAR [™] TARGET PPM PER TREATED WATER GALLON	0.50	WATER HYGIENE COST PER MONTH	\$ 154.85
AQUASOAR [™] PRECURSOR UNIT SIZE (GALLONS)	15	TREATMENT COST PER COW PER MONTH	\$ 0.15

ESTIMATED START-UP TREATMENT COSTS BY MONTH

PERIOD	TARGET PPM	ESTIMATED COST	PERIOD	TARGET PPM	ESTIMATED COST
WEEK 1	10	\$ 712.73	TOTAL MONTH 2	2.5	\$ 774.24
WEEK 2	5	\$ 356.36	TOTAL MONTH 3	1.0	\$ 309.70
WEEK 3	2.5	\$ 178.18	TOTAL MONTH 4	0.5	\$ 154.85
WEEK 4	2.5	\$ 178.18	TOTAL MONTH 5	0.5	\$ 154.85
TOTAL MONTH 1	5	\$1,425.45	TOTAL YEAR 1	1.1	\$ 3,903.03

For more information, call Acepsis[™] or your local representative.



ACEPSIS[™], LLC is an animal health based company that is focused on the development of state-of-the-art animal hygiene technologies. Our Company's mission is to apply innovative animal hygiene technologies into the agricultural and veterinary market sectors.