World Health Organization

WHO International Scheme to Evaluate Household Water Treatment Technologies

Aquatabs®

Product evaluation report

WHO performance classification	Targeted protection (bacteria and viruses only) One-star (★)
Manufacturer	Medentech Ltd Clonard Road Wexford Y35Y7WY Ireland www.aquatabs.com
Evaluation procedure	Desk review of existing data and abbreviated laboratory testing
WHO report issue date	Round I, 2015
WHO reference number	13/03/2014-R1-26

Summary of evaluation

This report summarizes the evaluation results of a chlorine disinfectant known by the tradename 'Aquatabs®' under Round I of the World Health Organization (WHO) International Scheme to Evaluate Household Water Treatment Technologies (the Scheme). Evaluation followed the requirements of the WHO protocol for chlorine disinfection technologies, and comprised a desk review of the existing laboratory data on the product's performance against bacteria and viruses and laboratory testing of its performance against protozoa. Based on the review of existing data and the abbreviated testing conducted, the product meets WHO performance criteria and is classified as providing *Targeted protection* (★) against bacteria and viruses only.

Background

Evaluation under the Scheme is based on performance criteria set out in *Evaluating Household Water Treatment Options: Health-based targets and microbiological performance specifications* (WHO, 2011). The criteria were determined by applying quantitative microbial risk assessment methods outlined in the WHO *Guidelines for Drinking-water Quality* (2011) and set out $\log_{10}$ reduction targets against bacteria, viruses and protozoa (Table).

WHO performance criteria for household water treatment technologies

Performance classification	Bacteria ($\log_{10}$ reduction required)	Viruses ($\log_{10}$ reduction required)	Protozoa ($\log_{10}$ reduction required)	Interpretation (with correct and consistent use)
★★★	≥ 4	≥ 5	≥ 4	Comprehensive protection
★★	≥ 2	≥ 3	≥ 2	
★	Meets at least 2-star (★★) criteria for two classes of pathogens			Targeted protection
—	Fails to meet criteria for 1-star (★)			Little or no protection

Product description

Aquatabs are effervescent chlorine tablets. The active ingredient is sodium dichloroisocyanurate (NaDCC), which is also known as sodium dichloro-*S*-triazinetrione or sodium triclosene. The tablets, which come as foil-wrapped strips of 10 tablets, are available in various strengths according to the volume and nature of water to be treated. The full product description, illustrations and use instructions can be found at: www.aquatabs.com.

Evaluation approach

Review of existing data

The laboratory data reviewed for the product were from performance testing of the product against bacteria (*Raoultella terrigena*) and viruses (Rotavirus and Poliovirus), based on the United States Environmental Protection Agency (US EPA) Guide Standard for Microbiological Water Purifiers (1987).

Abbreviated laboratory testing

Product-specific test plan: A product-specific test plan was developed based on the manufacturer's instructions for use; the WHO Scheme Harmonized Testing Protocol: Technology Non-Specific V 1.0 (WHO, 2015); and the test plan for Chlorine Disinfection Technologies V 1.0. Testing was conducted at a WHO-designated laboratory, KWR Watercycle Research Institute, in the Netherlands.

Test organisms: Laboratory testing of Aquatabs® investigated the performance of the chlorine disinfectant tablets in inactivating protozoa using *Cryptosporidium parvum* (*C. parvum*) oocysts as the test organism.

Test waters: The product was tested in Challenge Test Water (CTW), simulating surface water. Refer to the technology test plan for Chlorine Disinfection Technologies V 1.0 for details on the physicochemical characteristics of the test water.

Test set-up: Samples from three production lots were provided for the test. All sample units were applied according to the manufacturer's use instructions. Pretreatment and post-treatment water grab samples were analysed using methods identified in the product-specific test plan. Three sample units from each production were tested, resulting in nine sample points (i.e. 3 lots – 3 sample units). Posttreatment chlorine residual samples were collected and analysed. According to the *Guidelines for Drinking-water Quality* (2011), a minimum of 0.2 mg/L of residual chlorine should be maintained at the point of delivery to ensure sufficient disinfection. The concentration of total chlorine in drinking-water should not exceed the health-based guideline value of 5 mg/L.

Results

Desk review outcome

The test organisms and test procedure applied to generate the existing laboratory data were deemed comparable to those of the Scheme and sufficient to determine the bacterial and viral reduction by the product. Based on the review, Aquatabs® meets / exceeds the minimum performance targets for bacteria and viruses.

Abbreviated testing results

The Aquatabs® achieved a mean $\log_{10}$ reduction of 0.2 for *C. parvum* oocysts. Performance was consistent across the three lots tested. Free residual chlorine in treated water ranged from 0.5 to 1.0 mg/L, with a mean concentration of 0.7 mg/L. This was within the limits specified in the *Guidelines for Drinking-water Quality*.

Interpretation and application of results

Performance is classified in three ascending tiers: ★ (one-star), ★★ (two-star) and ★★★ (three-star), as shown in the Table. Both three- and two-star products are classified as providing *Comprehensive protection* against all three microbial groups. One-star products are those that meet performance targets for only two of the three microbial groups, and are classified as providing *Targeted protection*.

Each production unit should consistently meet or exceed the performance target for each microbial group in both test waters (GTW and CTW). A maximum deviation of 0.2 $\log_{10}$ is acceptable for 25% of sample points at the two-star performance tier and of 0.4 $\log_{10}$ at the three-star performance tier[1]. This means that for classification as a two-star product, up to three of the 12 sample points can achieve a reduction of 1.8 $\log_{10}$ for bacteria or protozoan cysts (instead of 2 $\log_{10}$) or of 2.8 $\log_{10}$ for viruses (instead of 3 $\log_{10}$). Each phage is treated separately for evaluating acceptable allowance, and the overall claim for viruses is based on the lower performing phage.

[1] These cut-off values were determined using QMRA modelling and selecting ranges that still resulted in appreciable health gains within a specific performance tier.

Performance classification

Based on the review of the laboratory data submitted and abbreviated testing conducted, Aquatabs® meets or exceeds minimum performance targets for bacteria and viruses. Aquatabs® does not meet performance targets for protozoa. As such, Aquatabs® is classified as providing *Targeted protection* (★) against bacteria and viruses only.

Considerations for product selection

	**Microbial conditions**	Use where contaminant of concern is known to be bacterial / viral microbes
	**Physicochemical water characteristics**	Use in non-turbid source water or as a secondary treatment for water that has been pretreated through e.g. filtration to reduce turbidity and natural organic matter Regardless of source water, regularly measure chlorine demand and free chlorine residual to ensure sufficient disinfection
	**Product information and labelling**	Check that the device is appropriately labelled and has clear instructions for use

References

Evaluating household water treatment options: health-based targets and microbiological performance specifications. Geneva: World Health Organization; 2011 (http://www.who.int/water_sanitation_health/publications/household_water/en/).

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Harmonized Testing Protocol: Technology non-specific version 2.0. Geneva: World Health Organization; 2015 (http://www.who.int/water_sanitation_health/water-quality/household/household-water-treatment-scheme-resources/en/).

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