



Mareva

Public consultation on potential candidates for substitution

NON-CONFIDENTIAL comments

Substance : Polyhexamethylene biguanide Hydrochloride ; PHMB (1415; 4.7)
Supported PTs : PT1, PT2, PT4, PT5, PT6
EC Number : Not allocated (polymer)
CAS Number : 32289-58-0 – 1802181-67-4
eCA : France

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Mareva - Piscines & Filtrations - S.A. au Capital de 3 000 000 €

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COMMENTS

This submission is made in response to the public consultation on Polyhexamethylene biguanide with a mean number-average molecular weight (M_n) of 1415 and a mean polydispersity Index (PDI) of 4.7.

We are submitting the below comments to inform why above PHMB should not be designated as a candidate for substitution.

Maréva was created in 1983 to distribute PHMB under the Brand Baquacil and under the brand Revacil from the 90' until today as a swimming Pool sanitizer for private pools as well as commercial pools.

The main application of biocide products containing PHMB is the sanitising water treatment for pools and SPAs. In France, PHMB was officially approved for the water disinfection for commercial and public pools (in 1991, 2002, 2007 until 2011).

To date, PHMB is the only alternative to chlorine-based products which are the only available treatments for public pool water disinfection. A new approval for the use of PHMB as a water disinfection in commercial and public pools depends on approval of the application PT2(.02) of cited above PHMB.

Chlorine-based products cause many nuisances that are easily perceptible by operating staff and users, such as chlorine odour in pool halls and related rooms, eyes & skin irritations, scraping throat & respiratory tract, miscellaneous discolouration's (hairs or swimsuits), etc...

Chlorine-based products can also cause nuisances that are less perceptible but probably more hazardous in the long term such as the in situ formation of several identified by-products in the treated water and released in the air. The main important (hazardous) ones - chloramines/ NCl_3 and haloforms/THMs - are well known to be hazardous to human, and have the property to easily be transferred in the atmosphere above the treated water, where the users breathe and staff (such as instructors and lifeguards present in an enclosed environment).

Moreover, these by-products are very difficult to avoid and have proven impact on adults as well as children health.



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To decrease the rate of these fatal by-products, pool operators dilute pool water by draining a portion of the treated water, replacing it by an addition of fresh water in the pools and, when possible, by recycling some air of the enclosed hall.

But these solutions generate unreasonable cost (water supply and water that need to be pumped and heated again).

In addition to these impacts on human, degradations are also visible on other parts of the facilities such as metallic parts and structure (including stainless steels), decorative plants, electric devices (switches or light blocks), electronics (computers, cash register), etc...

These disadvantages associated with the use of only available chlorinated sanitizing products for public pools are the same, regardless of their initial physical form (gaseous, liquid, solid) or chemical form (mineral or organic) used.

It must be noted that in France, exposure to chloramines has been included in a list of recognized occupational diseases since 2003 (Décret 2003-110 of 11 Feb. 2003, Table 66, point No34 "*Works exposing to amine derivatives of chlorinated products such as chloramine in swimming pools*").

Despite all these disadvantages, oxidative chlorine remains the only active substance used in public pools.

Thus, to date, PHMB represents the only available non-chlorine and non-oxidative alternative for the treatment of collective pool water.

PHMB is the only biocide active substance providing a real alternative solution to the chloramines problem because, as an organic product and due to its composition, it cannot generate any of these chloramines or haloforms by-products.

Even if a specific know-how to treat swimming pool with PHMB is required, **PHMB represents the only serious alternative to chlorinated products and has been proven efficient over 20 years in many commercial pools in France.**

This is probably the reason why many facility managers (and their staff) were interested in this treatment.

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From 2004 to 2010 several public pools were treated with PHMB.

Regarding the PHMB efficacy, all the swimming pools followed showed acceptable results following the same microbiological controls than for chlorine-based treatments:

To be searched (mandatory)	Conformity interval
Total Coliforms	Maxi = 10 ufc/100 ml (but no fecal coliforms)
Pathogen Germs (particularly staphylococcus)	Absence
Bacteria counting (revivifying aerobics at 37°C)	Maxi = 100 ufc/ml
IF Bacteria counting at 37°C >100 ufc / ml	Mandatory identification of the germs (*)
<i>Pseudomonas Aeruginosa</i> (efficacy indicator for PHMB)	Absence (0 / 100 ml) (*)

(*) Specific for PHMB treated pools.

The only challenge noted during these 20 years was a low efficacy of PHMB on the revivifying germs at 37°C (a parameter counting the non-pathogenic germ in the water, mainly brought by water adduction or, more likely, by swimmers themselves). A solution was found and implemented by using a low pressure UV-reactor at the outlet of the sand filters to control this parameter (as proliferation origin was found to be the sand filter).

PHMB is a more cost efficient solution: all swimming pools that switch from chlorine based products to a PHMB treatment observed **significant cost decreases** :

- **of water consumption** (from 125 L/swimmer/day to 80 L/swimmer/day): see annex 1
- **of energy consumption** (a part being directly linked to the water consumption because additional fresh water inlet must be heated to the set-point temperature, and another part due to air renewing and heating that is decreased). see annex 1
- of maintenance workload during the mandatory 2 annual emptying's
- of electrical breakdown : computer, regulations (level, injection pumps)
- of metal structure repairs that does not get corroded (by presence of chlorine by-products)

Regarding the handling and storage, PHMB only needs to be stored on retention places, which is the case in all premises dedicated to chemicals. Compared to "chlorine-generators", PHMB storage and handling is much safer than chlorine products:

- Gas chlorine: risks of lethal gas leaks
- Chlorine solutions (sodium hypochlorite): risk of incidental lethal gas formation (chlorine) in case of mixture with an acid (pH adjuster in swimming pools) and risk of explosive NCl₃ in case of a mixture with other treatment products (QACs) or with



organic chlorine. Both problems have been reported in public pools, with injuries from important to deaths).

- Chlorine solid (Calcium hypochlorite or organic chlorine, in granulates or pellets): same as for Chlorine solutions, but with higher concentrations and higher risk for explosive mixtures.

Regarding the use by operators, PHMB is very practical because is available under a maximum 20%-aqueous solution:

- It can directly be injected in the water flow back to the pool (usually after the filtration systems). Existing pumps are available with corresponding flow rates.
- If necessary, it can be diluted in water with limited individual Protection Equipments (gloves & protective glasses). 20%-PHMB is quickly soluble in water in all proportions.
- It doesn't react with any of the products used for swimming pools treatment.
- It is very stable to light and temperature; it can be stored during at least 2 years (test in progress for a 4-y stability)

Regarding possible its impact on the environment, PHMB, as any other sanitizer used in public pools follows mandatory and specific processes:

- First mandatory process: filter backwashing operations were done with water from the buffer tank, which was "shock chlorinated" before use. This chlorination step of the buffer tank allows the complete neutralization of PHMB (which is an organic compound) and the shock disinfection of a large part of the revivifying germs in the filter (see above).
- Second mandatory process: for the same reasons, pools volumes were chlorinated before any annual emptying operation. Pool water was not drained until residual chlorine measures are stable over time (24 to 48h).

PHMB is never sent to sewage unless it has been neutralized.

To summarise our points

PHMB is the only alternative to chlorine-based products for swimming public and commercial pools & SPA treatment. The possible alternatives solutions with other biocide active substances do not meet all the benefits provided by the PHMB:

- a) PHMB efficacy allow a use in public pools
- b) PHMB is a serious and economically viable solution for a use public pools
- c) PHMB is easy and practical to use
- d) PHMB can be stored and handled with no risks



ANNEX 1
Economical information
(Public Pool of Pont-de-Claix – 38 – France)

Fluids and Energy consumptions as a function of time:

		2000 ⁽¹⁾	2001	2002	2003 ⁽²⁾	2004
Electricity	[kW.h]	-	-	-	685 798	742 515
Trend		No historical data			-	-
Water	[m3]	18 860	55 523	61 187	40 553	37 171
Trend		58 355			-25.4%	-36.3%
Heating	[kW] ⁽³⁾	747	2009	1924	1555	1519
Trend		Average = 1966.5			-20.91%	-22.8%

(1) New swimming Pool: start in May 2000

(2) Start PHMB treatment in April 2003

(3) Heating ambient air and pool water is performed with hot water, counted in equivalent of kW supplied.

Corresponding economy savings in Euros:

		2000 ⁽¹⁾	2001	2002	2003 ⁽²⁾	2004
Electricity	[kW.h]	-	-	-	50 733 €	51 488 €
Economy		No historical data			-	-
Water	[m3]	34 285 €	69 081 €	85 967 €	56 997 €	70 410 €
Economy		77 524 €			-26.8% (20 527 €)	-9.2% (7 114 €)
Heating	[kW] ⁽³⁾	25 208 €	70 540 €	69 482 €	58 863 €	61 122 €
Economy		Average = 70 011 €			-15.9% (11 148 €)	-12.7% (8 889 €)