

The impact of chlorine gas and atmospheric problems in indoor pools

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Aim of paper

This study aims to analyse the degree of atmospheric chlorine in 21 indoor pools in Spain, and the possible effects on the users (clients and employees) of these sport facilities following by the procedures from National Institute for hygiene and safety work (INSHT) and possible solutions for sport managers to improve their management in this type of sport facilities.

Organisational/managerial context

Indoor pools are one of the most popular types of sports facilities and are also the type that is used most intensively. In Spain today, one of the biggest problems with indoor pools is the management of chlorine levels (most common disinfectant in Spain) in the water (Acosta, Gaviria & Méndez, 2005). This tends to be tightly controlled in most pools, as required by public health regulations.

The direct consequences of irregularity are excessive concentrations of chlorine on the surface of the water (Ferruz, Peña & Santamaría, 1999), producing irritations for both the users of the pool and the employees working there, as they spend many hours a day exposed to the harmful consequences of inhaling a product as highly toxic as chlorine in its gaseous state (Carbonelle et al., 2005; Freixa, 2006; Nickmilder, Carbonnelle & Bernard, 2007). Concentrations higher than 1 ppm can produce coughing, throat irritation and headache, just to stay for a couple of hours' exposition.

Organisational/managerial practice/issues

The samples were taken from 21 indoor pools. The measurements in four points into the indoor pools were carried out by two researchers who followed the Health and Safety at Work Regulations (NTP) 115 and NTP 341 procedures (INSHT, 1976; 1994).

An indirect iodometry method was used, consisting of passing a known quantity of air through an absorbent solution containing potassium iodide in an acidic medium with pH regulated.

For the determination of the iodide levels in each absorbent solution, a calibration curve of the absorbance of the samples with known concentrations of iodide was constructed, using a UV-VIS spectrophotometer (Uvmini-1240) which passed a beam of light with a wavelength of 352 nm through the absorbent solutions.

The measurements showed that in 87% of the cases, the authorised limit for an exposure of 8 hours was exceeded. In 50% of the cases, the measurements exceeded the authorised limits of 2.8 mg of chlorine/m³ for short periods of exposure. In 52% of the measurement points selected, the concentrations of chlorine in the air exceeded the limit of 1 ppm, meaning that susceptible people might feel uncomfortable with the presence of chlorine.

Implications for sport and sport management

We show some general recommendations and possible solutions for sport managers to improve their management in this type of sport facilities about using this disinfectant of water (chlorine): The main recommendation should be change the water disinfectant to a system other than chlorine: ultraviolet, ozone,...

If this disinfectant system is not able to change in the sport facility, because it is cheaper than the others, it is very important thoroughly monitor the parameters of chlorine in the water and remove water from the edges, keeping them as dry as possible at all times.

Therefore to ensure that sunlight does not fall directly on the surface of the water, to prevent rapid evaporation that would enable chlorine to pass from the water into the atmosphere. Keep the surface of the water ventilated at all times. Also, to reduce the impact of chlorine gas in indoor pools, the maintenance personnel and sport managers must to ensure correct recirculation and recycling of the air and keep the air temperature (relative humidity) 2°-3° above the water temperature.

Finally, the Spanish regulations should be move on to another water disinfectant system such as other countries in Europe (Germany or France).

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