Decolouration and Tensides Reduction with Ozone Oxidation

The objective of this article is to present the role played by ozone in achieving environmental friendly strategies for several types of industrial wastewaters that contain colour and recalcitrant pollutants.

Among the most dangerous sources of the natural environmental pollution are the industrial liquid wastes. The rising level of wasting water in the industrial production has caused surface water pollution and serious waste treatment problems.

From the ecological point of view the dye industry actually represents a serious threat. Most authorities engaged in environment protection are particularly interested in the atypical colouration of liquid wastes since colouration in the receiving body of water is also responsible for restrictions in the light transmittance and the self-purification of water.

The ozone plant has been designed for a maximum ozone production capacity of 28 kg/h at 7 wt % concentration, from oxygen (pipeline), supplied by SIAD (PRAXAIR GROUP)

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RANICA WWTP takes the municipal waste water sewages of several northern Districts of Bergamo, through a 20 km long central collector for approximately 75.000 inhabitants. Moreover, it collects wastes from some local industrial groups such as dye and textile, paper, mechanical and food companies. They use water in their production cycle and drain up to 3.000.000 m3/year, so that the plant is globally designed to treat a flow rate (average value) of 2.000 m3/h, for 250.000 A.E.

The effluent discharge into Serio river was still coloured (particularly deep during certain months). It was characterized by foams and Bacteria load which was out of new standard limits (Italian Law 152/1999, EU Directive 91/271/CE and 91/676/CE).

It was absolutely necessary to upgrade the plant with a new "tertiary" treatment. This consisted of a filtration with a subsequent final ozone section.

This treatment resulted suitable for the following purposes:

» enhancing of the standard quality of the wastwater effluent;
» fulfilling limits regarding chemical-physical and microbiological parameters, based on a correct operation of the biological section of the plant;
» a minor impact on the final receptor, due to the decolourization and foam reduction;
» in perspective to reuse treated water for civil and/or industrial purposes;

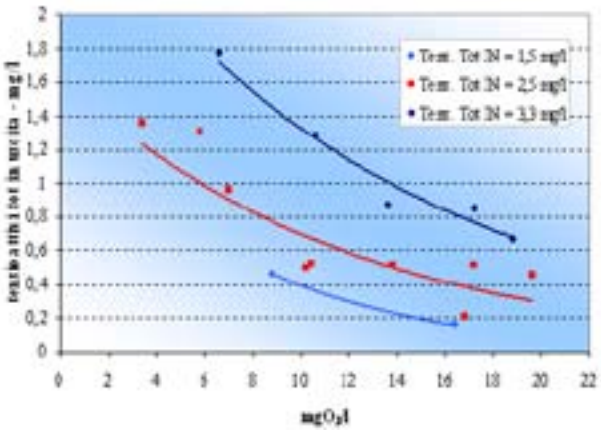
Project Details

Pilot trials directly realised on site, detect a sewage with the following main values:

COD	= 50 - 115 mg/l
BOD5	= 20 - 40 mg/l
suspended solids	= 20 - 60 mg/l
Total Tensides	= 0,6 - 3,6 mg/l
colour	= pale pink - purple
E. COLI	= 104 - 105 UFC/100 ml

In detail emerged a COD and tensides fluctuation in the influent, increasing from the beginning up to the end of the week, detecting 3 different sewage quality categories, on which setting proper ozone dosage.Basing on the above mentioned microbiological parameters, with an ozone dosage of 10 mgO3/l, it was possible to reduce E. Coli down to 1 x 103 UFC/100 ml.

The hydraulic retention time in contact columns, did not influence the final results significantly. Retention time from 10 to 30 minutes gave the same order of result.



Ozone for decolouration and tensides reduction at RANICA WWTP (Bergamo), Italy

sewage quality class	total Tensides inlet	COD inlet	Required O_3 dosage	decolouration quality result
Low concentration	0,5 - 1,5 mg/l	40 - 80 mg/l	10 mg/l	complete decolouration
Middle concentration	1,5 - 2,5 mg/l	80 - 115 mg/l	15 mg/l	complete decolouration
High concentration	2,5 - 3,3 mg/l	80 - 115 mg/l	20 mg/l	complete decolouration

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Xylem Water Solutions Herford GmbH
Boschstr. 4 – 14
32051 Herford, Germany
Phone: +49 5221 930-0