Reducing trace pollutants in waste water with ozonation

A new study from Austria shows that ozonation, a more advanced form of waste water treatment, may be required to further reduce levels of trace pollutants, called micropollutants, in addition to longer treatment times.

Micropollutants include compounds such as antibiotics, pesticides, painkillers and hormones found in contraceptive pills. If these substances are not efficiently removed by waste water treatment processes they can end up in drinking and surface water with potential adverse effects on human and animal health. Nutrient removal, the current best available technology (BAT), has led to greatly improved water quality since its introduction in the 1990s, but presently does not remove all micropollutants.

Previous studies have suggested that ozonation (treating water with ozone) can reduce the levels of micropollutants in waste water. This new study provides further support for using ozonation in waste water treatment plants. It looked at the effects of upgrading on an Austrian sludge treatment plant on micropollutants. The upgrade included increasing the length of treatment times (solids retention time) and applying ozone in the treatment process.

The longer treatment times alone were more effective at removing some of the micropollutants, but for other micropollutants, were not necessary and short treatment times were sufficient.

The results revealed that ozonation generally resulted in an increase in micropollutant removal, and the researchers recommend that ozonation is implemented in addition to increased treatment times. Ozonation worked well for the removal of the anticonvulsant drug carbamazepine and the anti-inflammatory drug diclofenac, reducing levels by nearly 100 per cent. The antibiotic sulfamethoxazole was also mostly removed by ozonation, whereas only around 50 per cent could be removed by ordinary treatment processes, with no improvement due to longer treatment time.

In recent years, concerns about micropollutants have focused specifically on endocrine disrupting compounds (EDCs), which can interfere with the actions of hormones in humans and animals. As of 2007, there were 28 EDCs that the European Commission considered to be of high or medium exposure concern, plus another 50 for which there was not enough data to make a proper assessment¹.

Several of the EDCs in the current study, including estrone, a female reproductive hormone, and ethinylestradiol, were almost wholly removed by the longer treatment times. Thus, because levels were already reduced to below detectable limits, it was difficult to demonstrate the effects of an additional ozonation step on these compounds. However, the researchers say previous research has already shown ozonation to be effective at reducing levels of some of these compounds.


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