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Letter to the Editor

Catalytic reduction of nitrates in natural water: is this a realistic objective?

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I refer to the letter "Assessment of the catalytic reduction of nitrates in water from an environmental point of view," by Professor Ruiz-Beviá. He points out that there is little hope for systems which involve the catalytic reduction of nitrates in drinking water, and that reverse osmosis is a more realistic solution. We are of the opinion that the removal of nitrates by catalytic reduction to reach the required level is an interesting and challenging subject. That is why we and many other scientists are conducting research in this field. We understand that a more active and selective catalyst is required for industrial applications. If sufficiently high selectivity can be achieved, taking into account the activity of the catalyst reported in our work [1] and the use of a fixed-bed reactor, then a LHSV of 350 h^{-1} will be necessary to treat the 1042 m^3/h of water required for a town of 100,000 habitants. The corresponding reactor should have 3 m^3 of catalyst which is not unrealistic.

There are indeed reasons for optimism. Fig. 1 presents some of our more recent catalytic results, obtained with a catalyst based on Mg/Al hydrotalcite containing at least one metal. To avoid time-consuming calculations, we give the results in millimoles per liter instead of milligrams per liter, as is the case in Ref. [1]. The results show that, under the same reaction conditions as described in Ref. [1], the time required to reach the European requirement for nitrates is 20 min. With this, catalyst selectivity to N_2 is 100%. This in turn means that the reaction time for producing acceptable drinking water from the point of view of the nitrate, nitrite, and ammonia concentrations is now 20 min while with the previous reported catalyst [1] it took about 120 min to remove nitrate and nitrite. We have already obtained a fivefold increase in catalytic activity (with 100% selectivity) with respect to the results, upon which the comments of Professor Ruiz-Bevia were based. Clearly we must attempt to increase catalytic activity even more. After all, we believe that the catalytic route for reducing nitrates in drinking water is a rational and realistic option.

References

[1] A.E. Palomares, J.G. Prato, F. Rey, A. Corma, J. Catal. 221 (2004) 62.

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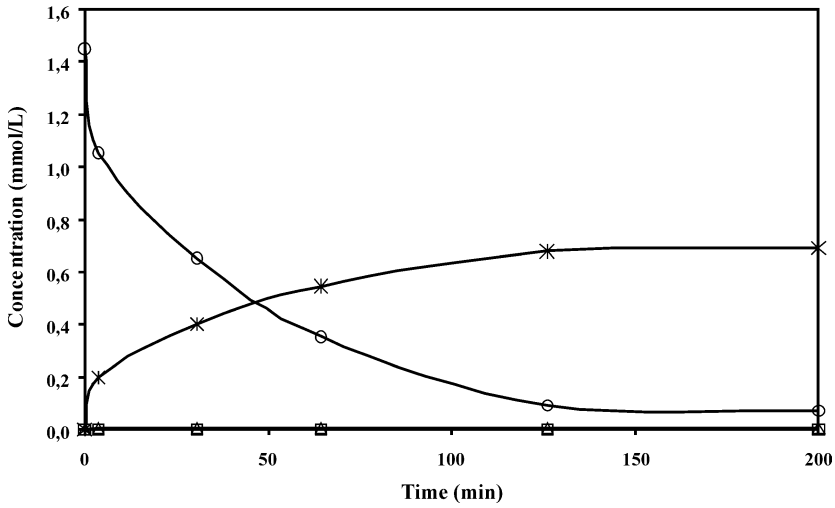

Fig. 1. Mg/Al-hydrotalcite containing at least one metal catalyst. NO_3^- (○), NO_2^- (□), and NH_4^+ (△) concentration profiles (mmol/L) and gaseous N_2 (∗) in millimoles released from 1 L of solution as a function of time. For reaction conditions see [1].