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Development of a new colorimetric method to determine nitrate

The increasing use of artificial fertilizers, the disposal of wastes (particularly from animal farming) and changes in land use have caused a progressive increase in the nitrate levels in groundwater supplies. Drinking water high in nitrates is potentially harmful to human and animal health. Thus, the necessity for development of sensitive methods for the direct determination of nitrate, whereby a simple test can be carried out in the fields, to assess the level of nitrate in particular water body when required has arisen.

The universally accepted, most effective method of nitrate determination is based on the quantitative reduction of nitrate to nitrite, by running the sample through a cadmium column followed by a colorimetric determination. However, due to the use of a packed cadmium column the method is unsuitable for direct testing.

In this project, the oxidizing properties of nitrate are exploited to oxidize an organic compound, which intern will cause the reduction of nitrate. The project was on determination of the reduced product of nitrate (nitrite) and the subsequent use of the reduced product to relate to the concentration of nitrate.

The system obeys the Beer – Lambert's law and has a minimum detection limit of 30 mg dm-3. As a method, it is very simple and can be carried out even in the field. Therefore it could be developed as a field-testing method.

The maximum nitrate level in the WHO (World Health Organization) drinking water quality standard is 45 mg dm-3. As this value is higher than the minimum detection limit of the method developed, it can be concluded that this method is suitable for testing the drinking water quality.