

Social impact of analytical chemistry

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Analytical chemistry has demonstrated its worldwide social impact. The capability of analytical chemistry to detect traces of pollutants and disease-related biomarkers and also to continuously monitor processes is urgently needed by society. However, this capability also requires that scientists disseminate and interpret the data obtained for the public, and discuss the social impact of these data. The following are a few examples of typical problems that affect everybody on a daily basis:

1. Analytical chemistry can help monitor nutrition, food, and especially water using simple methods, and allows hygiene monitoring. An upcoming typical problem is Lake Constance—this large reservoir for the southern part of Baden-Württemberg is becoming polluted by antibiotics and painkillers such as diclofenac.
2. Process analytics allow the monitoring and optimization of processes in industry and skilled crafts, and help reduce power consumption and emission of pollutants.
3. Glucose tests for diabetes, a quite simple form of point-of-care diagnostics, will be adapted for numerous other biomarkers for diseases and inflammatory diseases for use in ambulances, hospital wards and emergency departments, and GP practices. Within a very short time, quantitative or semiquantitative data on the state of the patient can be obtained, requiring no well-trained personnel.
4. Many larger cities in Germany are experiencing problems with fine particulates and diesel exhaust emission. Many

people commute daily between Tübingen and Stuttgart by car, bus, or train—accordingly, there is a high traffic volume in Stuttgart, and under certain weather conditions, the problem of smog arises. There is much talk about nitric oxide in diesel exhaust emission as the analyte whose volume needs to be reduced, and it is said that tire abrasion causing fine particulates poses an even larger problem.

Using these examples, we attempted to persuade Tübingen journalists to discuss these problems parallel to an international conference on analytical chemistry (ANAKON) in early April 2017 that was organized by the Analytical Chemistry Working Group of the German Chemical Society (Gesellschaft Deutscher Chemiker) in Tübingen. We have tried our best to convince the journalists that these problems can be tackled only if valuable data are obtained with sophisticated or easy-to-use devices. We hoped that at least interested people would visit the exhibition to get in contact with companies and ask about the quality and applicability of portable instrumentation to tackle daily problems. However, we could not convince the journalists in the university town of Tübingen—obviously they are overwhelmed by such a mass of information that they did not consider these analytical problems as sufficiently important. So we were happy that the newspaper in a neighboring larger town was interested, and it published a detailed report that brought interested visitors to the exhibition, and especially gave local exhibitors the impression that they could interest local residents in their simple devices.

In view of this experience, it is obvious that scientists in analytical chemistry should make their activities, results, and the consequences accessible to a broader public. Certainly, newspapers and journals with a large readership such as the *Frankfurter Allgemeine Zeitung*, *Der Spiegel*, and *Die Zeit* have good journalists who every now and then write interesting articles about scientific problems; however, there are

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many in Germany who do not read these publications. Therefore, we have to learn to present our relevant results to as many people as possible; we must make them realize the importance of these results for their daily life, and make them aware that decisions, including political decisions, can be made only when as many facts as possible are known and sound data are obtained. Two recent positive results were published in *Analytical and Bioanalytical Chemistry*, and found extreme interest in the community. One is the possibility to use optical spectroscopy to determine *in ovo* the sex of early embryos of the domestic chicken. Thus the shredding of several millions of day-old male chicks in production every year, which is ethically controversial, could be avoided [1]. Recently, a large German discounter announced it would be providing financial support for the development of an applicable industrial process. Another example is the observation of intense and offensive smells in some groups of aquatic children's toys coming from compounds that can be toxic [2].

In view of the high impact of analytical measurement results on society and the problem that nonscientists are not able to interpret these data, and to create a database that responsible persons can use to make decisions, *Analytical and Bioanalytical Chemistry* must also continuously present these data and their social impact. It will be the task of this journal not only to present new methods and applications, but also to show the consequences of these results for society.

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