

2. Production of Schedule 1 chemicals

The aim of this control régime is to confirm that chemicals listed in Schedule 1 are not produced, processed and consumed at declared facilities. This verification task can be fulfilled by two different methods:

- Deviations in the regular production procedure can be detected by recording temperature, pressure and flow profiles, which are unique to a specific reaction. Monitoring large amounts of variables and evaluation with today's methods of computer technology, as for example artificial intelligence or pattern recognition, could be a reasonable procedure to prevent tampering because all measured values have to match in many facets.

However, this monitoring technique is limited in certain cases as for example the production of phosphorus insecticides, which have very similar production procedures to the corresponding nerve gases.

- Detection of undeclared chemicals listed in Schedules 1 and 2 in the production facilities could be done by analytical methods.

As mentioned above, corresponding instruments (process analysers) are today in most cases tailor-made, expensive and highly demanding in service. The most promising analytical development which in the future could overcome these problems is near infra-red spectroscopy with fibre optics. The NIR spectrum as a distinct fingerprint of every molecule is a suitable tool for distinguishing different substances. This measuring technique has several advantages as for example simple sensors and its applicability to gases, liquids and solids. However for a widespread use great efforts have to be made in expanding the library of spectra and improving the mathematical tools for evaluation of the spectra (chemometry), which could also be a valuable method to prevent tampering.

CONCLUSIONS

Process monitoring is used as a standard tool in chemical industry to observe and control production processes. Besides the widely used methods for measuring physical variables, there are also process analysers available today for detecting concentrations. However for financial reasons and because of their high demands of maintenance, these instruments are restricted to the most relevant parameters.