SIMPLE AND INNOVATIVE DETECTION METHOD FOR ACETIC ACID

PATENTED TECHNOLOGY

CONTACT DETAILS:

Research Results Transfer Office-OTRI
University of Alicante
Tel.: +34 96 590 99 59
Email: areaempresas@ua.es
http://innoua.ua.es

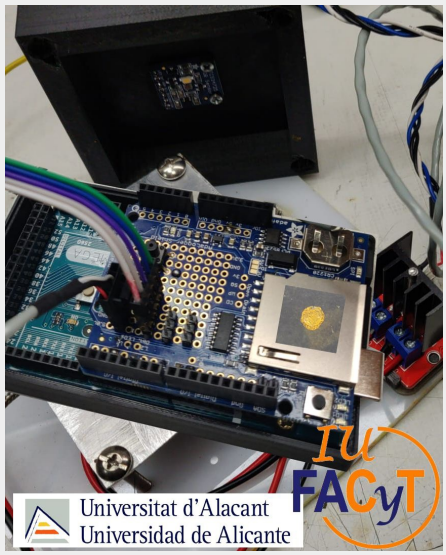
ABSTRACT

Researchers at the University of Alicante have developed a new method for detecting acetic acid using metal coordination compounds with metals that has significant advantages over existing techniques.

It identifies this substance specifically without reacting with other acids, it has a lower cost and is more reliable. In addition, the compound can be easily regenerated and reused.

Acetic acid is an atmospheric pollutant, commonly present inside buildings.

For this reason, its detection and quantification is very important for the prevention of risks to people and for the protection of other elements such as works of art.



INTRODUCTION

Acetic acid is a common substance in industry and is also considered an atmospheric pollutant of artificial origin. In this sense, it is an important element to assess indoor air quality and its presence and accumulation can be a health problem. This question is important in the workplace since the exposure of workers to this substance can be harmful.

On the other hand, it is also important in the museum environment since acetic acid is a harmful substance that can deteriorate works of art.

Currently, there are different methods that allow the detection of acetic acid but they have different drawbacks. Detection methods can be classified into the following groups:

- **Instrumental techniques of chemical analysis**. These are techniques such as gas chromatography, high resolution liquid chromatography, nuclear magnetic resonance and spectroscopic methods. These analysis methods allow to detect acetic acid and its concentration. However, they are expensive techniques that require advanced equipment and long analysis time, and require qualified personnel, so they are not applicable to the working or museum environment.
- **Variations of the density of acetic acid with temperature**. This technique has the drawback that the density also changes with temperature for other compounds, so it is not a specific method for acetic acid and produces unreliable results, especially when it is found in low concentrations.
- **Electrochemical techniques combined with enzymatic reactions**. These techniques use microorganisms that use acetic acid in their metabolism. The drawback of this technique is that it requires very specific conditions and any variation produces low reliability.
- **PH meters, acid-base indicators and acid-base titrations**. They are quick and cheap techniques, but their main problem is

that they do not specifically detect acetic acid. They react in a similar way to different acidic compounds and, therefore, it is not possible to differentiate them. In addition, they are single-use methods that require a new consumable for each test.

TECHNICAL DESCRIPTION

Acetic acid is normally found mixed with other acidic substances. For this reason, it is important to develop a method that allows detecting only acetic acid and being able to quantify its concentration.

The technology developed by the researchers consists of the use of coordination compounds with metals to carry out this detection. This compound normally reacts with acetic acid changing its colour, making it a suitable compound for use as a detector.

The proposed method allows detecting acetic acid in any medium, whether in solution, in the gas phase, in the solid phase or in any combination of these. Upon contact with the acid, a colour change occurs that can be detected visually or through optical means.

After its use, the active medium can be regenerated by a simple procedure and be available again for a new use.

This allows the creation of simple and intuitive detection devices, usable by non-experts and that can also be regenerated and reused.

ADVANTAGES AND INNOVATIVE ASPECTS

MAIN ADVANTAGES OF THE TECHNOLOGY

The advantages of the technology are as follows:

- Allows the specific detection of acetic acid and quantification of its concentration, discriminating it from other acidic compounds with which it may be mixed.
- Detection is fast, simple and intuitive, generating a visually appreciable colour change.
- Acetic acid can be detected in different media (in liquid, solid, gaseous phase or any combination of them).
- It is possible to regenerate the active detection medium through a simple process so it can be reused and therefore reduce the generation of consumables and waste.
- It has a lower cost compared to other methods currently used.
- Results are more reliable and simpler than electrochemical and enzymatic methods.
- It can be used by personnel without specialized training.

INNOVATIVE ASPECTS

The main novelty of the technology is the use of a coordination compound with metals that allows the presence of acetic acid to be detected and its concentration in the medium to be quantified quickly and easily.

Until now, there were no simple methods to detect this compound exclusively and the existing ones required complex analysis processes.

This method can be implemented in a detection device that is easily handled by any user. Detection is fast and very intuitive. In addition, the device can be regenerated and can be made available again for further analysis.

CURRENT STATE OF DEVELOPMENT

The research group has developed the detection procedure and has validated the analysis capacity in different scenarios. The technology can be adapted to different detection devices and materials depending on the needs of the users.

MARKET APPLICATIONS

The technology is useful as a contaminant detection system and in particular for the specific detection of acetic acid. This detection is very useful in closed spaces in work environments where the accumulation of this compound can be harmful to health.

It is also of great interest for the field of museology and heritage conservation since acetic acid can affect works of art.

The technology is useful for companies that need rapid and specific determinations of acetic acid in any type of substrate or in atmospheres in which acetic acid is a contaminant to be detected or quantified.

COLLABORATION SOUGHT

Companies interested in acquiring this technology for commercial exploitation are sought through:

- Patent license agreements.
- R&D project agreement (technical cooperation) to undertake projects related to technology.

Or companies or institutions that need to detect or quantify acetic acid.

INTELLECTUAL PROPERTY RIGHTS

This technology is under **patent application.**

MARKET APPLICATION (3)

Construction and Architecture
Medicine and Health
Chemical Technology

TECHNICAL IMAGES (1)