Evaluation of Odour Intensity by Using Arduino Uno Based Odour Sensory Method

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Abstract: - *Odor pollution is one of the most complicated issue in the environment at kurkumbh industrial area. I studied its sources and dispersion, the physical and chemical properties of odor, odor emission regulations in our countries, odor control technologies as well as the state-of-the-art instrumentation and equipment that are necessary to monitor odor, e.g., chemical sensors, olfactometry, gas chromatography, and electronic noses. In kurkumbh there are many chemical and Pharmaceutical industries these industries release many of Odorous compound in surrounding environment i.e. hydrogen sulfide (H_2S). Odor survey was conducted at each place of work and characteristics of odor release for each kind of business were made clear. And many researches and developments have been carried out to confirm reliable technique. Odor pollution abatement has involved a number of bodies. A complete explanation of pollution abatement and the development of the accompanying instrumentation technology are therefore critical links to understand the whole dimension of odor pollution in the environment. We describe the applicability of these sensor-based methods with respect to practicality in various environmental settings. Finally, we highlight the limitations and the future prospects of these sensor-based methods.*

Key words: - *odour, odour pollution, Arduino , MQ135 Sensor, MQ136 Sensor, olfactometry, annoyance.*

I. INTRODUCTION

With living standard improving, people who demand the quality of the environment is higher and is more sensitive to odor. H_2S is the principal component of odor, high toxicity, it not only damages the health of human being and corrodes equipment's, but also can be oxidized to SO2 by oxygen and ozone, to result in acid rain and destroy our environment. Therefore, elimination of H_2S odor is in great demand in both environmental and economic aspects. Hydrogen sulfide (H_2S) is a toxic gas with a characteristic malodor of rotten eggs H_2S is rapidly absorbed by the lungs, once exposed via inhalation. A variety of industrial epidemiological studies on humans has indicated that exposure to H_2S (at high concentrations) has profound health effects on the respiratory system, which could then lead to unconsciousness with attendant neurological sequelae and, sometimes, death. It has also been associated with cardiovascular related deaths. Further, it can cause a malodor- nuisance problem even at relatively low concentrations. As a first step towards the management of this gaseous pollutant, one has to monitor its behavior in various environmental settings. To determine this noxious gas in environmental samples, gas chromatography (GC)-based methods have been employed most frequently. These quantification methods have proved their reliability in terms of high detectability and precision. However, application of these methods is not simple, as it involves a multi-stage protocol starting from sampling and going to final determination. As such, this approach is not convenient to track down short-term variations in Behavior due to the dynamics of varying environmental conditions. Moreover, offline analytical protocols of H2S analysis can also suffer from a number of biases (e.g., sportive loss in association with its high reactivity. Hence, it has always been a big challenge to measure H2S accurately with the least amount of bias under field conditions. Chemical sensors have been widely used in a number of applications (e.g., critical care, safety, industrial hygiene, process control, product-quality control, human comfort controls, emissions monitoring, automotive industry, clinical diagnostics, home-safety alarms, and homeland security. For real-time monitoring of harmful pollutants that can cause a nuisance, numerous chemical sensors have been developed and employed. These sensors have mainly been based on semiconducting metal-oxide, electrochemical with both liquid and solid electrolyte) sensors, optical sensors, and sensor arrays. These sensor-based devices have shown several advantages in terms of high sensitivity, fast response, easy operation, and low cost. Depending on their material type and fabrication, their sensing principles can vary to a large extent. For example, semiconducting metal-oxide sensors mainly work on the principle of conductivity impedance, whereas electrochemical sensors rely on amperometry, potentiometric, cyclic voltammetry, and impedance measurements. However, the detection principles for optical sensors are based on observation of fluorescence- labeled systems or direct optical detection in the heterogeneous phase. To this end, most H2S gas sensors are developed based on principles of colorimeter and spectroscopy (absorption and fluorescence). The present review is made in an effort to describe the most up-to-date features of these emerging sensor based methodologies for H2S analysis in a practical sense. To this end, we first describe common sensor types after dividing them based on their material type and/or sensing principle. Then, we evaluate their efficacy in terms of real-world applications by comparing their quality-assurance (QA) parameters finally; we summarize these sensor-based methods and discuss them with respect to their advantages, limitations, and future prospects.

II. MATERIAL AND METHODOLOGY

In this structure consist two sensor ammonia (CH_3) MQ135 and hydrogen sulfide (H_2S) MQ136 sensor, display (16x2) and power 5 volts. This makes their work rather easier for them. The sensed gases can be transformed into signals so that a wireless communication can be established between the monitoring places where problem of odour. Hence a proper reading can be provided to them and their surroundings. Also their health conditions can be maintained in a better way which will increase their immune system. MQ135 gas sensor has high sensitivity to ammonia and MQ136 gas sensor has high sensitivity to Hydrogen sulfide.

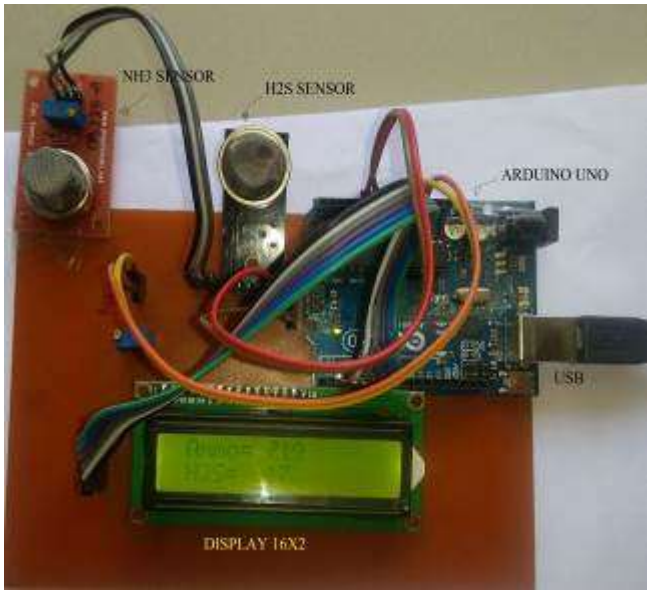

Figure 1: Arduino uno based gas measurement system

2.1 Arduino Uno Arduino Uno

Arduino/Genuino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output bits 6 referent inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started.

Model	MQ136
Sensor Type	Semiconductor
Standard Encapsulation	Bakelite, Metal cap
Target Gas	Hydrogen Sulfide(H_2S gas)
Detection range	1～200ppm

Technical specifications

Microcontroller	ATmega328P
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limit)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
PWM Digital I/O Pins	6
Analog Input Pins	6
DC Current per I/O Pin	20 mA
DC Current for 3.3V Pin	50 mA
Clock Speed	16 MHz
LED_BUILTIN	13
Length	68.6 mm
Width	53.4 mm
Weight	25 g

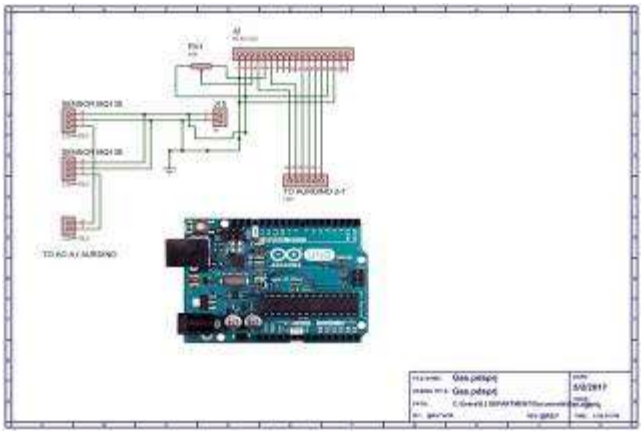

Figure 2: Circuit diagram of Arduino uno based gas measurement system

2.2 MQ136 Gas Sensor for Hydrogen Sulfide

When hydrogen sulfide gas exists, the sensor's conductivity gets higher along with the gas awareness rising. Users can convert the change of conductivity to correspond output signal of gas concentration through a simple circuit. MQ136 gas sensor has high sensitivity to H_2S gas, also can monitor organic vapor including sulfur well. It a kind of low-cost sensor for kinds of applications. It has good sensitivity to H_2S gas in wide range, and has advantages such as long lifespan, low cost and simple drive circuit etc. industrial H_2S gas seepage alarm and moveable H_2S gas detector.

Technical specifications

2.3 MQ135 Gas Sensor for Ammonia gas

When the target combustible gas exist, the sensor's conductivity is higher along with the gas concentration rising. This simple electro circuit, Convert change of conductivity to resemble output signal of gas concentration. This gas sensor has high sensitity to Ammonia, also sensitive to smoke and other injurious gases. It is with low cost and suitable for different application

Application

* Domestic air pollution detector
* Industrial air pollution measurement
* Portable air pollution detector

Technical specifications

Model No.	MQ135	
Sensor Type	Semiconductor	
Standard Encapsulation	Bakelite (Black Bakelite)	
Detection Gas	Ammonia, Sulfide, Benze steam	
Concentration	10-10000ppm (Ammonia, Benze, Hydrogen)	
Loop Voltage	Vc	≤24V DC

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III. METHODOLOGY

An odour emission often consists of a multifarious mixture of many odorous compounds. Logical monitoring of specific chemical compounds present in such odour is generally not useful. As a result, odour sensory methods, in its place of instrumental methods, are normally used to measure such odour. Odour sensory methods are available to observer odour both from source emissions and in the ambient air. Measuring odour can be proficient in several ways instrumental methods, Chemical analysis, electronic methods and sensory test methods or olfactometry. The Accurate measurement of odorous composites and thei impact have been exciting because these compounds possess widely varying physical and chemical properties and are present at concentrations ranging from high parts-per-million (ppm) to low parts-per-billion (ppb). In my study Arduino uno based odor sensory measurement system is used for measurement of intensity of odor. In Kurkumbh industrial area numbers of odours compounds are released from different industries i.e. ammonia, mercaptant, hydrogen sulfide, carbon dioxide, nitrogen etc. This procedure was developed based on prevailing theoretical background on evaluation of odor, covering the measurement of gases (H_2S and NH_3), olfactory perception and assessment of climate conditions at the time of measurement. The methodology was validated by evaluating odor at 9 different points (in areas near the chemical and pharmaceutical industries) in the Kurkumbh near Daund district pune chemical analysis were applied for detection of odors in this work, and the methodology applied was olfactory evaluation with the aid of a device for measuring gases Quantitative measurements of the gases H_2S and NH_3 were carried out using the equipment portable gas detector (measurement of H_2S and NH_3) which has a detection limit of H_2S and NH_3 ranging from 0 to 300 ppm. The temperature and relative humidity were determined from metrological data and the wind direction was determined by using pavanreka wind rose software.

IV. RESULT & DISCUSSION

Finding the sources of odor and their compound in the study area. At present this data is recorded only at the Kurkumbh industrial area. This data might be useful to evaluate the compound present in maximum in that area. Beside to the records of the production of odor emission sources it is also important to have records at the point of stack or chimney. Also pattern of emission odors gas from chimney or stack. It is important to measure the metrological data (wind speed, temperature, humidity etc.) required for the measurement of intensity of odors compound i.e. hydrogen sulfide and ammonia. Unplanned field survey has been conducted within Kurkumbh industrial area to collect the qualitative data of concentration of odor present at that area and also identify the effect of odor on the living people. For the examination of odor in the Kurkumbh select different location. Select total nine location surrounding the Kurkumbh industrial area The observation of all location understand that the total particle counts before and after the vegetative buffer were reduced by over 30% and odorous compound concentrations This intensity is compared to the standard given by the Maharashtra pollution central board (MPCB), OSHA and identifies the variation of odour intensity. By using the arduino uno based gas sensor measure the intensity of odorous compound within kurkumbh at different locations.

V. CONCLUSION

The issue of odor standardization has progressed significant during the last few years. It is important to understand well about the characteristics of each odor emission sources and its economic condition. In this paper use arduino uno based odor sensory system are used and intensity of odour producing gasses gasess are measured within Kurkumbh industrial area of Daund region district Pune. At different location different temperature, wind speed and direction, and humidity. Then understand that the intensity of odor reductions if the temperature increases and the reverse of wind blowing and wise versa. The increasing attention of the population to olfactory nuisances. Odour samples are problematic to store, because of their volatility, and, therefore, require rapid time of analysis. Finally, as it is well-known, Ardiuno based odor sensory system is too low time-consuming and quite expensive. As compare to all other methods this method is

most feasible and we can observe the periodical variation of odour intensity.

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REFERENCES

[1] Journal of Indian Association for Environmental Management, Vol 29, No. 1, February, 2002 (ISSN 0970-8480).

[2] Leger, C., 2008. Odors supervision setting by Air Norm and, air pollution monitoring network.

[3] CPCB Newsletter on Odour Pollution & its Control.

[4] Real-Time Monitoring of Odor Emission Regions, Cases and Methods, Scientific Lab. Center co, LTD, KOSORE Wokshop, pp. 35-50, 2

[5] Occupational Safety and Health Administration (OSHA), Fact sheet of Hydrogen sulfide(H_2S), DSG10/2005 (http://www.osha.gov/OshDoc_Hurricane_Facts/hydrogen_sulfide_fact.pdf).

[6] Odour Regulation and Odour Legislation Overview. (www.odournet.com/legislation.html)

[7] Bates, D.V., and Caton, R.B. 2002. A Citizen's Guide to Air Pollution. Second Edition.

[8] ASTM D1391: Standard Test Method for Measurement of Odor in Atmospheres (dilution method), American. Society for Testing and Materials, Philadelphia, PA, 1978.