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Study and Analysis of Odour at Baramati Industrial Areas

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ABSTRACT

In this paper, odour pollution in the environment will be reviewed, including its sources and dispersion, the physical and chemical properties of odour, odour emission regulations in selected countries, odour control technologies as well as the state-of-the-art instrumentation and technology that are necessary to monitor odour, e.g., chemical sensors, olfactometry, gas chromatography, and electronic noses. Since the Law of Offensive Odour Control was enacted, many enterprises have made efforts to prevent odour nuisance. Odour survey was conducted at each factory and characteristics of odour emission for each kind of business were made clear. And many researches and developments have been carried out to confirm reliable technique. In order to remove odourants from exhaust gas, deodorizing plants have been installed at various emission sources gradually. Much formation for odour control could have been stored up for these 30 years. In my seminar, an outline of odour pollution control at various emission sources in India is introduced, that is, a number of newly installed deodorization facility, characteristics of odor emission from each type of business, efficiency of deodorizing equipment, recent trend of the development. The different odour measurement methods were introduced to Indian experts and priority was set to methods which do not need a lot of technical facilities or expertise. It was observed that the most feasible option to carry out an odour survey in India is to use Field Investigation Method. Applied field investigation method was modified to fit India's need to measure different odour intensities based on the experience that clearly recognizable odour is observed as an annoyance.

Keywords : Odour, Odour Pollution, Instrumentation, Olfactometry.

I. INTRODUCTION

I.INTRODUCTION Whether pleasant or unpleasant, odour is induced by inhaling air-borne volatile organics or inorganics. Odour is sensory response to the chemicals in the inhaled air. Air quality is affected not only due to conventional air pollutants but also due to unpleasant odours. The usual effect of bad odours is nuisance ,but in more serious cases it may lead to feelings of nausea and headache and to other symptoms that appear to be related to stress .odour pollution has distinctly different characteristics and is undoubtedly the most complex of all all the air pollution problems. Till date, not much attention has been paid towards odour problem in the country. With growing population, industrialization and urbanization, the odour problem has been assuming objectionable proportion. Urbanization without proper sanitation facilities is a major cause of odour problem. Rapidly growing

industrialization has aggravated the problem through odorous industrial operations. Undesirable odour contributes to air quality concerns and affect human lifestyles. Odour is undoubtedly the most complex of all the air pollution problems. Odour pollution has distinctly different characteristics and is undoubtedly the most complex of all the air pollution problems. The land-use in India is complicated, as residential areas develop close to industrial regions the impacts from odorous substances generated from industrial activities (e.g. pulp & paper, distillery, sugar, bulk drug, pharmaceuticals, petrochemical and pesticides) result in increasing public complaints. Besides industrial activities unpleasant odour is generated from open sewer, polluted rivers and municipal solid waste landfills.Unlike conventional air pollutants, odour has distinctly different characteristics, which, to an extent, can be comparable with noise pollution. Similar to noise, nuisance is the primary effect of odour on people.

Odour legislation in India

In India emission Limit Values for few industrial sectors which include emission which may be odorous but limit values are not set based on their odor potential. There are for example emission limit values for hydrogen sulfide 5-150 mg/m^3, ammonia 5 mg/m^3, total organic carbon 0.1-20 mg/m^3 and carbon sulfide 125-225 kg/t of produced rayon fibre. Mentioned industrial sectors are large pulp & paper industry, pesticide industry, petroleum and oil refineries, rayon industry and other petrochemical industry. It is mentioned in the Environment Act (1986) that all efforts shall be made to remove unpleasant odor as far as practicable. Odor removal techniques and overview of measurement techniques are presented in the guidance for reducing odor emissions (CPCB 2008).

II. METHODS AND MATERIAL

A. Location for odor measurement

The latitude of Baramati, Maharashtra, India is 18.150663, and the longitude is 74.576782. Baramati, Maharashtra, India is located at India country in the Cities place category with the gps coordinates of 18° 9' 2.3868'' N and 74° 34' 36.4152'' E. Baramati, Maharashtra, India elevation is 552 meters height, that is equal to 1,811 feet.

B. Significance of choosing the problem

Names of the industries in the study area.

Name of Industry	Gasses emmitions
Bharat forge Pvt. Ltd.	NH_3, H_2S, SO_2
Piaggio Vehicles Pvt. Ltd.	NH_3,CL_2, H_2S
Imsofer manufacturing India Pvt. Ltd.	NH_3, H_2S, SO_2,CL_2
Schreiber Dynamics Dairies	NH_3, H_2S, SO_2,CL_2
Baramati Speciality Steels Ltd.	NH_3, H_2S, SO_2
Baramati Textile Industries	NH_3, H_2S, SO_2,CL_2

C. Sensory test method for odor measurement

In our study Arduino uno based odor sensory measurement system is used for measurement of intensity of odor. In Baramati industrial area numbers of odour compounds are emitted from different industries i.e. ammonia, mercaptant, hydrogen sulfide, carbon dioxide, nitrogen etc. This methodology was developed based on existing theoretical framework on evaluation of odour, 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 the sensory method use arduino uno based gas measurement system it consist two sensor (ammonia (NH_3) MQ136

and hydrogen sulfide (H_2S) MQ135 sensor), display (16x2) and power 5 volts.

Arduino Uno

Arduino/Genuino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog 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.

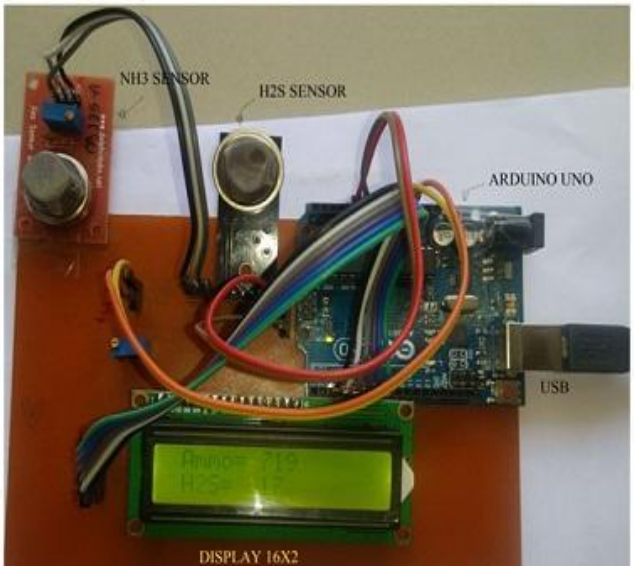


Fig.1 Arduino Uno based odor sensory measurement system

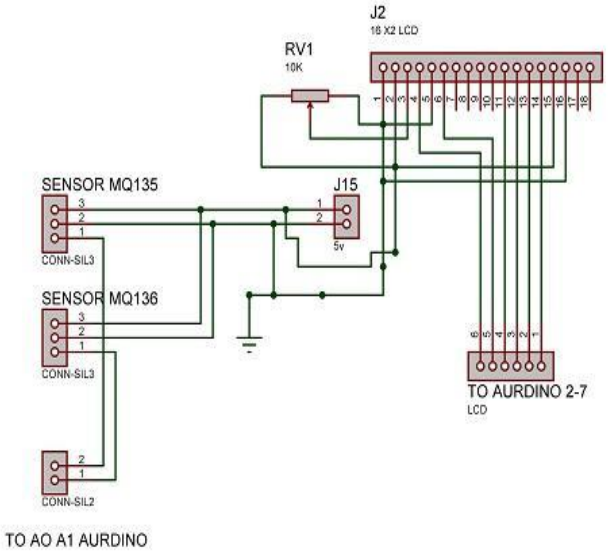


Fig. 2 Circuit diagram of Arduino Uno based sensor

D. Temperature & humidity variation within Baramati

Time	7 am	9 am	11 am	1 am	3 pm	5 pm	7 pm
Temp.	22^0	24^0	28^0	31^0	34^0	36^0	36^0
Humidity	24%	18 %	9%	8%	7%	7%	8%

III. RESULTS AND DISCUSSION

Observation of NH3 and H2S gas at three location in MIDC Baramati area

Table 1. Baramati-Bhigwan road

Time	Ammonia gas		Remark	Hydrogen sulphide gas		Remark
	dB	ppm		dB	ppm	
		(dB/1024)* 300			(dB/1024)* 300	
7am	230	67.38	Irritated eyes, throat and mucous membranes	13	3.80	Tearing of the eyes, Headaches or loss of sleep
9am	220	64.45		11	3.22	
11am	215	62.98		11	3.22	
1pm	212	62.10		10	2.92	

3pm	202	59.17		10	2.92	
5pm	190	55.66		11	3.22	
7pm	187	54.78		12	3.51	

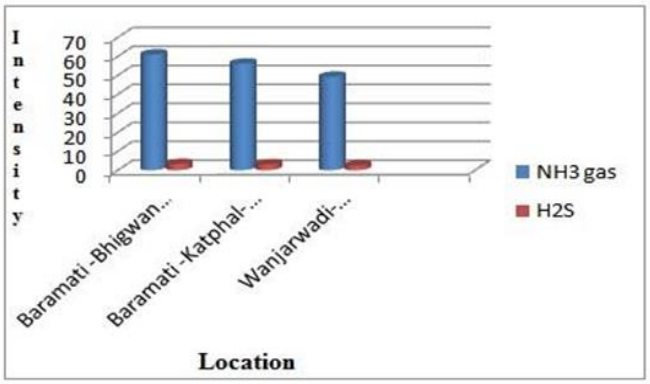
Table 2. Baramati-Katphal-Shirsuphal road

Time	Ammonia gas		Remark	Hydrogen sulphide gas		Remark
	dB	ppm		dB	ppm	
		(dB/1024)* 300			(dB/1024)* 300	
7am	210	61.52	Irritated eyes, throat and mucous membranes	12	3.51	Tearing of the eyes, Headaches or loss of sleep
9am	204	59.76		12	3.51	
11am	195	57.12		10	2.92	
1pm	190	55.66		11	3.22	
3pm	184	53.90		09	2.63	
5pm	180	52.73		10	2.92	
7pm	178	52.14		09	2.63	

Table 3. Wanjarwadi-Katphal-Shirsuphal road

Time	Ammonia gas		Remark	Hydrogen sulphide gas		Remark
	dB	ppm		dB	ppm	
		(dB/1024)* 300			(dB/1024)* 300	
7am	190	55.66	Irritated eyes, throat and mucous membranes	11	3.22	Tearing of the eyes, Headaches or loss of sleep
9am	182	53.32		10	2.92	
11am	175	51.26		08	2.34	
1pm	168	49.21		08	2.34	
3pm	160	46.87		07	2.05	
5pm	155	45.41		08	2.34	
7pm	148	43.35		07	2.05	

Maximum average intensity of NH_3 & H_2S gas witg graphical representation



IV. CONCLUSIONS

Dynamic olfactometry represents the standardized objective method for the determination of odour concentration, it is affected by some limitations. First of all dynamic olfactometry provides point odour concentration data, however, it is not sufficient to evaluate completely a case of olfactory nuisance because it does not allow one to perform continuous and field measurements, useful for monitoring the industrial processes causing odour emissions. Moreover, dynamic olfactometry considers the whole odour mixture and do not discriminate the single chemical compounds and their contribution to the odour concentrations. Odour samples are difficult to store, because of their instability, and, therefore, require rapid time of analysis. Finally, as it is well-known, Ardiuno based odor sensory system is too time-consuming and quite expensive and moreover frequency and duration of analysis are limited. On the other hand, electronic noses present lower analysis costs and quick results and they allow one to carry out continuous monitoring in the field nearby sources and receptors. After a training step, electronic noses are able to preview the class of an unknown sample and then to associate environmental odours to a specific source. Since each technique satisfies only a part of the problems of odour monitoring, many authors have focused their attention on carrying out comparisons and integrations between olfactometry and E-Nose results. These applications show the opportunity of using more than one approach for describing and understanding olfactory nuisance cases as completely as possible.

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