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Real Time Analysis of Total Volatile Organic Compounds in Ambient Air at Different Areas Kalasin, Thailand

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Abstract: The aim of this study was to investigate the real time analysis of total volatile organic compounds in ambient air at difference areas Kalasin, Thailand. The method sampling 10 locations such as road, cycle road, main road, bus station, fixing motorcycles, gas station, fixing car care, big gas station, intersection road and food center. Detection total volatile organic compound with real time via. TVOCs tester (The Extech instruments Model VFM200). The results found TVOCs in road, cycle road, main road, bus station, fixing motorcycles, gas station, fixing car care, big gas station, intersection road and food center were 483±75.8, 169±39.9, 410±90, 372±61, 384±52.5, 599.5±165, 754±21.6, 709.5±84.6, 495±56.5 and 125±14 μg/m^3. Some location exceeded USEPA guideline (<200 μg/m^3). Thus, the workers should be provided with the personal protective equipment meanwhile the workers and customers should avoid exposure to TVOCs for a long course of time.

Key words: TVOCs, ambient air and Kalasin, investigate, detection, equipment, customers

INTRODUCTION

Volatile Organic Compounds (VOCs) are an essential group of natural compounds in atmospheric chemistry. They can be either emitted into or shaped within the environment (Kim and Lee, 2013) Volatile Organic Compounds (VOCs) are nonmethane organic compounds containing one or more carbon atoms that have high vapor pressures and therefore, evaporate with no trouble to the environment (EPA., 2012; Kozicki *et al*., 2018). Inside the past decades, many studies had been centered at the non-carcinogenic health outcomes (e.g., respiratory disease or infection) of non-criteria air pollutants within the atmospheric environment that are ordinarily released from a selection of anthropogenic assets together with petrochemical facilities, motor automobiles, steel processing/completing industries, fuel stations and electricity sectors. However, a totally high occurrence of leukemia and lung/liver cancers has been taking place in the urban environment between the evolved and growing countries (Tsai, 2016).

Volatile Organic Compounds (VOCs) are an essential institution of natural compounds in atmospheric chemistry. They can be both emitted into or fashioned within the ecosystem. Primary emission VOC sources encompass each herbal (e.g., biomass burning) and anthropogenic (e.g., vehicular exhaust, cooking emission, incense burning and cigarette smoke). Many VOCs have damaging fitness effects and play vital roles in stratospheric Ozone (O_3) depletion, the formation of poisonous secondary organic aerosols, the formation of tropospheric ozone and the escalation of worldwide warming (Badjagbo *et al*., 2007; Choi *et al*., 2011; Ho *et al*., 2013). VOCs are nonmethane organic compounds containing one or more carbon atoms that have high vapor pressures and therefore, evaporate without difficulty to the surroundings. VOC emissions end result from natural and anthropogenic (man-made) sources. Herbal assets of VOCs include flowers, forest fires and animals even though herbal assets of VOC emissions are more standard there are anthropogenic sources in populated and industrialized regions which might be every other contributor to air great. The important anthropogenic assets of VOCs are motors, using solvents and solvent containing merchandise and industrial and agricultural assets (Ciganek and Neca, 2008) and unstable Organic Compounds (VOCs) which could set off allergic reaction in real lives (Mizukoshi *et al*., 2015).

Consequently, it's far essential to have correct emission inventories of VOCs to conduct air exceptional modelling studies for the improvement of best emission control techniques and for air first-class forecasting as well as to observe their temporal emission tendencies over the years as emission control techniques come to be applied. The large range of emission assets, both anthropogenic and biogenic and techniques main to those emissions (combustion, evaporation and flowers metabolism) make the development of accurate VOCs emission inventories hard. Furthermore, VOCs emissions cannot be derived from mass balances of the emission technique (as can be completed for instance for sulfur or heavy metal emissions) and that they ought to be acquired from measurements conducted at the supply of

the emissions. Additionally, emission testing is luxurious and a few emission elements are advanced for overall VOCs instead of for person. Koohkan *et al.* (2013) VOCs are man-made and/or certainly going on extraordinarily reactive hydrocarbons. World fitness organization defined VOCs as any organic compound whose boiling point is in the variety from (50-a hundred) to (240-260°C), corresponding to having saturation vapor pressures more than 102 kPa at 25°C (ISO16000-6, 2011). Many forms of VOCs are poisonous or even deadly to humans and may be destructive to the environment. Therefore, a multitude of definitions exist globally relying at the context body used by special organizations such as United Nations Economic Commission for Europe (UNECE) and US Environmental Protection Agency (EPA., 2012; Berenjian *et al.*, 2012).

Herbal origins of VOCs include wetlands, forests, oceans and volcanoes with the estimated global VOCs biogenic emission fee at about 1150Tg/year. A majority of VOCs are created from anthropogenic sports consisting of manufacturing industries, petrochemical industries and vehicular emissions (EPA., 2012). Maximum VOCs are image-chemically sensitive and when exposed to oxides of nitrogen and daylight could shape ozone and other products. The reactions represented with the aid of Eq. 1, involve VOCs oxidation with NOx, hydroxyl catalyzing a number of the important thing reactions including other chemical compounds. Ozone formation is as a result mainly pushed by using available nitrogen oxides and VOCs. Resulting floor degree ozone formation and carcinogenic smog is the principle motive of concern. Because the wide range of VOCs implies an extensive range of response charges. VOCs are able to lengthy range distribution and accumulation in components of environment (EPA., 2012; Berenjian *et al.*, 2012). Therefore, fuel stations can be taken into consideration a few of the most important assets of VOCs emissions in city regions. The primary assets of VOCs emission at gas stations are: fuel vapors emission from vent pipes of Underground Storage Tank (UST) both at the time of discharge of petrol tanker into the UST, in addition to during the day (respiratory evaporation of the UST); gas vapors emission at the time of vehicle fueling; gasoline vapours emission from a UST which has no longer been water proofed completely (Lemieux *et al.*, 2004; Eisaei *et al.*, 2015) Volatile Organic Compounds (VOCs), consisting of formaldehyde and acetaldehyde are causal materials of the Sick constructing Syndrome (SBS) or a couple of Chemical Sensitivities (MCS) (Hori *et al.*, 2013). The goal of this research to determine TVOCs in ambient air at Kalasin Thailand.

MATERIALS AND METHODS

Sampling sites: The method sampling difference 10 locations such as road, cycle road, main road, bus station, fixing motorcycles shop, gas station, fixing car care, big gas station, intersection road and food center. The transport locations were road, cycle road, main road and intersection road. Two gas stations locations such as big gas station and medium gas station. Fixing motor stations such as fixing motorcycles shop and fixing car care. The other station such as bus station and food center.

Sampling methods: Analysis of total volatile organic compound with real time via. TVOCs tester (The Extech instruments Model VFM200) that recoded data on wet season 2019 (Hori *et al.*, 2013; Supanee *et al.*, 2017).

RESULTS AND DISCUSSION

The results found the TVOCs concentration measured by the VOC taster in difference area Kalasin, Thailand such as road, cycle road, main road, bus station, fixing motorcycles, gas station, fixing car, big gas station, intersection road and food center in Table 1. The temperature all ten locations were 27-30°C. The relative humidity of ten locations were 73-85%.

The transportation locations such as road, cycle road, main road and intersection road found real time of TVOCs were 483±75.8, 169±39.9, 410±90 and 495±56.5 μg/m^3, respectively. The gas station and big gas station found real time of TVOCs were 599.5±165 and 754±21.6 μg/m^3, respectively. Fixing motorcycles shop and fixing car care found real time of TVOCs were 384±52.5 and 709.5±84.6 μg/m^3, respectively. Bus station found real time of TVOCs was 372±61 μg/m^3. The food center found real time of TVOCs was 125±14 μg/m^3.

TVOCs in ambient air at different area Kalasin, Thailand such as road, cycle road, main road, bus station, fixing motorcycles shop, gas station, fixing car care, big gas station, intersection road and food center. Were 483±75.8, 169±39.9, 410±90, 372±61, 384±52.5, 599.5±165, 754±21.6, 709.5±84.6, 495±56.5 and 125±14 μg/m^3. Some location exceeded USEPA guideline (<200 μg/m^3). Thus, the workers should be provided with the personal protective equipment meanwhile the workers and customers should avoid exposure to TVOCs for a long course of time.

The highest of TVOCs all ten locations was the big gas station that detected TVOCs as 754±21.6 μg/m^3. The highest of TVOCs at transportation locations (road, cycle road, main road and intersection road) was intersection road that detected TVOCs as 495±56.5 μg/m^3. Fixing car care found TVOCs was higher than fixing motorcycles shop. TVOCs at bus station found was 372±61 μg/m^3. TVOCs at food center was 125±14 μg/m^3 that was lowest of TVOCs at ten locations. Some location exceeded USEPA guideline (<200 μg/m^3) and however, the resulted showed the amount of TVOCs of all

Table 1: Comparison of the TVOC concentration measured by the VOC tester in different area Kalasin, Thailand

Locations	TVOC concentration average±SD (μg/m^3)
Road	483±75.8
Cycle road	169±39.9
Main road	410±90
Bus stations	372±61
Fixing motorcycles shop	384±52.5
Gas station	599.5±165
Big gas station	754±21.6
Fixing car care	709.5±84.6
Intersection road	495±56.5
Food center	125±14

gas station exceeded IQA standards (Internal Quality Assurance and the European standards and guidelines). Thus, the workers should be provided with the personal protective equipment meanwhile the workers and customers should avoid exposure to TVOCs for a long course of time.

VOCs are critical institution of air pollutants which are regularly known as poisonous or dangerous air pollution (HAPs), the crucial function in the formation of ozone and pleasant particulate count number by way of photochemical smog and additionally contribute to most serious health-related influences.

CONCLUSION

In addition, they purpose acute signs inclusive of irritations of the nostril, throat and eyes, purpose headaches, nausea, dizziness, allergic skin reactions and also can harm the inner organs which includes the liver and kidneys (Zheng *et al*., 2011; Zhang *et al*., 2013), moreover, some compounds of VOCs won't be instant hazards, however can cause persistent fitness dangers (Al Madhoun *et al*., 2012; Shuai *et al*., 2018) VOCs are natural compounds with big vapor pressures and consist of aldehydes, ketones and other light hydrocarbons. VOCs can cause inflammation and that they also can negatively affect human health at rather excessive concentrations. Possible side outcomes of exposure to VOCs encompass unwell constructing Syndrome (SBS) or a couple of Chemical Sensitivity (MCS) that may arise even at low concentrations. To analyze the contribution of VOCs to these ailments and to hold air best, the composition of VOCs inside the air desires to be decided (Oka *et al*., 2010; Choi *et al*., 2011).

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