Ambient air monitoring of nitrogen dioxide at Kalimati, Tirtomartani, Kalasan, Sleman, Yogyakarta

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Abstract. Nitrogen dioxide (NO₂) is one of parameters in air quality according to Indonesia Government No. 41/1999. NO₂ has influence in respiratory problem of human being if it exceeds threshold level (400 µgNO₂/Nm³). This study is air monitoring of NO₂ concentration in ambient air and it uses a Griess Saltzman method using the spectrophotometer (Indonesia Standard SNI 19-7119.2-2005) near of Plywood Industry and Main Road. The sampling location has two points at Kalimati Village, Tirtomartani, Kalasan, Sleman, D.I Yogyakarta. On December 2016, the results show which NO₂ concentration is below threshold level with 0,469 µg NO₂/Nm³ at first point and 0,234 µg NO₂/Nm³ at second point.

Keywords: Ambient Air Monitoring, Nitrogen Oxide, Kalimati, Griess-Saltzman

1 Introduction

Nitrogen Oxide (NO₂) is outdoor air pollutant [1] and it causes environmental problem such as health problem in respiratory problem and acid rain[2]–[4]. NO₂ come from combustion process with use oxygen excess [3]. NO₂ is also come from reaction between Nitric Oxide, NO and Oxygen, O₂ in internal combustion engine. Therefore, NO₂ is resulted from transportation sector both gasoline engine and diesel engine. This study objective is to monitor ambient air near Stack of Plywood industry at Kalimati Village, Purwomartani, Kalasan, Yogyakarta (LS 7°44'26.67" BT 110°27'45.47") and Main Road.

2 Methodology

2.1 Sampling Location

The air monitoring used two sample locations. The first sample location has agreement with the wind direction and the north of industrial plywood stack [5]. Table 1 shows the coordinate sampling point and table 2 presents the sampling scheduling on December 2016

Table 1. Coordinate of Sampling Location

Location	Coordinate Point
First	LS 7°44'25.7028" BT 110°27'50.6016"
Second	LS 7°44'20.598" BT 110°27'47.1456"

Table 2. Sampling Shcedule

Day	Time
Monday/Tuesday Afternoon	13.00 - 14.00
Thusday Morning	09.00 - 10.00

2.2 Sampling and Analysis

NO₂ sampling used single impinger with flow rate 0.4 lpm (liter per minute) and NO₂ analysis used Griess-Saltzman Method with spectrophotometer 550 nm. The analysis concept is NO₂ absorb by solution Griess-Saltzman to form azo-dye substance with pink in 15 minute [6].

3 Result and Discussion

3.1 Sampling Location

Fig. 1. Map of Kalasan, Sleman, Yogyakarta

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Fig. 2. Map of Sampling Location

Fig. 3. Sampling location at first point (a) and second point (b)

3.2 Sampling and Analysis

NO₂ sampling used single impinger with flow rate 0.4 lpm (liter per minute) and NO₂ analysis used Griess-Saltzman Method with spectrophotometer 550 nm. The analysis concept is NO₂ absorb by solution Griess-Saltzman to form azo-dye substance with pink in 15 minute.

Fig. 4. Temperature and Pressure for Morning Day

Fig. 5. NO₂ Concentration for Morning Day

Fig. 6. Temperature and Pressure for Afternoon Day

Fig. 7. NO₂ Concentration for Afternoon Day

At the first point in figure 4 Morning temperature is between 30-45°C, Pressure is around 740 mmHg, NO₂ concentration is slightly below 0.600 µg/Nm³ in average. During afternoon in figure 6, the temperature between 32 to 42°C, Pressure is around 740 mmHg. NO₂ concentration is slightly above 0.35 µg/Nm³. Temperature has influence during ambient air monitoring [6]. Temperature from morning to afternoon 37oC in average, and the reduce concentration two times. At the second point in figure 5, Morning temperature is between 30-

45°C, Pressure is around 740 mmHg. NO₂ concentration is slightly below 0.600 µg/Nm³ in average. During afternoon, the temperature between 32 to 42°C, Pressure is around 740 mmHg. Figure 7 shows which NO₂ concentration is somewhat above 0.35 µg/Nm³. So temperature from morning to afternoon 37°C in average, and the reduce concentration two times.

4 Conclusions

The ambient air monitoring has conducted at Kalimati Village, Tirtomartani, Kalasan, Sleman, Yogyakarta. On December 2016. Sampling location of NO₂ used two points and analysis of NO₂ used Griess-Saltzman method. The results show which NO₂ concentration is below threshold level with 0,469 µg NO₂/Nm³ at first point and 0,234 µg NO₂/Nm³ at second point.

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