

Analysis of Air Pollution Levels in Lubuk Begalung Sub-District Padang

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ABSTRACT

Increasing development activities will also increase the risk of air pollution and environmental damage. This will cause damage to the structure and basic functions of ecosystems that support the lives of humans and other living creatures. Therefore, research regarding the analysis of air pollution levels is becoming increasingly important to carry out. This research aims to analyze the level of air pollution in Lubuk Begalung Sub-District, Padang City, and analyze the main sources of pollution that have an impact on the level of pollution. The research methods used in this research include direct observation and laboratory analysis to measure air quality and analyze the content of pollutants in it. Analysis of air pollution levels was carried out using descriptive statistical methods. Descriptive statistics were used to summarize the data and calculate the mean, median, and standard deviation values of the observed air quality parameters. The ISPU value obtained for the Total Suspended Particulate (TSP) parameter is 30.65, PM10 is 46.46, CO gas is 101.64, NO₂ gas is 49.2 and SO₂ gas is 50.86. From the analysis results, it can be seen It was concluded that the air quality in the Lubuk Begalung Sub-District area is still safe and has not polluted the air which is dangerous to human, animal, or plant health.

KeyWords: Ambient, Air Pollution Levels, Environment, Lubuk Begalung.



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INTRODUCTION

Increasing development activities will also increase the risk of air pollution and environmental damage. This will cause damage to the structure and basic functions of ecosystems that support the lives of humans and other living creatures. Industrial activities have important items that have the potential to produce air pollutants. The smoke produced by industry is released into the atmosphere (Edinov, 2013). Air pollutants that can be released by industry include dust particles, Sulfur Dioxide (SO₂) gas, Nitrogen Dioxide (NO₂) gas, Carbon Monoxide (CO) gas, Ammonia (NH₃) gas, and Hydrocarbon (HC) gas (Mukono, 2011). Republic of Indonesia Government Regulation No. 41/1999 explains that air pollution is the entry or introduction of substances, energy, and other components into the ambient air by human activities so that the quality of the ambient air drops to a certain level which causes the ambient air not to fulfill its function.

Air pollution is the presence of one or more physical, chemical, or biological substances in the atmosphere in amounts that can endanger human, animal, and plant health, disturb aesthetics and comfort, and damage property. Air pollution refers to the release of pollutants into the air that are detrimental to human health and the planet. Air pollution can be caused by natural sources or human activities. Some definitions of physical disturbances

such as noise pollution, heat, radiation, or light pollution are considered air pollution. The natural nature of air means that the impact of air pollution can be direct and local, regional, or global (Sompotan & Sinaga, 2022).

According to the World Health Organization (WHO), every year air pollution is responsible for nearly seven million deaths worldwide. Nine out of ten humans currently breathe air that exceeds WHO guideline limits for pollutants, with those living in low- and middle-income countries suffering the most. The classification of air pollution materials can be divided into two parts, namely primary pollutants and secondary pollutants. Primary pollutants are pollutant substances that arise directly from air pollution sources. Carbon monoxide is an example of a primary air pollutant because it is a product of combustion. Secondary pollutants are polluting substances formed from reactions of primary pollutants in the atmosphere. Ozone formation in photochemistry is an example of secondary air pollution (Fitriyanti, 2016).

At certain concentration levels, air pollutants can have a direct impact on human health, either suddenly or acutely, chronically or chronically/sub-clinically, and with vague symptoms. Given the severity of the health impacts, much research has been conducted regarding the assessment of PM levels and quantification of their sources (Goyal et al., 2021). Variations in PM levels are caused by quite high domestic and industrial emissions and are a routine phenomenon. In another study, Gokhale (2011) reported higher concentrations at traffic intersections due to non-uniform traffic flow patterns and frequent queues and emissions exposed there. The consequences that arise in the human body due to pollutants are irritation of the respiratory tract mucosa, which increases the incidence of Chronic Non-Specific Respiratory Diseases (CNSRD), such as asthma and bronchitis. Some organic materials in the form of dust particles can cause pneumoconiosis, and biological materials such as viruses, bacteria and fungi can cause infections and allergic reactions. The impact of air pollution on the environment, flora, and fauna, whether primary or secondary, has the same chain as on humans, where at certain levels it will have an impact on reducing the level of agricultural productivity, which will also have an impact on other sectors. Meanwhile, the impact of pollution on materials is corrosion and loss of the beauty of the material (Budiyono, 2010).

This research was conducted in Lubuk Begalung Sub-District. Lubuk Begalung Sub-District is one of 11 sub-districts in Padang City. This sub-district has an area of 30.91 km² consisting of 15 sub-districts, where the land area is equivalent to 4.62 percent of the land area of the Padang City area, and has a population density of 3998 people in 2021 (BPS, 2018). Lubuk Begalung Sub-District is one of the areas designated as an industrial area (Ali et al., 2022). This is one of the causes of air pollution caused by various factors, such as industrial pollution, transportation, and domestic pollution. Therefore, efforts are needed to analyze the level of air pollution in Lubuk Begalung Sub-District, so that appropriate action can be taken to reduce the level of air pollution. This research aims to analyze the level of air pollution in Lubuk Begalung Sub-District, and to analyze sources of pollution that have an impact on the level of air pollution in Lubuk Begalung Sub-District.

METHODS

Analysis of air pollution levels was carried out using descriptive statistical methods because the aim was to describe the condition of air pollution levels in Lubuk Begalung Sub-District. Descriptive statistics were used to summarize the data and calculate the mean, median, and standard deviation values of the observed air quality parameters. Apart from that, this research is also quantitative because the data obtained from field observations and laboratory analysis are measured using numbers and statistics.

2.1 Research Preparation

2.1.1 Preliminary Survey

The preliminary survey aims to estimate that the selected study location is suitable and meets requirements such as the specific research location, location situation plan, accuracy of the method chosen, estimated survey time, determination of the type and equipment to be used, availability of electrical power, estimated costs and amount of resource power. humans needed.

2.1.2 Research Sample

The sample used in this research was ambient air at the research location. The sample to be analyzed is polluted ambient air at the specified research location. The parameters that will be tested are TSP, Particulate Matter (PM10), CO gas, NO₂ gas, and SO₂ gas. Samples were obtained using a method based on the Government Regulation Indonesia No. 22/2021 concerning the Implementation of "Environmental Protection and Management".

2.1.3 Tools Used

In this research, writing tools were used in the form of books and pens, stopwatches or timers, cameras, High Volume Air Sampler (HVAS), Impinger Air Sampler, Spectrophotometer, and Gravimetry.

2.1.4 Selection of Research Locations

The research location chosen was Lubuk Begalung Sub-District. This sub-district has an area of 30.91 km² consisting of 15 sub-districts, where the land area is equivalent to 4.62 percent of the land area of the Padang City area and has a population density of 3998 people in 2021 (BPS, 2018). The location selection meets the location criteria, namely as follows:

- At the point one air sampling location, there is an intersection of four red lights in Lubuk Begalung where there is a meeting of vehicles from four lanes, and it is also an intersection that is very frequently passed using transportation, be it public transportation, private vehicles, or utility vehicles heavy from the industry.
- At point two air sampling location, is an industrial area where there are many factories and coal storage, and is frequently passed by heavy equipment and other types of vehicles so it has the potential to pollute the air.

The point three air sampling location, it is a densely populated residential area that has the potential to cause air pollution caused by community activities, also often called domestic air pollution.

2.1.5 Selection of Research Locations

The measurement time for TSP, PM10, and pollutant gases CO, NO₂, and SO₂ was carried out on September 18th, 2023 at 09.35 WIB until the air sample measurement process was completed.

2.2 Research Implementation

2.2.1 Research Techniques

The research techniques used in this research include:

- Literature Study: A literature study was carried out to understand concepts and theories related to air pollution and to find out about previous research that has been carried out regarding the evaluation of air pollution levels in large cities in Indonesia.
- Observation: Field observations were carried out to directly observe environmental conditions and the main sources of pollution in Lubuk Begalung Sub-District, such as industrial pollution, transportation, and domestic pollution. Direct observations were carried out using air quality measuring instruments, such as TSP, PM10 measuring instruments using HVAS, as well as CO gas, NO₂ gas, and SO₂ gas using an impinger air sampler.
- Laboratory Analysis: Laboratory analysis was carried out to measure the content of pollutants in the air taken at the research location. The air samples taken are then analyzed by the laboratory to determine the type and amount of pollutants contained in them. Laboratory analysis is carried out in the UPTD laboratory. Occupational Safety and Health, West Sumatra Province Manpower and Transmigration Service.
- Data Analysis: Data that has been collected from field observations and laboratory analysis is then processed and analyzed using statistical programs. The analysis was carried out to determine the level of air pollution in Lubuk Begalung Sub-District, and to determine the main sources of pollution that have an impact on the level of pollution.
- Drawing conclusions: Conclusions are drawn regarding the level of air pollution in the city and the main sources of pollution that need to be addressed. Apart from that, conclusions are also drawn to provide recommendations regarding efforts that can be made to reduce the level of air pollution in the city.

2.2.2 TSP, PM10, and Gas Pollutant Data Collection

TSP, PM10, and Gas Pollutant data collection will refer to the Republic of Indonesia Government Regulation No. 22/2021 concerning the Implementation of Environmental Protection and Management. Sample parameter measurements are guided by SNI 19-7119.3-2005 regarding how to test total suspended particles using HVAS equipment for TSP and PM10 sampling. Meanwhile, pollutant gas samples were taken using an impinger air sampler.

2.2.3 Quality Testing for TSP, PM10, and Gas Pollutants

Air pollutants can be gases consisting of CO gas, NO₂ gas, and SO₂ gas and in the form of TSP or PM10 dust (Munfarida et al., 2015). TSP, PM10, and gas pollutants will be tested by the UPTD Occupational Safety and Health Laboratory, West Sumatra Province Manpower and Transmigration Service.

2.2.4 Data Collection on Number of Vehicles

Data on the number of vehicles is calculated using software in the form of an application called Traffic Counter and is calculated manually and will be classified per hour of measurement. Passing vehicles will be divided into 3 categories, namely buses (buses, trucks, tank cars, and other heavy vehicles), passenger cars (sedans, minibusses, pickups), and motorbikes (two-wheeled vehicles).

2.2.5 Data Analysis Techniques

- Average Value Calculation Method

$$m = \frac{\text{Amount of data}}{\text{Lots of data}}$$

$$m = ?$$

- ISPU Calculation Method

$$A = \frac{I_A - I_B}{X_A - X_B} (X_X - X_B) + X_B$$

Information :

- I = Calculated ISPU
- IA = ISPU Upper Limit
- IB = ISPU Lower Limit
- XA = Upper Limit Ambien
- XB = Ambien Lower Limit
- Xx = Actual Ambien Level Measurement Results.

RESULTS

The results of the analysis of air pollution levels carried out in Lubuk Begalung Sub-District, Padang City, are based on data that has been collected. This research includes air quality parameters such as TSP, PM10, CO gas, NO₂ gas, and SO₂ gas. Analysis of air pollution levels was carried out using descriptive statistical methods. Descriptive statistics were used to summarize the data and calculate the mean, median, and standard deviation

values of the observed air quality parameters. A summary of the results of the analysis of air quality tests that have been carried out can be seen in Table 1 below.

Table 1. Ambient air quality test results

No	Parameter	Test result			Average value ($\mu\text{g}/\text{Nm}^3$)	Quality Standards
		Point One Location ($\mu\text{g}/\text{Nm}^3$)	Point Two Location ($\mu\text{g}/\text{Nm}^3$)	Location of Point Three ($\mu\text{g}/\text{Nm}^3$)		
1	Total Particulate Dust	246,50	217,84	152,61	205,65	230
2	PM10	53,27	48,03	27,48	42,92	75
3	Gas CO	342,59	260,34	132,56	245,16	10.000
4	Gas SO ₂	95,58	79,63	49,97	75,06	150
5	Gas NO ₂	107,73	71,10	55,41	78,08	200

From the results of the analysis of air pollution levels carried out in Lubuk Begalung Sub-District, conversion to ISPU was then carried out so that we can find out what level of air pollution occurs at the research location or in Lubuk Begalung Sub-District. The conversion results from research results converted to ISPU can be seen in Table 2 below.

Table 2. ISPU conversion results

No	Parameter	ISPU figures	ISPU Category
1	Total Particulate Dust	30,65	Has no impact on human, animal and plant health.
2	PM10	46,46	Has no impact on human, animal and plant health.
3	Gas CO	101,64	It is detrimental to humans or sensitive animal groups or can cause damage to plants or aesthetic values.
4	Gas SO ₂	50,86	It has no effect on human or animal health but does affect sensitive plants.
5	Gas NO ₂	49,2	Has no impact on human, animal and plant health.

3.1 Data on Number of Vehicles

The following is data on the number of vehicles passing through the research location. This data was obtained by counting the number of vehicles using software in the form of an application called Traffic Counter. Data was obtained by manually counting the number of passing vehicles. Data on the number of vehicles was obtained on the same day and time when the air sampling was taken, the number of vehicles was calculated for one hour per location, and data on the number of vehicles was taken from three research locations at the same time as the air sampling location can be seen in Table 3 below.

Table 3. Data on number of vehicles

No	Transportation type	Location Point One	Location Point Two	Location Point Three	Average Number
1	Motorcycle	2117/jam	293/jam	2078/jam	1.496/jam
2	Sedan Car (Private)	1686/jam	496/jam	274/jam	818/jam
3	Truck (Large Vehicle)	1023/jam	409/jam	8jam	480/jam

3.2 TSP Levels

The data in testing TSP parameters was obtained using HVAS and tested and analyzed

using the gravimetric method. From the diagram above we can see that the results of air quality testing and analysis that have been carried out show that the level of air pollution by TSP parameters at research location point one (Lubuk Begalung intersection) is 246.50 $\mu\text{g}/\text{Nm}^3$. Meanwhile at the research location point two on the Batuang Taba Bypass highway (in front of the United Tractors, Tbk office) the level of air pollution by the TSP parameter was 217.84 $\mu\text{g}/\text{Nm}^3$, and at the research location point three on Jalan Parak Laweh the results of the analysis of the level of air pollution by TSP parameter was 152.61 $\mu\text{g}/\text{Nm}^3$, so an average value was obtained of 205.65 $\mu\text{g}/\text{Nm}^3$. The average value obtained from the analysis results was then converted to ISPU with an ISPU figure of 30.65 in the category of having no impact on human, animal, and plant health.

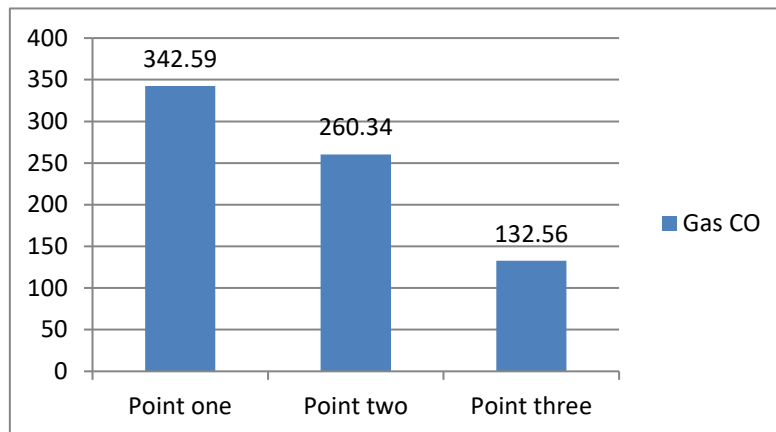


Figure 1. TSP test results diagram

If we look at and compare it with the air quality standards, the value of the air pollution level by the TSP parameter is still safe because the level of pollution produced is still below the air quality standards. None of these concentrations have passed the ambient air quality standards of the Republic of Indonesia Government Regulation No. 22/2021, namely 230 g/m^3 . However, at research location point one (Lubuk Begalung intersection) the results of the analysis show that the TSP value has exceeded the air quality standard threshold, which means it has had an impact on human health or the environment, therefore direct action or efforts are needed to prevent this from happening. Air pollution poses a greater risk to humans and the environment. From data on the number of motorized vehicles passing through the research location which is a source of air pollution, the average number of motorbike-type vehicles passing through the research location is 1,496 vehicles/hour with a maximum number of 2,117 vehicles/hour at the location point one (Lubuk Begalung sub-district). The lowest number was 293 vehicles/hour at the point two locations (Jl. Raya By Pass Batuang Taba/in front of the United Tractors Office). For sedans or other types of private cars, the average number of vehicles passing is 818 vehicles/hour with a maximum number of 1,686 vehicles/hour at location point one (Lubuk Begalung sub-district), and the lowest number is 274 vehicles/hour at location point three (Jl. Parak Laweh). Meanwhile, for heavy vehicle types such as trucks and the like, the average number of vehicles passing is 480 vehicles/hour with a maximum number of 1,023

vehicles/hour at point one location (Lubuk Begalung sub-district), and the lowest number is 8 vehicles/hour at point location three (Jl. Parak Laweh).

3.3 Air Particle Levels (PM10)

The data in testing the PM10 parameters was obtained using HVAS and analyzed using the gravimetric method. From the diagram above we can see that the results of air quality testing and analysis that have been carried out show that the level of air pollution by the PM10 parameter at research location point one (Lubuk Begalung intersection) is 53.27 $\mu\text{g}/\text{Nm}^3$. Meanwhile at the research location point two on the Batuang Taba Bypass highway (in front of the United Tractors office) the level of air pollution by the PM10 parameter was 48.03 $\mu\text{g}/\text{Nm}^3$, and at the research location point three on Jalan Parak Laweh the results of the analysis of the level of air pollution by the PM10 parameter amounted to 27.48 $\mu\text{g}/\text{Nm}^3$, resulting in an average value of 42.92 $\mu\text{g}/\text{Nm}^3$. The average value obtained from the analysis results was then converted to ISPU with an ISPU figure of 46.46 in the category of having no impact on human, animal, and plant health.

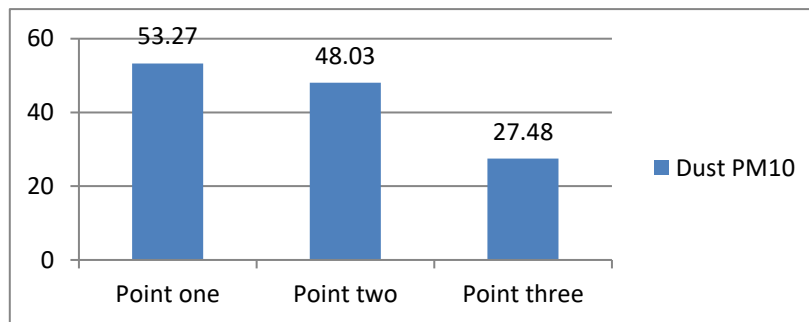


Figure 2. Diagram of PM10 dust test results

If we look at and compare it with air quality standards, the value of the level of air pollution by the PM10 parameter is still safe because the value or level of pollution produced is still below the air quality standard. None of these concentrations have passed the ambient air quality standards of the Republic of Indonesia Government Regulation No. 22/2021, namely 75 g/m^3 . If we look at the data on the number of motorized vehicles passing through the research location which is a source of air pollution, the average number of motorbike-type vehicles passing through the research location is 1,496 vehicles/hour with a maximum number of 2,117 vehicles/hour at location point one (Lubuk Begalung sub-district), and the lowest number was 293 vehicles/hour at the point two locations (Jl. Raya By Pass Batuang Taba/in front of the United Tractors Office). For sedans or other types of private cars, the average number of vehicles passing is 818 vehicles/hour with a maximum number of 1,686 vehicles/hour at location point one (Lubuk Begalung sub-district), and the lowest number is 274 vehicles/hour at location point three (Jl. Parak Laweh). Meanwhile, for heavy vehicle types such as trucks and the like, the average number of vehicles passing is 480 vehicles/hour with a maximum number of 1,023 vehicles/hour at point one location (Lubuk Begalung sub-district), and the lowest number is 8 vehicles/hour at point location three (Jl. Parak Laweh). This research provides the

same analysis results as research conducted by Ruslinda & Wiranata (2014) which explains that PM10 concentrations in Padang City City have not yet exceeded the threshold for ambient air quality standards by Republic of Indonesia Government Regulation No. 41/1999, namely 150 g/m³.

3.4 CO Gas Concentration

The results of carbon monoxide gas analysis obtained using an impinger and analyzed using methods based on SNI 7119.10: 2011 show that the level of air pollution by CO gas parameters at the research location point one (Lubuk Begalung intersection) is 342.59 µg/Nm³. Meanwhile, at the research location point two on the Batuang Taba Bypass highway (in front of the United Tractors office) the level of air pollution by the CO gas parameter was 260.34 µg/Nm³, and at the research location point three on Jalan Parak Laweh the results of the analysis of the level of air pollution by parameter CO gas was 132.56 µg/Nm³, so an average value was obtained of 245.16 µg/Nm³. The average value obtained from the analysis results is then converted to ISPU with an ISPU figure of 101.64 in the category of being detrimental to humans or sensitive animal groups or causing damage to plants or aesthetic value.

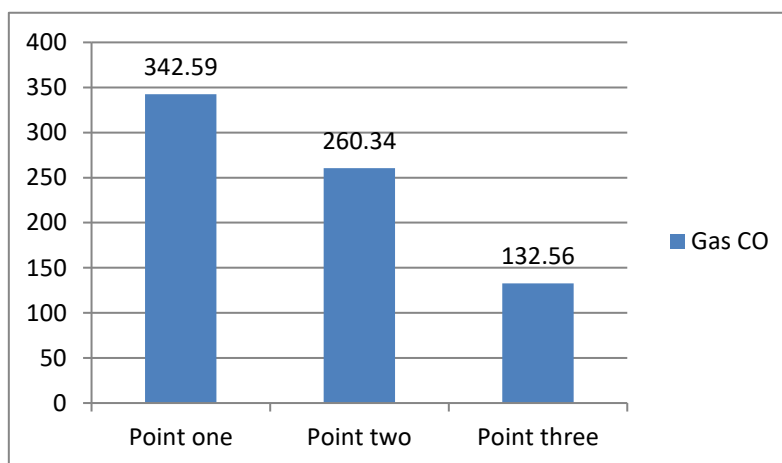


Figure 3. Diagram of CO gas test results

If we look at and compare it with air quality standards, the value of the level of air pollution by the CO gas parameter is still safe for both humans and the environment because the value or level of pollution produced is still below the air quality standards. None of these concentrations have passed the ambient air quality standards of the Republic of Indonesia Government Regulation No 22/2021, namely 10,000 g/m³. If we look at the data on the number of motorized vehicles passing through the research location which is a source of air pollution, the average number of motorbike-type vehicles passing through the research location is 1,496 vehicles/hour with a maximum number of 2,117 vehicles/hour at location point one (Lubuk Begalung sub-district), and the lowest number was 293 vehicles/hour at the point two location (Jl. Raya By Pass Batuang Taba/in front of the United Tractors Office). For sedans or other types of private cars, the average number of vehicles passing is 818 vehicles/hour with a maximum number of 1,686 vehicles/hour at

location point one (Lubuk Begalung sub-district), and the lowest number is 274 vehicles/hour at location point three (Jl. Parak Laweh). Meanwhile, for heavy vehicle types such as trucks and the like, the average number of vehicles passing is 480 vehicles/hour with a maximum number of 1,023 vehicles/hour at point one location (Lubuk Begalung sub-district), and the lowest number is 8 vehicles/hour at point location three (Jl. Parak Laweh). This research provides the same analysis results as research conducted by Irawan et al, (2021) which explains that the concentration of CO gas in Padang City has not yet exceeded the threshold for ambient air quality standards.

3.5 NO₂ Gas Concentration

Data from NO₂ gas analysis results obtained using an impinger and analyzed with SNI 7119-2: 2017 shows that the level of air pollution by the NO₂ gas parameter at research location point one (Lubuk Begalung intersection) is 107.73 µg/Nm³. Meanwhile, at the research location point, two on the Batuang Taba Bypass highway (in front of the United Tractors office) the level of air pollution by the NO₂ gas parameter was 71.10 µg/Nm³, and at the research location point three on Jalan Parak Laweh the results of the analysis of the level of air pollution by parameter NO₂ gas was 55.41 µg/Nm³, so an average value was obtained of 78.08 µg/Nm³. The average value obtained was analyzed and then converted to ISPU with an ISPU figure of 49.2 in the category of having no impact on human, animal, and plant health.

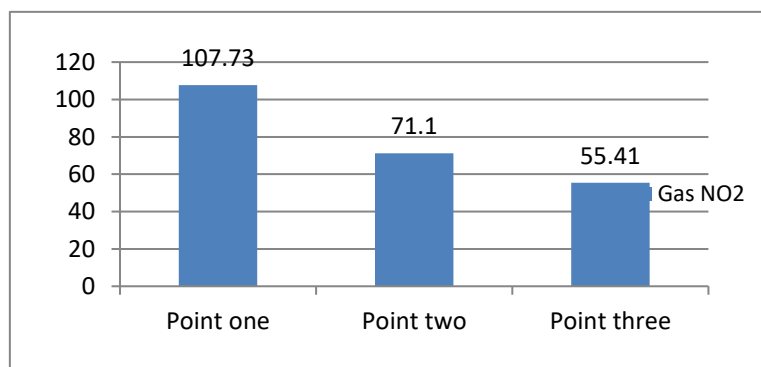


Figure 4. Diagram of NO₂ gas test results

If we look at and compare it with air quality standards, the value of the level of air pollution caused by the NO₂ gas parameter is still safe and does not have an impact on humans or the environment because the value or level of pollution produced is still below the air quality standards. None of these concentrations have passed the ambient air quality standards of the Republic of Indonesia Government Regulation No. 22/2021, namely 200 g/m³. From data on the number of motorized vehicles passing through the research location which is a source of air pollution, the average number of motorbike-type vehicles passing through the research location is 1,496 vehicles/hour with a maximum number of 2,117 vehicles/hour at the location point one (Lubuk Begalung sub-district). The lowest number was 293 vehicles/hour at the point two locations (Jl. Raya By Pass Batuang

Taba/in front of the United Tractors Office). For sedans or other types of private cars, the average number of vehicles passing is 818 vehicles/hour with a maximum number of 1,686 vehicles/hour at location point one (Lubuk Begalung sub-district), and the lowest number is 274 vehicles/hour at location point three (Jl. Parak Laweh). Meanwhile, for heavy vehicle types such as trucks and the like, the average number of vehicles passing is 480 vehicles/hour with a maximum number of 1,023 vehicles/hour at point one location (Lubuk Begalung sub-district), and the lowest number is 8 vehicles/hour at point location three (Jl. Parak Laweh), this data can be seen in Table 3. This research provides different analysis results from research conducted by Afrianita (2022) which explains that the concentration of NO₂ gas in Padang City City has exceeded the threshold for ambient air quality standards by Republic of Indonesia Government Regulation No. 41/1999, namely 200 g/m³.

3.6 SO₂ Gas Concentration

The data from the analysis of SO₂ gas parameters was obtained using an impinger and analyzed using a method based on SNI 7119-7: 2017. The results of the analysis in the diagram above show that the level of air pollution by SO₂ gas parameters at research location point one (Lubuk Begalung intersection) is 95.58 µg/Nm³. Meanwhile, at the research location point two on the Batuang Taba Bypass highway (in front of the United Tractors office) the level of air pollution by the SO₂ gas parameter was 79.63 µg/Nm³, and at the research location point three on Jalan Parak Laweh the results of the analysis of the level of air pollution by parameter SO₂ gas was 49.97 µg/Nm³, so an average value was obtained of 75.06 µg/Nm³. The average value obtained from the analysis results was then converted to ISPU with an ISPU figure of 50.86 in the category of having no effect on human or animal health but affecting sensitive plants.

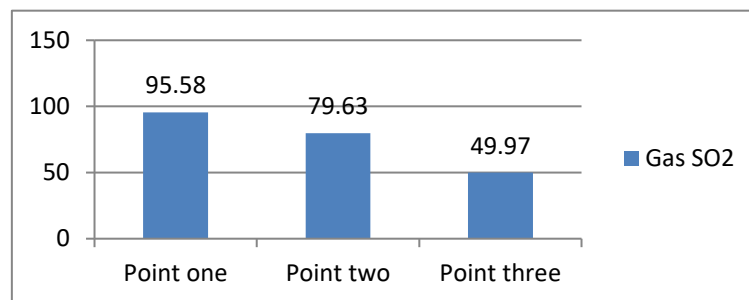


Figure 5. Diagram of SO₂ gas test results

If we look at and compare it with the air quality standards, the value of the level of air pollution caused by the SO₂ gas parameter is still safe and does not have an impact on humans or the environment because the value or level of pollution produced is still below the air quality standards. None of these concentrations have passed the ambient air quality standards of the Republic of Indonesia Government Regulation No. 22/2021, namely 150 g/m³. If we look at the data on the number of motorized vehicles passing through the research location which is a source of air pollution, the average number of motorbike-type

vehicles passing through the research location is 1,496 vehicles/hour with a maximum number of 2,117 vehicles/hour at location point one (Lubuk Begalung sub-district), and the lowest number was 293 vehicles/hour at the point two location (Jl. Raya By Pass Batuang Taba/in front of the United Tractors Office). For sedans or other types of private cars, the average number of vehicles passing is 818 vehicles/hour with a maximum number of 1,686 vehicles/hour at location point one (Lubuk Begalung sub-district), and the lowest number is 274 vehicles/hour at location point three (Jl. Parak Laweh). Meanwhile, for heavy vehicle types such as trucks and the like, the average number of vehicles passing is 480 vehicles/hour with a maximum number of 1,023 vehicles/hour at point one location (Lubuk Begalung sub-district), and the lowest number is 8 vehicles/hour at point location three (Jl. Parak Laweh). This research provides the same analysis results as research conducted by Nurhatika & Regia (2022) which explains that the concentration of SO₂ gas has not yet exceeded the threshold for ambient air quality standards by Republic of Indonesia Government Regulation No. 22/2021, namely 150 g/m³.

CONCLUSIONS

This research aims to analyze the level of air pollution in Lubuk Begalung Sub-District. From the results of the analysis, it can be concluded that the air quality in the Lubuk Begalung Sub-District area is still safe and has not polluted the air which is dangerous to human, animal, and plant health. From the results of the analysis that has been carried out, we can see the level of air pollution in Lubuk Begalung Sub-District, with the ISPU value obtained for the TSP parameter of 30.65 with the ISPU category having no impact on human, animal and plant health. The ISPU value obtained for the PM10 dust parameter was 46.46 with the ISPU category having no impact on human, animal and plant health. The ISPU value obtained for the CO gas parameter is 101.64 with the ISPU category being detrimental to humans or sensitive animal groups or can cause damage to plants or aesthetic value. The ISPU value obtained for the NO₂ Gas parameter was 49.2 with the ISPU category having no impact on human, animal and plant health. The ISPU value obtained for the SO₂ gas parameter is 50.86 with the ISPU category. It has no effect on human or animal health but affects sensitive plants.

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