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FACULTY OF PUBLIC HEALTH UNIVERSITAS AIRLANGGA
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November 19th, 2016

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On behalf of the committee we are pleased to inform you that your abstract
Title : Analysis of Ammonia (NH3) Emissions Treatment in Factory Production I PT. Petrokimia Gresik

was accepted for **Oral Presentation** in the 1st International Symposium of Public Health 2016.

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The accepted abstracts shall completed with full paper consist of 8-10 pages which is written in English according to our guidelines as you could access in our website. Your full paper will then be reviewed through a merit system by the scientific committee. The successful paper will be published at Advanced Science Letters as Conference Proceeding (ISBN). The publication of the paper will need another IDR 200.000 additional fee.

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We kindly remind you, that presenting author should be registered as participant, proceed with the payment for the conference fee:

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Thank you for having submitted your abstract, as well as your participation in the 1st International Symposium of Public Health 2016. If you have any inquiry, please do not hesitate to contact us.

Warm Regards,

Dr. Sri Sumarmi, S.KM, M.Si

DOCTORAL AND UNDERGRADUATE PROGRAM, FACULTY OF PUBLIC HEALTH
COLLABORATION WITH AIRLANGGA HEALTH SCIENCE INSTITUTE

Certificate

This is to certify that:

Prehatin Trirahayu Ningrum,S.KM.,M.Kes

Has attended

Oral Presentation

In The 1st INTERNATIONAL SYMPOSIUM OF PUBLIC HEALTH (ISOPH)

"Emerging and Re-emerging Diseases"

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ANALYSIS OF AMMONIA (NH3) EMISSIONS TREATMENT IN FACTORY PRODUCTION I PT. PETROKIMIA GRESIK

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Abstract

Ammonia (NH3) occurs naturally in low concentrations in areas that are not polluted. At higher concentrations would poison aquatic organisms present in a large scale. Toxicity of unionized ammonia will be higher if the low temperature and high pH.Ammonia concentration above 0.11 mg /L would pose a risk of growth disturbance in all species of marine fish, marine plants for the concentration of ammonia at 25 micromoles per liter causes of death (I.Riwayati 2010 case: 27-32). The purpose of this study is to describe the quality of emissions of ammonia (NH3) in the exhaust stack emissions of ammonia (NH3) in the factory unit I PT. PetrokimiaGresik , and to describe the effectivityofammonia emissions treatment in unit Factory I PT. Petrokimia Gresik. The variable of study is quality of ammonia emissions and the effectivity of ammonia emission treatment. This study was descriptive, using the method of observation. The result showed that the concentration of NH3 per month is still below the quality standard of the Environment. Their emissions scrubber system, especially in the processing of NH3 gas in Urea Plant to reduce concentrations of NH3 are released in the air, so that the ambient air quality is maintained and does not cause negative effects to health and the environment in residential PT. PetrokimiaGresik.

Keyword : Treatment, ammonia (NH3), emissions

Introduction

PT. Petrokimia Gresik is a company status SOE (State Owned Enterprises) within the Ministry of Industry and Trade is engaged in the production of fertilizers, production materials using chemicals (H2SO4, H2PO4, CO2, etc.) and production systems that use heavy machinery. PT. PKG is the second oldest fertilizer plants in Indonesia after PT. Pupuk Sriwijaya (PUSRI) in Palembang and also a complete fertilizer plant among other fertilizer plant. PT. PKG has three (3) the location of the plant, namely Plant I, Plant II and Plant III. Where the factories have the production process and produce different products. Factory I (nitrogen fertilizer plant) to produce Ammonia, ZA I & III, Urea, CO2, Dry Ice and Utility. Factory II (Phosphate fertilizer plants) produce SP-36 1 & 2, Phonska, Tankyard Ammonia and Phosphate. While Factory III (Phosphoric Acid Factory) produces sulfuric acid, acid phosphate (H3PO4), Aluminium Floride (AlF3), Cement Retarder and ZA II.

Ammonia occurs naturally in low concentrations in areas that are not polluted. At higher concentrations would poison aquatic organisms present in a large scale. Fish are the most sensitive species perubaha ammonia concentration in the waters. Water solution is in the form of ionized ammonia (NH4 +) or non-ionized (NH3). Relative concentration of each type depends on several factors such as pH and temperature. Toxicity of unionized ammonia will be higher if the low temperature and high pH. Ammonia concentration above 0.11 mg / L would pose a risk of disruption pertumbugan on all species of marine fish, marine plants concentration of ammonia at 25 micromoles per liter causes of death (I.Riwayati 2010 case: 27-32).

According to the East Java Governor Regulation No. 10 of 2009 says that the ammonia emission limit value of 500 mg / m3. According to the survey conducted in the factory unit I PT. Petrochemicals said that the measurement of ammonia emissions on the environment Production Unit I PT. Petrochemicals conducted over three months which is done by the Laboratory of Chemistry Department of Process and Energy Control PT. PKG. According to the results of air quality measurements emisioleh Technical Implementation Unit of Occupational Health and Safety (K3 UPT) in the chimney saturator ZA III 06 - E 301 A in April 2015 was 0.82, in August 2015 amounted to 213, and in December 2015 amounted to 147.9. Of the value of the measurement results that can be concluded THAT processing result of emissions of ammonia done by Production Unit I effectively enough to reduce the levels of ammonia in the air.

As the measurement results dilakukanhasil obtained is sufficient environmental quality standard yaitudibawahnilai 400 mg / m3yang artinyapengelolaan 10 ammonia emissions Production Unit I quite effective, but according to the survey conducted to the community and the results of public complaints there are community concerns about the smell of ammonia was overpowering. It is caused by several factors, emitted, the atmospheric conditions, the distribution of wind, relative humidity, and the presence of a leak in the pipeline processing of ammonia at the plant unit I PT. PKG. If this is
not done tepatmaka handling can have an impact on public health and air quality deterioration around the factory PT. PKG.

Ammonia in gaseous form is irritating to skin, eyes and respiratory tract. If inhaled will irritate the nose, throat and mucous tissue. Irritations of the concentration from 130 ppm to 200 ppm. At a concentration of 400-700 ppm can result in permanent damage due to irritation of the eyes and respiratory diorgan. Tolerance brief exposure to the maximum concentration of 300-500 ppm for half to one hour. Exposure to concentrations of 5000-10000 ppm can cause death (Bridgend an Stringer, 2000).

MATERIALS AND METHODS

This research type is descriptive quantitative approach. The study population was all the workers who are in a stone quarry dishes as well as make the sample as much as 33 respondents. The purpose of this study is to describe the quality of emissions of ammonia (NH3) in the exhaust stack emissions of ammonia (NH3) in the factory unit I PT. PetrokimiaGresik , and to describe the effectivity of ammonia emissions treatment in unit Factory I PT. Petrokimia Gresik. The variable of study is quality of ammonia emissions and the effectivity of ammonia emission treatment. This study was descriptive, using the method of observation. Analysis using descriptive and presentation of the data by using tables.

Results and Discussion

Quality Emission Ammonia in the factory I

Based on the test data quality emissions of ammonia production unit Icarried out by the Technical Implementation Unit Occupational Health and Safety (UPT K3)is in chimney I saturatorZA 03 - E301 A, saturator ZA III 06 - E 301 A, chimneyprilling tower and stack Dryer carried out in April, August and December 2015 to get the following results:

a. Chimney Saturator ZA I 03 - E 301 A

Tabel 4. 2 Hasil Ammonia Emissions Quality Measurement Results in the chimney Saturator ZA I 03 - E 301 A

No	Date / Month / year	Unit	Measurable levels				speed	Wind direction
			1	2	3	average		
1	02 Apr 2015	mgr/Nm3	351	356	94,62	267	1,1-2,9 m/det	South
2	05 Agst 2015	mgr/Nm3	64,4	69,1	74,1	69,4	0,9-3,9 m/det	East
3	02 Des2015	mgr/Nm3	157	138,9	144,4	146,77	0,98-2,88 m/det	Southeast

Based Quality Measurement Results table 4.2 Ammonia Emissions in ChimneySaturator ZA I 03 - E 301 A conducted in April, August and December 2015to get results with the average of April 267 with a wind speed of1.1 to 2.9 m / s wind direction to the south, in August 69.4 with wind speedsof 0, 9 to 3.9 m / s wind direction towards the East, and in December at 16.77 with theofdirectionthe wind speed of 0.98 to 2.88 m / sec wind direction to the Southeast.

b. Chimney Saturator ZA III 06 - E 301 A

Table 4. 3 Quality Measurement Results Ammonia emissions in flue Saturator ZA III 06 - E 301 A

No	Date / Month / year	Unit	Measurable levels				speed	Wind direction
			1	**2**	**3**	**rerata**		
1	2-april-2015	mgr/Nm^3	0,86	0,60	1,00	0,82	1,1-4,3m/det	South
2	2-agust-2015	mgr/Nm^3	205	202	231	213	1,1-2,8m/det	East
3	2-des-2015	mgr/Nm^3	147,9	139,8	156	146,9	0,67-2,51m/det	Southeast

Based Quality Measurement Results table 4.3 Ammonia Emissions in ChimneySaturator ZA III 06 - E 301 A which carried on April, August and 2015Decemberto get results with an average of 0.82 in April with wind speedof 1.1 to 4.3 m / s wind direction to the south, in August 213 with a wind speedof 1,1- 2.8 m / s wind direction to the East, and in December amounted to 146.9 with theofdirection the wind speed of 0.67 to 2.51 m / sec wind direction to the Southeast.

c. Stack Dryer ZA I 01 – D 303

Tabel 4. 4 Quality Measurement Results Ammonia emissions in Stack Dryer ZA I 01 – D 303

No	Date / Month / year	Unit	Measurable levels				speed	Wind direction
			1	**2**	**3**	**Average**		
1	2-april-2015	mgr/Nm^3	1,66	1,88	1,29	1,61	1,2-3,2 m/det	South
2	2-agust-2015	mgr/Nm^3	18,4	19,6	17,1	18,4	1,2-3,9 m/det	East
3	2-des-2015	mgr/Nm^3	18,4	152	172	155,83	0,67-2,51 m/det	Southeast

Based Quality Measurement Results table 4.4 Ammonia Emissions in Stack Dryer I ZA 01 - 303 D conducted in April, August and December 2015 to get resultswith an average of 1.61 in April with wind speed of 1.2 to 3.2 m / sdirectionthe windtosouth, in August 18.4 with wind speeds of 1.2 to 3.9 m / sdirection windtowards the East, and in December at 155.83 with the direction of the wind speed of 0.67 to 2.51 m / s wind direction in Southeast

d. Stack Drayer ZA III 06 – D 303

Tabel 4. 5 Results Quality Measurement in Ammonia Emissions Stack ZA Drayer III 06 - D 303

No	Date / Month / year	Unit	Measurable levels				speed	Wind direction
			1	**2**	**3**	**rerata**		
1	02 Apr 2015	mgr/Nm 3	0,52	0,27	0,28	0,36	1,2-3,2 m/det	South
2	05 Agst 2015	mgr/Nm 3	60,9	63,6	73,0	65,9	1,3-4,6 m/det	East
3	02 Des2015	mgr/Nm 3	143,5	152,4	171,2	155,7	0,82-2,71 m/det	Southeast

Based Quality Measurement Results table 4.5 Ammonia Emissions in Stack ZA Drayer III 06 - D 303 conducted in April, August and December 2015 to get resultswith an average of 0.36 in April with wind speed of 1.2 to 3.2 m / sdirectionthe windtoSouth, the moon 65.9 in August with wind speeds of 1.3 to 4.6 m / sdirection windtowards the East, and in December amounted to 155.7 with the direction of the wind speed of 0.82 to 2.71 m / s wind direction to the Southeast.

e. CerobongPrilling Tower GB 301 B

Tabel 4. 6 mmonia Emissions Quality Measurement Result in chimney Prilling Tower GB 301 B

No	Date / Month / year	Unit	Measurable levels				speed	Wind direction
			1	**2**	**3**	average		
1	01 Apr 2015	mgr/Nm 3	68, 1	11 0	109	95,8	1,9-3,4 m/det	South
2	05 Agst 2015	mgr/Nm 3	2,3 0	1,7 3	2,21	2,08	0,6-2,6 m/det	East
3	01 Des2015	mgr/Nm 3	15 4,3	14 5,7	167,2	155,73	0,78-2,97 m/det	Southeast

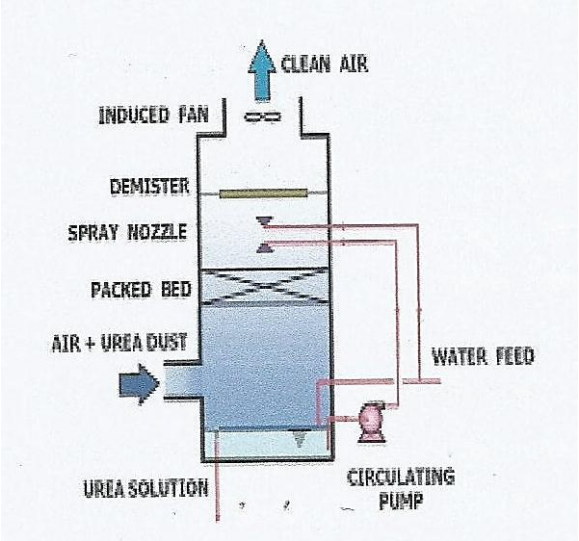
Based on table 4.6 Ammonia Emissions Quality Measurement Result in 301 GB prilling Tower B conducted in April, August and December 2015 to get results withan average of 95.8 in April with a wind speed of 1.9 to 3.4 m / s wind direction to the North, in August 2.08 dengankecepatananginsebesar 0.6 -2.6 m / detarahanginmenujuTimur, and in December at 155.73 with the direction of the wind speed of 0.78 to 2.97 m / s wind direction to Northwestern.

Ammonia Emissions Management Effectiveness

PT. Petrokimia Gresik in the fertilizer production process produces waste in the form of gas ammonia which is a heavy metal group. Ammonia gas before it is discharged intothe environment so that the management do not impact negatively on the environment and surrounding communities. PT. PKG pass the management of ammonia emissions using Dust Scrubbing system. Scrubber can be defined asmeans of separating asolid particles (dust) in the air using the gas or liquid as atool. Water is a liquid that is generally used in the process of scrubbing.

Scrubbing dust system is mounted on the top of the prilling tower to pick up dustin the area of cooling air. Molten urea at a concentration of 99.7% by weight (including biuret)droplets in a prilling tower as granules after missed strainer and head tank at the*top tower and is injected into the distributor-type "acoustic granulator". To keep*biuret formation to a minimum, the system should be designed and operated with the intention ofmolten urea temperature is maintained slightly above the melting point of urea (132.7^0C) and also tomaintain a residence time as short as possible. Molten urea from the head tank is distributedevenlyto the distributor. When I get off the tower, granular urea in contact with the air rises,so the cooling and solidification is achieved before fludizing cooler at the bottom tower. Ureaprill perfectly cooled with air conditioning that put fludizing bed*of fludizing cooler. Urea prills are collected and cooled in a cooler at thefludizingbottom towerdanover flow into the trammel to be separated urea prillyang over size of*the product. Urea is dissolved over size with a solution of a dust chamber in the dissolving tank.

Product urea prill sent to the belt scale for weighing and then sent*battery limit. Hot air from the prilling tower containing urea dust in the treatment of post* dust recovery system which is in the top tower to meet pollution regulations. Spray nozzles and packed bed installed for air scrubbing. Then air is discharged into the atmosphereby the induced fan to prilling tower after droplets of scrubbing section reduced is by a demister.



Picture 1. Dust circulation pump

Part PrillingTower

Dust circulation pump for recovery mounted on top of tower for circulating theurea solution from the sump to the packed bed for dust recovery. The concentration of urea solution is maintained ± 20% by weight by setting the amount of water intake. Pipes over flow for the dissolving tank installed to keep the solution sump. Finally urea dust emissions in the exhaust air of the tower is 30 mg / Nm^3 or less where the air meets pollution regulations solution *direcycle recovery ureato the urea solution tank.*

Scrubber system is a tool that is effective enough to reduce the content of ammonia in the gas. This can happen because ammonia is highly soluble in water, little big decrease the effectiveness of the ammonia content of the gas is influenced by the water used the inscrubber system, long in the scrubber system, and how big the content of ammonia in the waste gas. if the water used in the scrubber system in a state of saturation, the water functions can not work optimally. The longer the ammonia gas in the scrubber system the lower the content of ammonia in the gas, it is becausethe conditions in the scrubber system tends to damp the particles in the gas bound bywater droplets so that particles with a separate gas. If this situation is repeated constantly in the scrubber system then decreased levels in the gas ammonis more leverage. High or low content of ammonia in the gas also affects the effectiveness of decreased levels of ammonia in the gas. The higher levels of ammonia contained heavier system scrubber in the separation of ammonia gas.

Cocclusiom and Recommendations

Based on the analysis of the measured data the concentration of NH3 in air emissions released in the production process can be concluded that the concentration of NH3 per month is still below the quality standard which has been established by the Governor Regulation No. 10 in 2009 that is equal to 1360 μm / Nm. Their emissions scrubber in the processing of system,especially NH3gas in Urea Plant can reduce the concentration of NH3 is released in

the air, so that the ambient air quality is maintained and does not cause negative effects to health and the environment in residential PT. Petrokimia Gresik. should be carried out maintenance and checking of the air control device in a production machineregularly and scheduled.

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