

Can India lead the World in Preventing Global Warming?

K. Jagadeesan

Chairman, K J Research Foundation

152 Poonamallee High Road, Chennai, India

Abstract : The dimension of global warming is a serious concern for everyone which need to be addressed. The major cause of global warming is pollution of the atmospheric air. Carbon monoxide and carbon dioxide are the major air pollutants. With the aim to combat smoke pollution we have developed this novel and cost effective methodology which utilizes a biological fluid namely Cow's urine (Gomutra) as the biological filter to remove/trap the toxic components of smoke. It is observed that Gomutra is liberally sprinkled when Large quantities of smoke and fire emanates during religious ceremonies probably to ward of toxic gases. We have used a smoke generator as per the illustration and the smoke is allowed to pass through a jar containing fresh gomutra via a system of perforated and coiled polythene tubing. The out coming air physically appeared colorless and odourless. On analyzes of the out coming air showed about 95% clearance of carbon monoxide, 77.61% reduction in carbon dioxide and 25.96 % in particulate matter.

'Clean Air From Smoke'

BACKGROUND

It is estimated that by 2050 global warming due to pollution will be increased by 1.5° C and India will be the major contributor to world pollution. So according to G7 Nations pledge it is expected that India should reduce pollution by 40 -70% by 2050.

INTRODUCTION

Global Warming is the increase of Earth's average surface temperature due to the effect of carbon dioxide, carbon monoxide and other global warming pollutants collect in the atmosphere like a thick blanket, trapping the sun's heat and causing the earth to warm up which otherwise would escape from Earth. Although local temperature fluctuate naturally, over the past 50 years the average global temperature has increased at the fastest rate in recorded history. It is high time that we curb the emission. The average temperature in the U S as reported, could be 3 to 9 degrees higher by the end of the century¹.

Air pollution is introduction of particulates, gases and other harmful materials into in to the atmospheric air. It can cause diseases, death to humans and damage to other living organisms. In India it is quite a serious issue with the major sources being fuel wood and biomass burning, fuel adulteration, vehicle emission and traffic congestion, also from human activity or natural sources^{2,3}. Pollution of air becomes complex issue due to multiplicity and complexity of air polluting sources such as industries, automobiles, generator sets, domestic fuel burning, road side dusts, construction activities, etc⁴. The major source of air pollution in cities is from vehicle exhaust fumes. Carbon monoxide and carbon dioxide are the major air pollutants. Carbon monoxide is a poisonous, odorless, colorless gas that is formed when burning fossil fuels such as coal, petroleum etc⁵.

Therefore it is the need of the hour to develop innovative techniques to reduce the hazardous effect of smoke pollution. With the aim to combat smoke pollution we have developed this novel (and cost effective) methodology which utilizes a biological fluid namely Cow's urine (Gomutra) as the biological filter to remove/trap the toxic

components of smoke.

Indians worship cow as gomatha. The cow was elevated to divinity in the **Rig Veda**. In Book VI, Hymn XXVIII attributed to Rishi Bhardwaja extols the virtue of the cow. In **Atharva Veda** (Book X, Hymn X), the cow is formally designated as Vishnu, and 'all that the Sun surveys'⁶.

METHODOLOGY AND RESULTS

Author's observation of sprinkling cow's urine especially during religious ceremonies where fire and smoke emanates in large quantity is unique. The cow's urine liberally sprinkled all around, probably to ward off the toxic effect of gases. Purohiths could continuously perform their duties in front of the emanating fire and smoke without any ill effect. This observation lead to the present innovation to purify the smoke with cow's urine. In this context, we have generated thick smoke (Figure 1) white in color from burning coconut fiber with the help of a smoke generator (Figure 2). The generated smoke is lead through a one way valve to the reservoir. The outlet of the reservoir is connected to the jar containing cow's urine through a 6 mm polythene tube (Figure 3). The distal portion of the tube is made in to a coil with multiple perforation (about 10 – 20 perforations per/cm) and terminal end of the tube closed. The coiled and perforated tube is approximately 15 cm in height which is immersed in two liters of cow's fresh urine. So that the smoke is allowed to percolate only through the perforations which gives time for the smoke to interact with the cow's urine. The generator was delivering smoke at the rate of 600 – 800ml/min. The air coming out is physically colorless and odourless (Figure 4). The out coming air is collected and submitted for estimating various parameters (Table 1) at an NABL accredited testing lab. The results were tabulated and shown in Table 2. As a control we have repeated the procedure with distilled water with all factor remain same. The procedure was done again with cow's urine and distilled water connected in series. The out coming air again tested for various parameters as mentioned in table 1.

The laboratory generated smoke was analyzed for its contents before passing through any of the fluids. This is taken as the standard (Table 2). It is observed that there was considerable reduction in carbon monoxide, carbon dioxide and particulate matter levels after treatment of smoke with cow's urine. The reduction of carbon monoxide to 94.8% when it is passed through the cow's urine alone, 36.55%

Correspondence: Dr. K. Jagadeesan, Founder and Director, K. J. Hospital Research and Postgraduate Centre, Chairman, K.J. Resaerch Foundation, 182, Poonamalle High Road, Chennai – 600084, India e-mail: kjresearchfoundation@gmail.com

reduction is noted in distilled water alone and when it is combined with cow's urine and distilled water in that order, the reduction is 96.91%. The reduction of carbon dioxide is 77.61% in cow's urine, distilled water 47.76% and in combined situation the it is 85.07%. The reduction of particulate matter is 25.96 %, 6.25% and 37.5% respectively (**Table 3**).

Chemical analysis of cow's urine before and after the procedure did not show any change in pH value. The color has changed from pale straw yellow to straw yellow post testing. Specific gravity has changed from 1.015 to 1.020, urea 114 to 126mg, creatinine 34 to 36.2 mg, calcium 3.5 to 3.9, potassium 97 to 101 (**Table 4**).



Figure 1: Thick white smoke

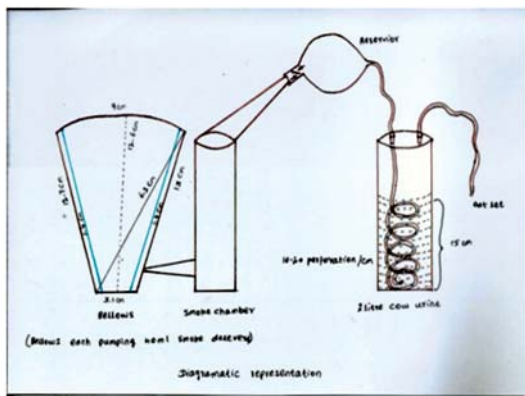


Figure 2: Schematic diagram

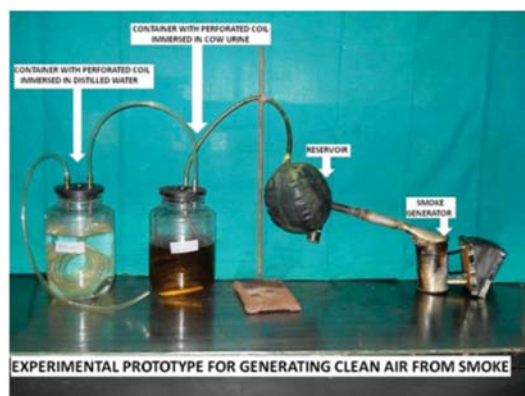


Figure 3: Jar containing cow's urine



Figure 4: Out coming clean air

Table 1: Parameters tested pre and post experiment

Sl.No	Test Parameters	Sl.No	Test Parameters
1	Sodium Chlorite	7	Nitrogen Oxides
2	Potassium Hydroxide	8	Carbon Mono Oxide
3	Lead as Pb	9	Calcium
4	Carbon di Oxide	10	Chlorine as Cl2
5	Oxygenated PAH's	11	Sulfur as S
6	Sulfur di oxide	12	Total Particle Matter (PM10)

Table 2: Results of test parameters analysis

Sl. No	Parameters	Lab Generated Smoke	Distilled Water	Cow's urine	Cow's urine + Distilled Water	Protocol	Unit
1	Sodium Chlorite	BDL (DL : 1.0)	BDL (DL : 1.0)	BDL (DL : 1.0)	BDL (DL : 1.0)	By Conversion	µg/m ³
2	Nitrogen Oxides	BDL (DL : 7.0)	BDL (DL : 7.0)	BDL (DL : 7.0)	BDL (DL : 7.0)	IS 5182 : Pt 6 : 1975 (Reaff. 1988)	µg/m ³
3	Potassium Hydroxide	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	NIOSH - 7401	µg/m ³
4	Carbon Mono Oxide	13105	8315	672	404	NIOSH - 6604	ppm
5	Lead as Pb	BDL (DL : 1.0)	BDL (DL : 1.0)	BDL (DL : 1.0)	BDL (DL : 1.0)	NIOSH - 7300	µg/m ³
6	Calcium	25.3	21.5	20.9	27.8	NIOSH - 7300	µg/m ³
7	Carbon di Oxide	6.7	3.5	1.5	1.0	By IAQ Analyzer	%
8	Chlorine as Cl2	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	IS 5182 (Part - 19) : 1982	µg/m ³
9	Oxygenated PAH's	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	NIOSH - 5515	µg/m ³
10	Sulfur as S	BDL (DL : 4.5)	BDL (DL : 4.5)	BDL (DL : 4.5)	BDL (DL : 4.5)	NIOSH - 6004	µg/m ³
11	Sulfur di oxide	BDL (DL : 4.5)	BDL (DL : 4.5)	BDL (DL : 4.5)	BDL (DL : 4.5)	NIOSH - 6004	µg/m ³
12	Total Particle Matter (PM10)	20.8	18.7	15.4	12.2	IS 5182 (Part - 23) : 2006	µg/m ³
		BDL : Below Detectable Level		DL : Detectable Level			

Table 3: Percentage of reduction in major air pollutant post Gomutra, distilled water and combined test analysis

Sl. No	Parameters	Lab Generated Smoke As standard	Cow's urine	Distilled Water	Cow's urine + Distilled Water
1	Carbon Mono Oxide	100%	94.8%	36.55%	96.91%.
2	Carbon di Oxide	100%	77.61%	47.76%	85.07%.
3	Total Particle Matter (PM10)	100%	25.96 %	6.25%	37.5%

Table 4: Cow Urine Analysis – Pre and Post Testing – Total Volume 2000ml.

Si. No	TEST PARAMETERS	PRE PROCEDURE URINE	POST PROCEDURE URINE 1Hr	POST POROCEDURE URINE 2Hrs	POST PROCEEDURE URINE 3Hrs	POST PROCEDURE URINE 4Hrs
1	pH	7.5	7.5	7.5	7.5	7.5
2	Color	Pale Straw Yellow	Pale Straw Yellow	Straw Yellow	Straw Yellow	Straw Yellow
3	Sp.Gravity	1.015	1.015	1.020	1.020	1.020
4	Ketone	Nil	Nil	Nil	Nil	Nil
5	Urea	114	114	117	122	126
6	Creatinine	34	34.6	35.4	35.9	36.2
7	Calcium	3.5	3.5	3.8	3.7	3.9
8	Phosphorus	3.0	3.2	3.4	3.4	4.0
9	Uric Acid	12.5	12.4	12.7	12.8	13.1
10	Sodium	77	76	70	68	65
11	Potassium	97	97	99	100	101
12	Sugar	5.7	5.8	5.8	5.7	6.0

DISCUSSION

Atmospheric pollution from smoke, dust and other impurities are generated on a daily basis by industry, automobile exhaust and various other generator exhaust, construction, coal based thermal power station etc are the major smoke pollution sources. Wherever hydrocarbon is utilized will produce abundant smoke. There is a lot of write up and discussion that India is one of the major contributor responsible for producing air pollutants because of industrial and automobile development. The wet technology what we have experimented has got the benefit of clearing the major toxic gases such as carbon monoxide and carbon dioxide. Incidentally the slurry after the clearance of smoke is enriched with urea which will become a rich agricultural input. By controlling the pollution the health of human being, animals and the plant species will definitely benefit. Here it will be interesting to note the use of diesel and petrol in public utility vehicles is discontinued in favor of compressed natural gas (CNG) in the capital city of India hence the automobile pollution has come down to a great extent. The rate at which the major metropolitan cities are growing day by day the pollution is also on the increase. As we have a remedy within our sight this problem could be minimized. We are in the process of developing further this wet technology to make a dry technology so that it could be used in the exhaust and other sources of smoke generation.

It is observed that the quantity of the smoke, volume of urine and duration has got a direct linear relationship.

The explanation for urea production is carbamoyl phosphate synthetase is the first committed step of the urea cycle. This enzyme is allosterically activated by N-acetyl glutamate. N-acetylglutamate is a precursor for ornithine biosynthesis, and is an essential activator for the urea cycle. Urea formation has been shown to be stimulated by the addition of N-acetylglutamate during liver perfusion when

substrates for urea production were present in excess. Thus, the liver concentration of N-acetylglutamate and amino acid catabolism in the liver may limit the rate of urea synthesis⁷.

Ammonium carbamate is a salt of ammonia and carbamic acid. It can play a key role in the formation of carbamoyl phosphate is necessary for the urea cycle⁸.

CONCLUSION

This approach is simple and cost effective as it removes carbon monoxide, carbon dioxide etc. from the laboratory generated smoke. If it is properly applied and developed to suit the industrial chimneys and automobile exhaust will make a world of difference and we will have a healthy and disease free humanity in foreseeable future by minimizing the global warming.

This innovation has been dedicated to the honorable Prime Minister of India and to the Nation.

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