

Air Pollution Analysis Resulted From Energy Part

Ahmad Zatirostami

Department of Science and Engineering, Islamic Azad University, Behshahr branch, IRAN, Behshahr

ABSTRACT

Various types of air pollutants have harmful effects on health of human beings vegetables and animals and effect the natural circum stance pollutants which make problems on sensitive regions are: fume resulted from combustion, harmful pollutants are co, nox, so2 and suspended particles such as dust, hydro carbons produced by all combustion, harmful materials distributed from different chemical processes, heavy metals with refined metals and unpleasant smalls fines from different processes..In addition to second-handed pollutants their side effects should not be denied. We turn to study air pollution resulted from energy part technically.

Key words: Energy, Pollution, Air, Combustion.

INTRODUCTION

1. Different pollutants and their origin

A. Sulfur oxides (so_x)

Sulfur oxides are produced by effect of combustion and fuels heats or materials contained sulfur such as coal or oil. Distributed sulfur oxides are mostly so_2 and some. how so_3 oxidation so_2 to so_3 is performed in presence of light, and this process continues to 2days. so_3 is attracted in rain and clouds rapidly and then is changed to so_4H_2 , so produces a ridge at sulfuric acid. so_x sources are steam pots which use coal or oil as fuel, heat ovens, oil quarry ovens, sulfuric quarry heat ovens, coal oven, rubbish burners and car's diesel engines and ships. so_x concentration in output gas is compatible with amount of fuel sulfur indirectly.

B. Nitrogen oxides (no_x)

Nitrogen oxides contained in air are: no_2 , no , o_2N_5 , O_2N_4 , O_2N_3 , NO_3 , O_2N produce pollutants artificially which totally collection of these pollutants are stated as ($NO_x + NO$). By effect of sailor coal combustion, NO_x is produced. NO_x existed in fuels accordance with nitrogen combinations in fuel and prod heated NO_x produced by oxidation of N_2 in high temperature there is huge NO_x with shape of NO in high temperature output gas NO is oxide to NO_2 rapidly .as nitrogen oxides and hydrocarbons are mixed and exposed to ultraviolet radiation of sun light, take part in a complex photochemical reaction and produce photochemical oxides (o_x). In presence of water in air, NO_2 in converted to HNO_3 meaning ilea dense of nitrate is produced and or NO_2 is reacted with metal salts to produce nitrate particles. productive resources of NO_x are steam ovens of oil and coal, different combustion ovens and their devices, cars engines, ships, air plans ,heat systems with usage of animal fuel so an extreme range of used devices in combustion process are in this pile also especial sources such as devices producing nitric acid and their combination and compounds like as cellulose nitrate and nitro benzene, processes related to colors and cleaning metals are in the range of productive sources of NO_x as for as productive rate of NO_x converts in according with combustion temperature, distribution of the combination depends on action situation and present facilities.

C. Carbon mono oxide (CO)

Carbon mono oxide is produced by uncompleted combustion of coal, oil and other fuels. the most significant sources of CO distribution in urban regions are cars which the amount of the distribution of combination depends on. way and style of their traffic .

*Corresponding Author: Ahmad Zatirostami, Department of Science and Engineering, Islamic Azad University, Behshahr branch IRAN, Behshahr. Email: zati@iausari.ac.ir

D. Matter particulate (PM)

Matter particulate as pollutants included dust, fog or fume which are produced in combustion process or heat process and dust arisen from production operation, exchange and process with operating the powdered materials too, most part of matter particulate are resulted from earth, oceans and volcanoes. Artificial productive sources of matter particulate are in urban regions. matter particulates have diameter less than to micro meters and are suspended these matters fall down easily be effect of their weight in atmosphere hence they remain on the atmosphere for a long time the amount of present matter particulate in atmosphere could be reduced by use of dust collector a lot.

E. Hydrocarbons(CH)

The atmosphere contains various kinds of hydro carbons like as combinations of paraffin's, naphthenic , dolphin ,aromatic. Most of these combinations have low concentration and are her mess. The studies showed that some hydrocarbons like as Benson peahen and benzoic flu oration are cancerous and harmful. In addition to that olephinic combinations mixed with NO_x , produce photochemical oxidants (O_x) .Sources producing hydrocarbons are auto mobiles, oil stores, refinery places and dyeing devices. In urban regions, auto mobiles have an important role an hydrocarbons distribution.

F. Chlor (CL₂) and hydro chloride (HCL)

Main amount of chlor in sea water is in the shape of ion or chlor is distributed by artificial sources these. sources includes chlor production installation, rubbish burners that rubbishes or compound wastes is made up of chloride virile or other chlorides or is in castration of waste, chlor compound and water refinery units.

G. Heavy metals

Heavy metals include cadmium (CD), chrome (CR), lead (PH) and their combinations are transferred in the atmosphere. With shape of particles mainly, and settled in soil and water during moisturized or dried, while they increase problems of soil and water pollution. cadmium pigment and etc lead is produced from lead refinery in dustiest, pigment making installation, glasses manufacture units, engines which work whit gasoline whit out lead (since 1975 tail today in most of the countries ,use ,of gasoline whit out lead has become common, hence this kind of pollution is not observed)is produced productive source of chrome includes maker industries of chrome pigment .hydrogen fluoride (HF)and silica fluoride (SIF)remove vegetables nutrition sources of fowls and birds and domesticated animals die fluoride sources include aluminum refinery,(glass and dishes),super phosphate manure, metal processed facilities and fluoride and fermions resin.

H. Unpleasant smells

Organic materials include nitrogen or sulfur such as ammoniac, methyl mercaptan and hydrogen shipline cause to distribute unpleasant and annoying smell unpleasant smells from animals and fowls pastures, sol process or installation, found materials installations, food materials installation, leather industries, table making and other chemical industries are produced.

I. special materials

There are materials in table 4-2 that are determined as special pollutants. Industries related to produce these materials are represented on the table.

J. Chloro fluoric Carbons

Chloro fluorocarbons (CFCl_3 , CL_2CF_2 and etc that are mentioned by abbreviation CFC compound)are harmless but stable, so they remain on the atmosphere for a long time, but as they arrive to stratosphere are broke down by ultraviolet in sun light, this process damages the ozone it has been determined that by effect of ozone damage, the earth is exposed to increased amount of infra radiation which this matter causes concern illness CFC compounds have extended usage in refrigerator industries, sprays and etc. in fact, thinning the ozone layer(which is mentioned ozone hole)is observed recently in north pole and north pole stratosphere and other parts of northern.

1. NO_x and SO_x production

A. Source Category

Firstly it should be determined that how much no_x and so_x compounds are produced ,their concentration in circumstance should be evaluated and a level should be considered that more than that mentioned pollutants should not

be distributed in this section productive sources of NO_x and SO_x which produce these pollutants extensively are studied productive sources of the pollutants are divided to two categories of movable and fixed, fixed sources include building installation and establishment and movable sources are automobile engines in addition, pollution resulted from small companies and commercial regions should be to productive sources.

B. Fixed Sources

Pollutants concentration is compatible with evacuation amount in circumstance directly so it is necessary that not only concentration of each pollutants is checked in output gas, but also the amount of external gas (distribution speed, diameter of external mouth and temperature) should be measured and determined carefully fixed sources include output gas from a big steam pot, an oven or other similar devices. In some cases, real measure of pollutants compounds is impossible hence SO_x concentration is attained from sulfur volume in fuel, raw materials and also real amount of fuel and consumed materials NO_x concentration is measurable from output stable coefficient for related facilities and consumed fuel amount. NO_x distribution from commercial and fixed regions is checked by control of many fuel kinds (city gas, crones and etc) which these studies often are ore formed by determination of consumed fuel amount multiplication of results by distribution coefficient of typical NO_x and determination of NO_x amount for every level (table 5)

3. Movable sources

A. Automobile engines

NO_x and SO_x distributed pollutants amount (according as gram on kilometer in every hour) from automobiles engines is measurable from medium output coefficient ($\text{g}/\text{car.km}$) which is measured by average of distribution coefficient for every car and numbers of automobiles (the numbers of every car in every hour). In some of the countries, distributed SO_x from automobiles engines is not considered, hence sulfur volume in used gasoline and oil and gas (for diesel engines) is low in table 4,5, some of the SO_2 Coefficients are presented. The same as fixed sources, distributed SO_2 amount from automobiles is determined by sulfur volume present in fuel. It is supposed that car passes 1 kilometer distance with consumption of 17 liters of fuel which contain C percent of sulfur the amount of distributed SO_2 is attained from relation of $\text{PWC}(22/4/32)/10(\text{Nm}/\text{car.km})$ Is attained which is fuel density (g/l)

The amount of distributed NO_x from automobiles is so different and depends on type of automobile and style of driving most of the real measures represent that average of output coefficients of SO_2 and NO_x in passenger automobiles in some of the counties is the same as table 6.

B. Ships

When ships enter to ports near to urban region or get out from them, distributed NO_x and SO_x from this traffic I problematic ships are facilitated to a main engine, auxiliary devices and a productive during loading and cast anchor the amount of evacuated SO_x and NO_x from a ship is somehow equivalent of output amount of these compatible production devices a real output is equivalent with output rate multiple equal load factor. Table 7 presents the average of load factor related to each kinds of sailing in table 8 experimental formula of output measure and amount of distributed NO_x , consumed fuel and output gas is presented.

C. airport

In regions near to the air ports, NO_x distributed from airport abuses air contamination the amount of evacuated NO_x depends the numbers of flights and amount of output gas so much which last case is produced exactly by differences among all types of airplanes. In table 9 list of output NO_x (for each engine) is presented with considering the verify flight time for every passenger air piano.

D. various sauces

There productive sources of SO_x and NO_x occludes machines in urban and engineer establishments, tractors, diesel and steam locomotives and so on NO_x also is produced by combustion of grass and trees conclusion. productive sources of pollutants and type of pollutants materials are so different of certain pollutants it is important to control the amount of consumed material which produces mentioned pollutants and determination of direct and indirect these sources in order to perform this, it should be considered sufficiently that how a pollutant productive source related to time works.

Table1. Special pollutants and their producer

material	Chemical formula	Related industries
Hydrogen fluoride Hydrogen supplied	HF	Manure, ceramic, aluminum Oil refinery, gas industries
Selenium dioxide	H2S	Aluminum, tube making Metal refinery, chemical industries
Hydrogen dioxide	SEO2	Making nitric acid, different industries with composition Acid euphoric of industries consuming heavy oil as
Sulfur dioxide	HCL NO2	Fuel of metal industries, making tube Manure industries
Cholor	SO2	Dyeing industries, organic synthesis
Silica fluoride Phosgene	CL2 SIF4	Carbon disulphide, solvent, dies infection materials establishments
Carbon disulphide Hydrogen cyanide Ammoniac	SI2F6 COCL2 CS2	Acid hydro cyanic, iron making, gas industry, pitting Manure ,metal work, organic industry, mineral tablets Tablet making, dichloride phosphor
Three chloride Phosphor Punta chloride phosphor	HCN NH3 PCL3	Three chloride phosphor, phosphor oxide Phosphor refinery, making phosphor compound
Yellow phosphor	PCL5	Making tablet, making the pigment Making the formalin, making the leather, synthesis resin
Cholor sulphanic acid	P4	Making the acrylic acid, synthesis resin, making the polish oil Making the phosphoric acid, making the phosphoric acid manure oil refinery, making the formalin, dyeing industry, organic solvents making methanol, making formalin
Formal decide Acroleine	HSO3CL HCHO	dyeing industry, resin industry oil chemistry, nickel refinery Making sulfuric acid, Making fertilizer industries, Chemistry Color agricultural chemicals
Hydrogen phosphate	CH2=CHCHO	
Benzene	PH3	Gas industries, Refined metal, Internal combustion Bitumen industry, Chemical drug, Dyeing industries, Resin Industry
Methanol	C6H6	
Nickel carbonyl Solphoric acid (containing so3)	CH3OH NI(CO)4 H2SO4	Pharmaceuticals, Chemical industry etc. Oil, Oil Chemistry, Pharmaceuticals, Food Industry Making Inorganic nitric acid ,With combustion of different industries
BRUM	BR2	
Carbon monoxide Phenol Pyridine Mercaptan	CO C6H5OH C5H5OH CMHNSH	

Table 2

Coal	LNG	Light Oil	Cruzan	C-Heavy Oil	B-Heavy Oil	A-Heavy Oil	Fuel Equipment
75/43	23/31	13/91	26/71	32/21	57/89	58/29	Energy-generating boiler
53/01	16/38	10/02	19/25	23/21	41/72	40/96	L boiler industry
-	-	410/2	318/2	398/9	711/1	752/9	Diesel generator energy
-	75/3	87/4	67/8	58/0	151/6	160/5	Gas Turbine
64/33	23/61	27/41	21/26	26/66	47/53	50/32	Gas-producing furnace
-	21/72	25/21	19/56	24/52	43/71	46/28	Ore pellets ash maker
349/0	128/1	148/7	115/4	144/6	257/8	273/0	Iron Mine
-	30/74	46/30	35/87	43/83	79/82	77/36	Hot House Coke
-	17/14	25/65	19/87	24/28	44/22	42/86	Air heating furnace blast
273/0	100/2	116/3	90/24	113/1	201/7	213/5	ISO Oil Heating Furnaces
-	56/11	65/15	50/53	63/35	112/9	119/6	Adhesive curing ovens (dry system)
121/6	44/63	51/82	40/20	50/39	89/84	95/12	Ceramic furnace (series)
327/9	120/4	139/8	108/4	135/9	242/3	256/5	Furnace glass (series)

Table 3. Fundamental factors in the production of fuel combustion exhaust gas main

Exhaust (Nm ³ /l)	Energy heater(kcal/l)	Visa viscosity(kg/m ³)	Amount of sulfur (%)	Fuel factors
11/4	9390	0/84	0/69	A heavy oil
12/1	9540	0/91	1/82	B heavy oil
12/2	9690	0/93	1/91	C heavy oil
11/5	9130	0/83	0/40	Light oil
16/2	10498	0/71	0/001	LNG
9/1	6149	1/53	0/817	Coal
10/9	8690	0/79	0/004	Cruzan
11/4	3832	0/80	0/092	Firewood

Table 4. Nox emission coefficient of small sources

NOx Emission coefficient	Fuel
0/5_1/6KG3M3	Gas City
1/3_2/0 Kg/	LPG
1/3_2/0 Kg/K1	Cruzan
2/5_4/0 Kg/K1	Heavy oil

Table 5. Average emission coefficients NOX and SO2

NOX emission coefficient (g/NO.of Car.km)	SO2 emission coefficient (g/NO.of Car.km)	Car Type
1/255	0/032	The passenger cars
0/267	0/021	Passenger cars Brisk
5/545	1/214	Truck
2/427	0/042	Light Truck
0/524	0/034	Small Truck
6/158	0/502	Bus

Table 6. Motor load factor based on state wrestling

Turbine	Diesel	Status/ Engine
100	85	Full
65	52	Almost filled
20/5	10/6	Half full
15	5/3	Slow
14	3/6	Very slow

Table 7. Empirical formula for the output coefficient Ships (Diesel engines using heavy oil type A)

Y Value	X Power	FORMOLA
NOx(Nm ³ /h)1	X(Ps/h)	$Y = 1835X^{1/125} \times 10^{-3}$
(Kg/h) Fuel consumption.2	X(Ps/h)	Y=O/15X+25/24
(Nm ³ /h)Output 3	X(Ps/h)	Y=5/05X+490/96

Table 8. Output value NOx(Nm³/h) multiple possibilities plane

NAMC-YS-11	B-737	B-747	CD-8	Aircraft Type Status
0/028-0/034	0/061-0/085	0/827	0/211	Stasis
0/200-0/201	0/630-0/805	6/506	2/441	Landing
-	-	52/589	9/403	Ascent
0/552	3/100	94/063	14/382	Get up

E. Other resources

Other sources include NO_x and SO_x in machine engineering and urban facilities, tractors, diesel and steam locomotives and more. NO_x also caused fires and grass trees are produced.

Conclusion

Pollutant sources and types of pollutants vary widely. About a certain contaminants, controlling the amount of materials used that will produce the pollutants, and determine direct and indirect impact of these resources is important. To do this, how should the source activities generating contaminants with time (hours, days, months, seasons and years) to be paid attention.

REFERENCES

- [1] Rethinking the future, youth Employment opportunities in Renewable energy (discussion paper) UNIDO Hyderabad regional forum ,2003.
- [2] European commission, Externalities of Energy, Extern project, Report Number 10 National Implementation Edited by CIEMAT, 1998.
- [3] Investigation of pricing incentives in a Renewable Energy strategy Thailand, Review of externality Valuation, 2003.
- [4] Human development report published for the united Nations Development Program (UNDP New York, oxford university press, 2000.
- [5] International Energy Agency - carbon dioxide capture and storage issues accounting and baselines under the United Nations Framework Convention on Climate Change (UNFCCC), 2004.