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Environmental Recommendation to Mitigate Beirut Explosion Consequences

Ahmed Hesham*

Department of Chemistry, Suez Canal University, Ismailia, Egypt

Introduction

Beirut harbor explosion on 4th August 2020, carried out in the quarantine area of highly flammable substances caused, white gases emissions followed by reddish-brown gases emissions. The previous epidemiological studies stated that nitrogen dioxide has appeared to be a good indicator of the pollutant mixture. Furthermore, animal toxicological studies show that prolonged exposures can cause decreases in lung host defences and changes in lung structure. Beside many adverse health effects on human organs like on blood, liver and spleen. Also, cause hypertension, diabetes, heart and cardiovascular diseases and even death. Additionally, on July 2020,
Ogen Y, stated that the long-term exposure to NO_2 may be one of the most important contributors to fatality caused by the COVID-19 virus in the worldwide. On these grounds, it is proposed that a long-term recommendation for nitrogen dioxide be established. So my recommendation to put a plan for monitoring the air quality parameters especially nitrogen oxides, water quality parameters (drinking water, waste water and sea water) and soil parameters to develop a mathematical models to draw the boundaries of the affected area and take the corrective actions accordingly.

Description

The white gases emissions which followed by reddish-brown gases emissions, was big adequate to clip the attention of many people of Beirut residents who captured it on their cellphones. The last one was greatly and caused a shockwave and a sonic boom, cause many financial losses. Lebanese Prime Minister Hassan Diab supposed a probable 2750 tons of ammonium nitrate had been kept at a warehouse for six years. The direct impact it has killed more than 135 people and injured over 3000 in the Lebanese capital. Ammonium nitrate was behind many terror attacks like in Oklahoma city, US at 1995, also the same substance was behind a massive deadly blast in Tianjin, China in 2015.

The released toxic gases by the blast, urging people to stay indoors and wear masks with filter to adsorb the gases on the filter media. The expected released gases from this explosion Nitrogen Monoxide (NO), Nitrogen Dioxide (NO_2) and Dinitrogen Tetroxide (N_2O_4). The nitrogen oxides will be predominately nitric oxide but this can gradually change to nitrogen dioxide as the effluent moves away from the fire.

Long-term exposure to NO_2 may be one of the most important contributors to fatality caused by the COVID-19 virus in the worldwide. Also, it has been confirmed that the irregular variability of the diffusion of SARS-CoV-2 in Italy could partially depend on the levels of atmospheric pollutants. Even though the chronic exposure to atmospheric pollutants and related diseases may represent a risk factor in determining the severity of COVID-19 syndrome and the high incidence of fatal events.

According to the US, department of labor, occupational safety and health administration office, nitrogen dioxide is categorized as a respiratory irritant and the route of exposure is mostly inhalation. The term "silo-fillers disease" is associated with exposure to NO_2 as well as other nitrogen oxides.

There is only lonely indication of disorders of the mechanism of breathing and of ventilatory role on repeated exposure to NO_2 concentrations of (1 ppm-5 ppm). The infinite common of lung biochemical studies show special effects only after acute or subchronic exposure to levels of nitrogen dioxide exceeding 2 ppm. The Concentration (C) of nitrogen dioxide had more influence than exposure duration (T).

While for long term exposure according studies on animals had obviously shown that several weeks to months of exposure to NO_2 concentrations of less than (1 ppm) cause a plethora of effects, primarily in the lung but also in other organs such as blood, liver, the spleen, hypertension, diabetes, heart and cardiovascular diseases and even death. Biochemical changes often reflect cellular alterations (lowest reported levels for several studies (0.2 ppm-0.4 ppm) but isolated cases of lower effective concentrations). Nitrogen dioxide levels as low as (0.5 ppm) also increase defenselessness to bacterial and viral infection of the lung. While the expected concentration now in Beirut many thousands times larger. The atmosphere became saturated by nitrogen oxides that may lead to acid rain and photochemical smog and will affect the soil, sea water especially which close to the Beirut harbor, drinking water and wastewater stations.

***Address for Correspondence:** Ahmed Hesham, Department of Chemistry, Suez Canal University, Ismailia, Egypt; E-mail: Ahmed_hesham@science.suez.edu.eg*

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Conclusion

More severe exposures (>50 ppm) are characterized by pulmonary edema, cyanosis, bronchiolitis obliterans, respiratory failure and death. The LC50 (Lethal Concentration 50) for a 4-hour exposure is approximately 90 ppm NO_2. Some studies have stated that chronic exposure to NO_2 is linked with increased risk of all-cause death and proposed a specific association of the gas with cardiopulmonary mortality as well. There is a high degree of scientific complications involved, very little research on the kinetics and metabolism of nitrogen dioxide has been conducted. The available information is inadequate and only partially describes its deposition and fate in the respiratory tract.

Recommendations

It is highly recommended to monitor the air, water and soil parameters to develop a mathematical model to identify the affected area accurately. Also it is recommended to make clinical studies for all persons who exposed to the explosion in near. COVID-19 cases numbers to be followed in focus because it is expected to rise significantly.

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