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The Environmental Impact Of Air Pollution By Suspended Particles From Crude Oil

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Abstract : There are many problems in air pollution and the deterioration of its quality due to large oil production processes and the burning of associated gas in the oil extraction process, which results in the emission of particulates and highly toxic gases that cause humans many serious diseases. This research represents an applied study to analyze the levels of pollution in suspended particles in the air near the Central Oil Company, resulting from the drilling of oil wells, exhaust emissions of electric generators, transportation and some industrial activities, as well as the impact of flying dust because most sites are affected by flying dust by dust storms. Pollution of the region's air with solid pollutants. The results of this research showed that the air of most oil well drilling sites is polluted with Total Suspended Particles (TSP) by measuring the concentrations of Total Suspended Particles (TSP) in (3) selected areas within the close boundaries of the study area and comparing the measurement results with local and global determinants Permitted to know the environmental impact of drilling oil wells in the spread of air pollutants (TSP) emitted from drilling sites to the surrounding air and with the direction of the prevailing winds.

Keywords: Air pollution, TSP, Crude oil.

1- INTRODUCTION

The world is currently facing many environmental problems, and the problem of environmental pollution and the depletion of its resources is no longer a concern for industrialized countries only, but rather is faced by developed and developing countries alike(Filipponi and Sutherland (2013). As industrial progress and technological progress are linked to environmental pollution, the manifestations of pollution to the environment and its causes are different. Therefore, man, as a result of neglect, sabotage, and excessive consumption of environmental resources and not protecting them, has become a direct source of this problem. Therefore, man today is not safe from the air he inhales, the water he drinks and the food he eats, which has put his life and the lives of other creatures in danger(Ho, et al., 2001).

Iraq suffers, like other developed countries, from the problem of environmental pollution in its various sections due to the continuous violation, destruction and depletion of resources, which has led to the emergence of environmental problems that threaten the safety of the Iraqi human being. Air only for a few minutes, and this constant need for air makes a person unable to choose the type of air he breathes, so he must breathe the air available around us, regardless of its quality and degree of pollution, unlike water and food, which a person can avoid polluted and damaged(Araujo and Nel, 2009).

There are changes in the weather factors in terms of the vastness of the desert areas, the scarcity of natural vegetation, the high temperatures, the rates of sun brightness, the lack of rainfall and low humidity, which results in a dry air loaded with dust rising from the surface of the soil and creates suitable conditions for photochemical reactions in the presence of sunlight to generate pollutants affecting the soil. Human health and the environment, as well as the increased demand for fossil fuels and raw materials, which negatively affected the terrestrial ecosystem, such as soil erosion, disruption in geological layers, oil leakage and contamination of groundwater, as well as drilling oil wells affecting the soil, creating ground gaps and landslides, as well as exploration work every, this led to an increase in air pollution in Iraq, especially the areas close to oil extraction and refining, which negatively affected the air quality and air pollution in those areas in Total Suspended Particles (TSP) and its impact on human health(Adeniran, et al., 2018).

Therefore, the study aimed to demonstrate the environmental impact of drilling oil wells on the spread of air pollutants (TSP) emitted from drilling sites to the surrounding air and with the prevailing wind direction in air pollution through:

1- Identify the problem of air pollution in suspended minutes in the area near the Central Oil Company and what are its causes and sources.

2- Studying the concentrations of air pollutants emitted from oil well drilling sites and comparing them with the permissible national and international determinants, to find out the extent to which these pollutants exceed the permissible limits.

Research Methodology:

The research methodology is represented by adopting the field research method, which required site visits to sites near the Central Oil Company in Baghdad / Rashidiya, to know the environmental impact of

drilling oil wells in the spread of air pollutants (TSP) emitted from the drilling sites to the surrounding air and with the direction of the prevailing winds. This was represented by two approaches:

1- The descriptive-analytical approach: It is used to describe all the sources that lead to air pollution with particulates, with the spatial analysis of the air pollutants emitted from oil well drilling sites.

2- The quantitative approach: This approach was adopted for its great importance in analyzing data and calculating the concentrations of particulate pollutants in the air.

2: Materials and Methods:

The concentrations of particulate air pollutants (TSP) were calculated using the following steps according (EPA, 1996 ; Elder and Oberdorster(2006):

1. The filters are dried while empty in an electric oven (Oven) at a temperature of (60°C) for half an hour, in order to get rid of moisture, then the filter is cooled after that and its weight (W1) is determined in grams accurately.

2. The intake air flow rate is measured in liters/minute (L/min). It is read directly from the device when starting the device (V1).

3. After a full hour (t=60 min) has passed since the air intake device is running, the air flow rate (V2) is measured in units (L/min) and read directly from the device.

4. The filter is weighed again after completing the suction process by means of the air intake device, and its weight and contents (W2) are determined in grams.

5. The concentration of suspended particles in the atmosphere is calculated in units of micrograms/m3 (µg/m3) at all measurement sites after converting the weight in grams to units of micrograms by multiplying by (106) and converting the flow rate from liters/minute

(L/min) to units of volume In cubic meters (m3) by dividing by (1000) and the following equations illustrate these calculations:

Study area:

The study area is located in Iraq in the eastern part of the city of Baghdad. In this study, three sites close to the study site were identified and measurements were made for particulate pollutants (TSP), and the measurement results were compared with the permissible local and international determinants to know

the environmental impact of drilling oil wells on the spread of air pollutants (TSP) emitted from the drilling sites to the surrounding air and with the direction of prevailing winds.

3- RESULTS AND DISCUSSION:

The results of measurements and analysis of concentrations of total suspended particles (TSP) (µg/m3) in the air of sites close to drilling oil wells in the study areas with some locally measured climatic elements obtained from measurement and modeling processes and conducting analyzes for this type of pollution. Air quality in well drilling sites depends on knowing the concentrations of pollutants and comparing them with national and international to determine the extent to which pollutants match or exceed the permissible limits, whether local or global, and discuss the reasons that led to the increase in pollutant concentrations in the air of those sites this mentioned by (Eybpoosh, 2018).

Table (1) The concentrations of suspended particles in the air of the study sites with some locally measured climatic elements

Site code	(TSP) (µg/m3)	temperature C°	relative humidity %	Wind speed M/sec
S1	1121.11	37.9	13.8	0.2
S2	1418.31	34.7	15.1	3.6
S3	1417.1	39.2	17.1	0.8
S1a	1420.1	24.1	41	6.5
S2a	1498.5	23.6	44.5	2
S3a	1211.1	31.9	25.4	2.5
S1b	1562.7	30.7	26.2	2.5
S2b	1316.6	29.3	26.8	2.3
S3b	1607.8	29.6	27	3

Table (1), which shows the concentrations of suspended particles in the air of the study sites with some locally measured climatic elements, where the highest concentration of suspended particles in the air of the study area was in site No. (3), which amounted to (1607.4) µg/m3, while the lowest. The concentration was in position No. (1) where it reached (1121.1) µg/m3. That's conclude by analyzing the data to measure the total suspended particles in the air of the measurement site and in comparison

with the permissible determinants of air pollutants that they have exceeded the permissible limits locally and globally and in most sites, and this indicates that the air in the study area is polluted with suspended particles according to(Adeyanju and Okeke, 2019), this is the reason for the impact of fly dust, because most sites are affected by fly dust as a result of drilling oil wells and exhaust emissions of electric generators, means of transportation and some industrial activities. On the study sites, all this made the air of the study area polluted with suspended particles, this results agree with(Goto, et al., 2004; Iraq ministry of environment.(2009).

The optical microscope was used to photograph in Figure 1 models of the air intake filters, in order to determine the shapes of the suspended particles, which were collected from some study sites (1 and 3) as for small sizes (µm<20, 10), they are centered between the zigzags and torsions spread on the uneven surface of the filter, and Figure (1) shows the shapes of suspended particles for some sites close to the central oil company.

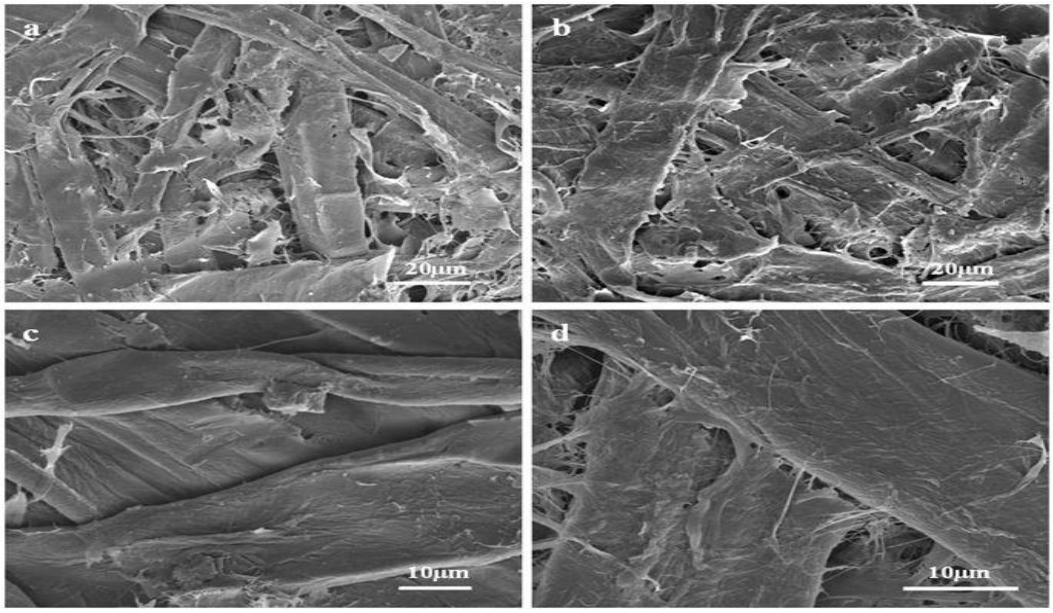

Figure (1) Air filters containing suspended particles by light microscopy for some selected sites in the study area.

4- Conclusion

TSP Total Suspended Particulates remains suspended in the air for a long time, but its sedimentation is relatively slow, and its diameter ranges between (0.1) to (10) micrometers. And suspended particles are among the most dangerous particles polluting the air, as they can reach the lungs and settle there. Some

of these particles are large and can be seen with the naked eye, such as smoke, and others are so small that they can only be detected by electron microscopes.

The diameter of suspended particles does not exceed (2.5) micrometers, which result from the combustion of fuel in car engines, factories, power plants and wood burning. As for the particles with a diameter greater than 2.5 micrometers, they usually result from the movement of cars on unpaved roads, and the atomization of winds, crushers and volcanic eruptions. The accumulation of these suspended substances in the air in the respiratory system results in multiple health effects as well as low vision and the problems it causes and the destruction of colors, paints and building materials (Reyam, et al., 2010; Reyam, et al., 2018).

Fine suspended particlesvery small particles that have a diameter of less than (0.1) micrometer, are difficult to sediment and have random movement and may aggregate with each other to increase in size to more than (1) micrometer. In polluted air, its number reaches more than (100) thousand per cubic centimeter, while its number in clean air reaches several hundred per cubic centimeter. These particles do not pose a great danger to human health, although they reach the lungs easily, where the lungs can exhale them during exhalation (Reyam, et al., 2018). Air polluting particles can be classified according to their nature into the following types: (Soot, which results from the combustion of fuels and organic materials, which is a collection of carbon atoms, ash, and these particles are released with flue gases, dust, which are chemically inert fine materials, fumes are often in diameter less than (1) micrometer produced by condensation or chemical reactions, the spray is no more than (2) micrometer in diameter and it consists of liquids suspended in the air (JenkoPražnikar and Jure Pražnikar, 2011; Jane ,et al., 2012) and finally aerosols and aerosols are solid particles Or micro liquid, the particles play a role in turbidity of the atmosphere and their diameter is often less than (1) micrometer and never accumulate, as it includes all solid and chemical particles (resulting from chemical reaction processes) and bio particles (pollen grains, fungi of all kinds, bacteria Chemical salts, in addition to the above mentioned liquid water droplets released from the surface of the earth (JenkoPražnikar and Jure Pražnikar, 2011).

The damage caused by suspended particles to human health, with a diameter of 0.01 and 10 microns, is one of the most influential particles in human health, and pollutes the air, because it constitutes the largest percentage of air-polluting particles and includes minute particles that speak of great damage to the respiratory system, especially in children because they are able to It penetrates the defenses of the nose and then reaches the lungs. These particles may contain pesticides, dust and smoke particles, as well as the intrusive fumes of condensation of volatile substances (Shiravan, 2014).

Particles affect human health by entering the respiratory system and contact with the skin and eyes, and thus cause many diseases, such as bronchitis, asthma, emphysema and difficulty breathing. Particulate matter affects significantly and directly in most parts of the human body.

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