

Pollution lab 5

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Theoretical part

Dust consists of particulate matter (PM) in the atmosphere. It represents one of the most significant air pollutants that produces several damages on humans, animals and plants especially when it exists in a large quantity to cover large areas.

Dust particles come from various sources such as: soil, dust lifted by weather (an Aeolian process), volcanic eruptions, and pollution.

Theoretical part

Dust in homes, offices, and other human environments contains small amounts of plant pollen, human and animal hairs, textile fibers, paper fibers, minerals from outdoor soil, human skin cells, and many other materials which may be found in the local environment.

Theoretical part

Size is important to the behavior of PM in the atmosphere and human body and determines the entry and absorption potential for particles in the lungs. Particles larger than $10\ \mu\text{m}$ are trapped in the nose and throat and never reach the lungs. Therefore, particles $10\ \mu\text{m}$ in diameter or less are of most concern for their effects on human health. Particles between 5 and $10\ \mu\text{m}$ are removed by physical processes in the throat. Particles smaller than $5\ \mu\text{m}$ reach the bronchial tubes, while particles $2.5\ \mu\text{m}$ in diameter or smaller are breathed into the deepest portions of the lungs.

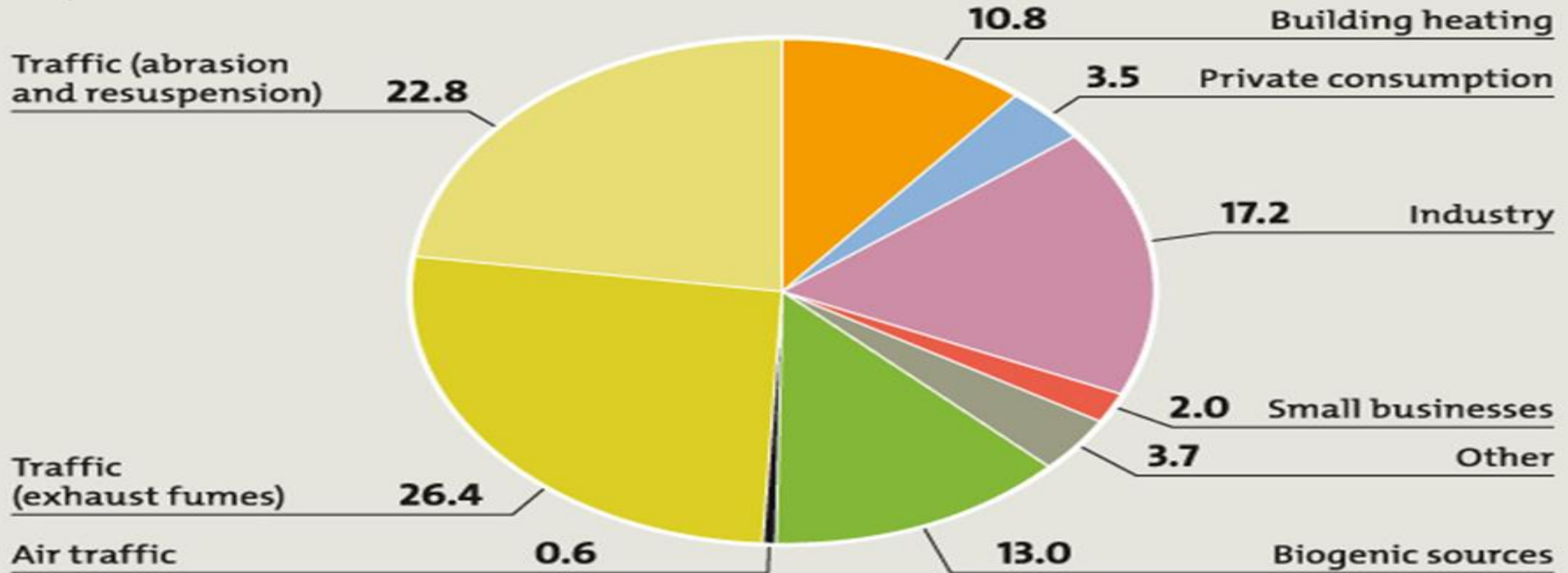
Theoretical part

Dust particles are classified according to its size to

- ▶ 1- Accumulated dust particles: its size is more than 12.5 μm and it has a slight effect on the respiratory tract because the nasal hairs are able to catch this type of particles, but it has a sever effect on eyes.
- ▶ 2- Suspended dust particle: its size range between (0.1-12.5 μm). It deposit slowly as they remain suspended in air for long time, and it has a dangerous effect on human and animals health and produce lung diseases.

Theoretical part

Sources of particulate matter emissions (Friedberger Landstrasse)
(in per cent)



(Source: IUTA 2009)

Practical part:

- ▶ **Accumulated dust particles measurement**
- ▶ In this experiment, it must be taken in consideration that Accumulated dust particles must be measured during natural conditions and non- stormy rainy or weather, because rain works to wash air dust.

Practical part:

Opened glass method:

- ▶ 1. Weigh the empty glass (W_1).
- ▶ 2. Put (150 ml) of distilled water in the glass and leave it opened for one glass week in the outdoor environment.
- ▶ 3. After one week, heat the glass to let the rest amount of water to evaporate, then leaves the glass to get cold and weigh it to (W_2) give
- ▶ 4. Calculate the dust weight from the following:

$$\text{Accumulated dust particle weight} = W_2 - W_1$$

Practical part:

- ▶ **Suspended dust particle examination by using sticky surface**
- ▶ Suspended dust particle could be caught from air by a sticky surface when it falls down under the effect of gravity.

Practical part:

▶ **Sticky surface method**

- ▶ 1. Put glycerin clean glass slide glycerin is a raringeous material that on a laid horizontally on the slide and left for one week exposed to air.
- ▶ 2. Examine the slide under microscope to distinguish the deposited particles by using different powers of magnification. Shape and color of dust particles could be recognized articles may include plant pollen, fibers carbon particles and dust particles.
- ▶ 3. Particle shapes could be arranged in the following table:

Practical part:

Type Of Suspended dust particle	NO.
Pollen	
Dust particles	
Carbon particles	
Fibers	