Erasmus Plus – “Cherchons lyceéns pour sauver la Planèt”

Istituto Tecnico Economico e Turismo

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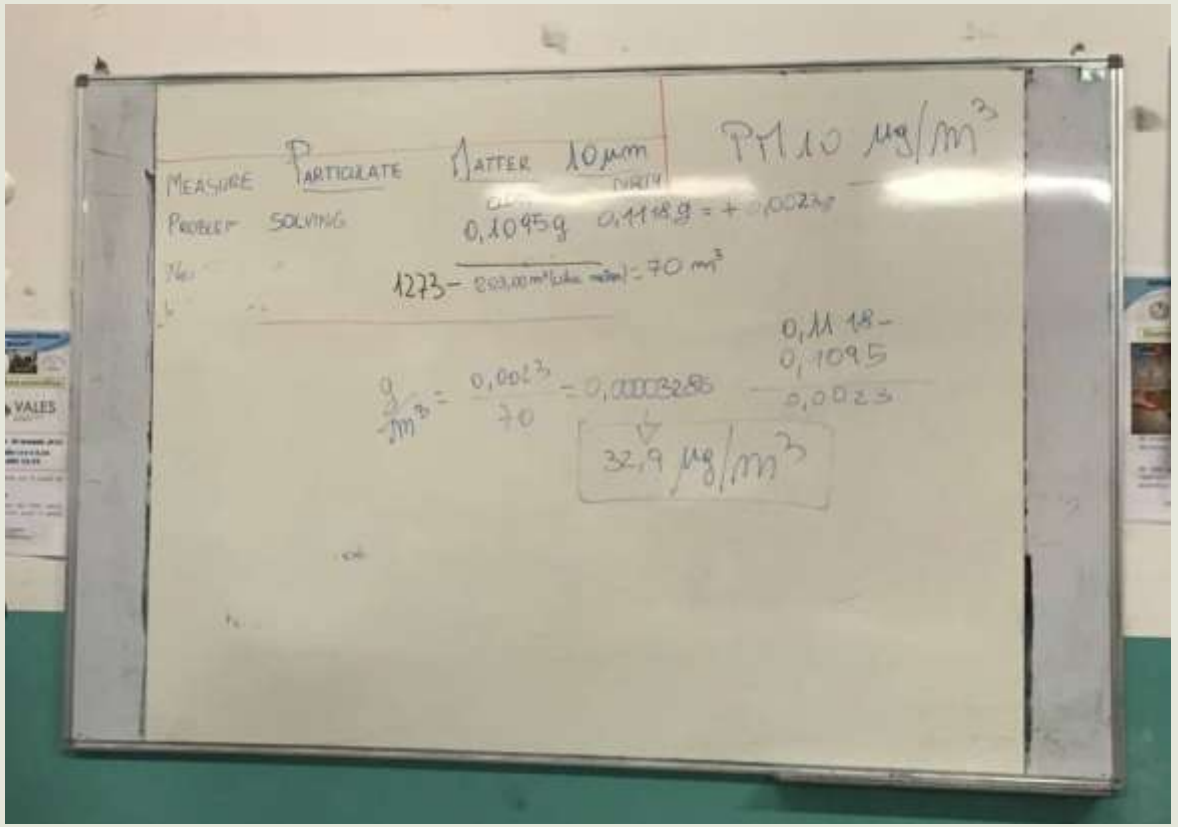
Air Pollution (PM 10)

The term “**Pollution**” indicates the degradation of the environment caused by the introduction of substances that physically, chemically and biologically alter its characteristics.

Some polluting substances can be solid, liquid and gaseous

Particulate Matter



The definition of **Particulate**

“A set of particles (solid or liquid), because of their form and low density remain suspended in the air”

Dust particles (particulate matter)

Emission

Haze

Sands

Smoke

Aerosol

PM = Particulate Matter

Dust Particles

TPS = Total airborne dust particles (particulate matter):

- They are a set of airborne particles of various size able to enter the human body through enteraction with the respiratory apparatus (inhalable matter).

Inhalable fraction **PM 10** and breathable fraction **PM 2.5**.

- A set of particle-sized particulate matter, bound together due to respiratory movements, can reach and deposit itself in the alveolar area.

Origins Natural

Erosion, volcanic eruption, fires, seeds, pollen…

Human Interaction

- Chemical process, combustion vehicle emissions (diesel motors, heatiny, energy production)
- Wear and tear (for example from friction between the asphalt and tyres)
- Industrial processes (cement plant, foundries, etc…)

What would the measurements of PM 10 in nature be without man’s presence?

Basic natural concentrations based on annual measurements vary from 4 µg/m³ at 11 µg/m³

PM 10 and PM 2.5

PM 10 represents the particulate that has a diameter inferior to 10 microns and are also called inhalable dust particles. They are capable of penetrating the upper respiratory tract (from the nose to the larynx)

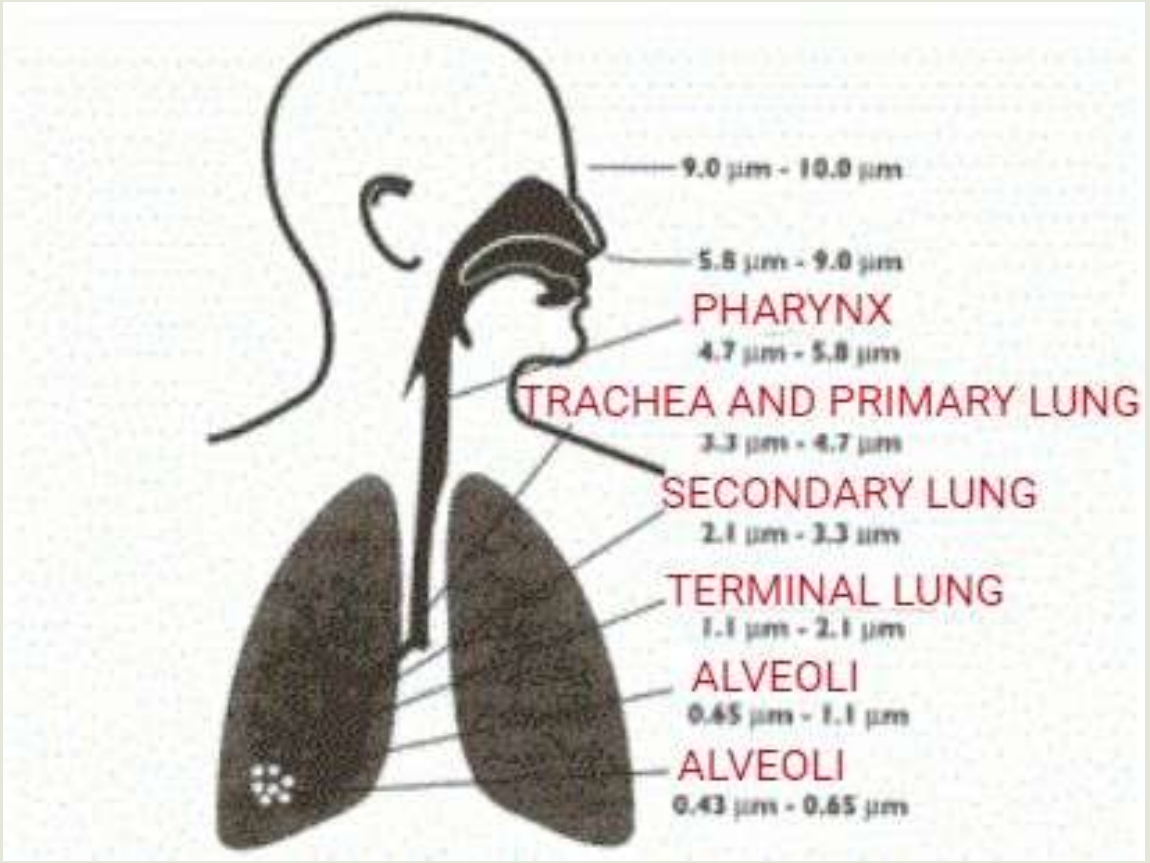
PM 2.5 constitute approximately 60% of PM 10 and represent the particulate that has a diameter inferior to 2,5 microns, are also called dust particles respirable they are capable of penetrating the inferior respiratory tract (from the trachea to the alveoli)

Effects on man

The toxicity of the particulate in tied to:

- Type of chemical
- Capability of the absorption of the toxic substances, heavy metals, polycyclic aromatic hydrocarbons.

The dust particles (particulate matter) worsen chronic respiratory disease such as bronchitis and emphysema.



Limit value PM 10 and PM 2.5

Regulatory framework – Dlgs 155/10

Limit value PM 10	Annual average: 40 µg/mc	
Limit value PM 10	Maximum daily average: 50 µg/mc	Maximum number of annual exceedances: 35
Limit value PM 2.5	Annual average: 25 µg/mc	

Palermo – Air pollution monitoring station

Measurements techniques

- Sampling
- Analysis by weighting

Filters used for the sampling

Analytical procedure:

- Determination of the exsiccated filter mass in analytical scale.
- The use of filters to the collect particulates during analysis.
- Following extraction of the filter, conservation in a protected container.
- Determination of the filter mass with the particulate.
- Calculation of the concentration of PM 10 in the analysed sample.

Analysis by weighing

The particulate material in determined through the filtering of air with the consequent collection of airborne particulate matter.
The final concentrarion of the particulate matter is abtained through the ratio of filter weighing and the volume of aspirated gas (gravimetric method).

$$M = \frac{m}{V} = \frac{m_f - m_i}{V}$$ [µg/Nm^3]

The concentration of particulate matter is calculate by the ratio between the difference in mass (mf-mi) and the volume of sampled gas.

Gravimetric analysis

The struments are:

- Constant flow volume sampler.
- Analytical scale.

Auxiliary equipment:

- Filters.
- Connecting pipes.
- Nozzle holder.

Particulate matter, PM 10, PM 2.5

Measuring chain: