



AIR POLLUTION

Lecture 2

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Introduction

Air pollution is a problem in many of areas of the world.

It can damage trees, lakes and animals, and make people sick.

It can also damage buildings and other structures.

Air pollution also can cause haze, reducing visibility in national parks and sometimes interfere with aviation (Perkins, 1974).



Air Pollution

*London fog in the time
of Dickens*



Wellcome Institute Library, London

Air is never 100% clean

90% Natural Sources: Volcanoes, Sea Spray, Spores and Pollen, Terpenes, Dust, Soot, Smoke from Forest Fires

10% Anthropogenic Sources:

Agriculture, Industry, Transportation

By accident or design, every chemical species contributes to air pollution.

But Anthropogenic Pollutants:

Are the most toxic.

Are emitted where people live, work, and play.

Typically have the highest concentrations.

Typically cause the greatest health problems.

Are mostly controllable.



Air Pollution

Definition: A concentration of substances in the atmosphere that may be detrimental to health, infrastructure, or environmental quality.



تعریف آلودگی هوا

هرگونه تغییر در ویژگیهای متشکل هوا که بطور مستقیم یا غیر مستقیم منافع و حیات موجودات زنده را به مخاطره اندازد.

Scales

مقیاس	مسافت (km)	محدوده تاثیر	رویداد
شخصی	-	ریه ها	کشیدن سیگار
محیط بسته	-	ساختمان ها	انتشار گازها و مواد سمی
محلی	1-100	شهرها	مه دود
منطقه ای	100-2000	منطقه	باران اسیدی
جهانی	1000-40000	جهان	گرمایش زمین، کاهش ازن

گازهاي كمياب (Trace gases)

به گازهايي اطلاق مي شود كه از غلظت كمی در هوا برخوردار باشند.

The remaining less than 1% of the atmospheric gases are known as **trace gases** because they are present in such small concentrations.

They include

carbon dioxide (CO_2),

methane (CH_4),

Carbon monoxide (CO),

nitrous oxide (N_2O),

nitrogen oxides ($NO_x=NO+NO_2$),

sulphur dioxide (SO_2),

chlorofluorocarbons (CFCs),

ammonia (NH_3),

hydrogen sulphide (H_2S),

dimethyl sulphide (DMS) (CH_3SCH_3)

ozone (O_3).



Importance

These trace gases play a crucial role in the Earth's radiative balance and in the chemical properties of the atmosphere.

Despite their relative scarcity, the most important trace gases in the Earth's atmosphere are the greenhouse gases.

These trace gases are important because of their ability to produce daytime and night time vapour species which can either condense to form new particles or condense onto existing particles.

Furthermore, the NO_x and CO levels, (or more precisely the changes in those levels); provide a good tracer for the amount of traffic activity in a city, as they are a direct measure of primary emissions from vehicles (Williams; 1999).



Definition: (تعریف)

Aerosols

هواویزها: ذرات جامد و مایع معلق در یک گاز معمولاً هوا و یا یک کلئوئید. مانند فیوم-گرد (غبار)- دود- مه- دوده و مه دود.

- *Fume-Dust-Smoke-Fog-Soot--Smog*

Air pollutants

آلوده کننده های هوا: گازها-مایعات یا جامدات معلق در اتمسفر در غلظت هایی که سلامتی انسان ها-حیوانات و زندگی گیاهی را تحت تاثیر قرار داده و یا موجب فرسایش ساختمان ها میگردند.

