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AIR POLLUTION

classmate

Date _____

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ATMOSPHERE :

1) TROPOSPHERE :

- > 0-11 km
- > 15 to -56°C
- > Contains N_2 , O_2 , CO_2 , H_2O
- > Air pressure and temperature drops with altitude
- > 99% of water vapour (including clouds).

2) STRATOSPHERE

- > 11-50 km
- > -56 to -2°C
- > Contains O_3 (Ozone layer of 15 km)
- > Temperature increases with altitude.
- > Lacks turbulence, thus jets fly in lower parts

3) MESOSPHERE

- > 50-90 km
- > -2 to -92°C (coldest temp. in atmosphere around top part)
- > Contains O_2 , O^+ , NO^+ , e^- (ionosphere)
- > Too thin air with pressure 1% of sea level.
- > Temperature decreases with altitude

4) THERMOSPHERE

- > 90-650 km
- > -92 to 1200°C
- > Contains O_2 and NO^+
- > Extremely thin air that burning temp. feel freezing.
- > Contains satellites and phenomena like aurora, northern southern lights.

1) EXOSPHERE

- > 650 - 100,000 km
- > Extreme temp.
- > contain H_2 , He
- > Considered as a leakage of atmosphere in space.

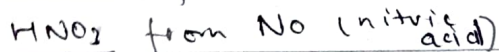
2) THERMOSPHERE

- > Between thermosphere & mesosphere
- > Contains charged atoms and ions with knocked e^- .

3) ATMOSPHERIC HAZARDS:

1) ACID RAIN

- > CO_2 & NO produced by burning CO_2 (coal, oil, NO_x petrol, oil (in power station) (in vehicles))



make acid rain

- > $CO_2 + H_2O \rightarrow H_2CO_3$ (carbonic acid) (until saturation where $pH=5.6$) (atmospheric)

- Thus, all rain is acidic.

- > Harms: (i) vegetation destruction (ii) marine life damage (iii) corrosion of metals (iv) Etching of buildings (v) damage to nervous/respiratory system (vi) contaminates lakes/ponds

2) OZONE DEPLETION



} formation



} depletion

- * Sources of depletion (ODS - Ozone depleting substances)
- > CFC, HCFC, Halogens, CCl_4 , CH_2Br etc.
 - > CFC sources - refrigerator coolant, cleansing agent etc.
- * Effects:

~~Global warming / Greenhouse gas~~

- (i) Human health - skin cancer, blindness (actinic keratitis), low immunity.
- (ii) Aquatic system - damage of fish / larval crabs, phytoplankton (absorber of CO_2) destroyed.
- (iii) Materials - paint / plastic degradation
- (iv) Climate - global warming

3) GLOBAL WARMING / GREENHOUSE GAS

"Progressive warming up of earth's surface due to blanketing effect of 'man made CO_2 in atmosphere'."

* Greenhouse gases *	Time in atmosp.	Warming potential
i) CO_2	50 - 120 yrs	1
ii) CH_4	12 - 18 yrs	23
iii) N_2O	114 - 120 yrs	296
iv) CFCs	1 - 20 yrs	900 - 8300
v) HCFCs	9 - 390 yrs	470 - 2000
vi) CCl_4	42 yrs	1400

Ozone and SO_2 are also kinda pollutants.

H_2O vapour ~~are also~~ and hydrocarbons are also major.

* Effects:

- i) Sea level - rise due to glacier melts.
- ii) Agriculture / forestry - less productive crop making due to changed rainfall pattern.
- iii) Water resources - Drought / floods are frequent.
- iv) Terrestrial ecosystem - Inadaptability for plants & animals

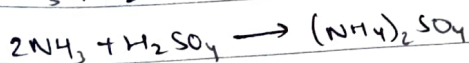
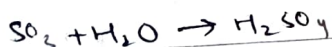
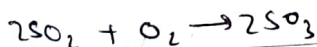
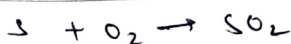
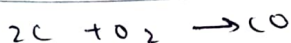
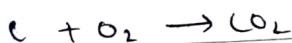
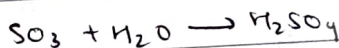
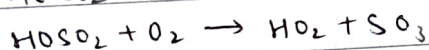
4) SMOG:

"Hazy mixture of heavily polluted air due to emission of SO_2 and aerosols (smoke) from the burning fossil fuels, under cold, stable, moist conditions."

* Types:

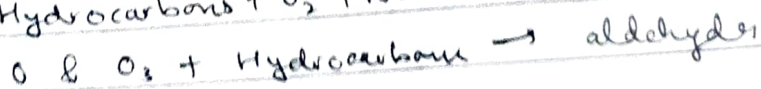
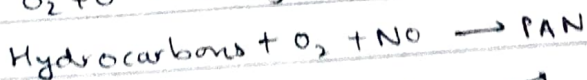
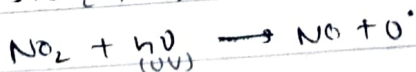
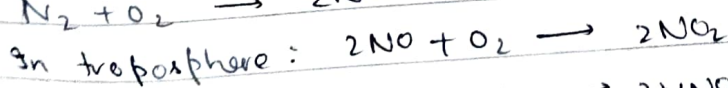
> Classical / Industrial Smog / London Smog / Sulphurous smog

→ When sulphur particles dissolve in water vapor, while coal soot darkens the sky. (greyish in color)



> Photochemical smog / L.A. smog

→ When sunlight reacts with Nitrogen oxides and volatile organic compounds (hydrocarbons / aldehydes / O_3 / CO etc) (brownish)

* Effects:

> Mostly poisonous

> Reduces visibility

- > Irritation in eyes / nose / throat
- > Breathing trouble
- > Crop damage / animal damage
- > Building corrosion

* Remedies

- > Conserve energy
- > Use ecological paints and cleansers
- > Avoid burning trash / leaves etc.
- > Properly inflate your tires.
- > Use spill-proof gasoline containers.

MONITORING POLLUTANTS

* SAMPLING OF VAPOURS

- > Grab sampling - Fill water in container, empty it so air replaces
- Absorption in liquid - Eg: NO_2 in NaOH , CO_2 in KOH etc.
- > Adsorption in solid - Eg charcoal
- > Cold Trapping
- > Combustion

* SAMPLING OF PARTICLES

- > Filtration - (cellulose filter paper)
- > High Volume Filtration
- > Sedimentation
- > Impingement
- > Electrostatic precipitation
- > Thermal precipitation

* STACK SAMPLING