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Ref. No. .....

Date. 10/08/2022

B.Sc. Semester-6H, DSE-4, 2022 Examination (F.M: 40)
Bejoy Narayan Mahavidyalaya, Itachuna, Hooghly

Sl. No.	Roll No.	BU Registration No	BU Registration Year	Students' Name	Topic	Signature of Student
1	190340300017	201901040141	2019-20	CHANDAN SAMADDER	Milk Adulteration	Chandan Samadder
2	190340300018	201901040142	2019-20	DIBYENDU PARAMANIK	Environmental Nano toxicology	Dibyendu Paramanik
3	190340300022	201901040146	2019-20	JAYITA MONDAL	Chemical Influence of Pesticides	Jayita Mondal
4	190340300028	201901040153	2019-20	MAMOON HASSAN	Basic of Chemical Fertilizer	Mamoon Hassan
5	190340300040	201901040165	2019-20	PRIYA NEOGI	Importance of Colloids in the Field of Medicine	Priya Neogi
6	190340300047	201901040174	2019-20	RITWIK RAY	Air Pollution and Climate Change	Ritwik Ray
7	190340300054	201901040181	2019-20	SAYAN KUMAR DEY	Soil Pollution and Trace Elements	Sayan Kr. Dey

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8	190340300058	201901040186	2019-20	SHUBHADIP MONDAL	Global Warming and Ozone Depletion	Shubhadip Mondal
9	190340300064	201901040192	2019-20	SK MONIRUL ISLAM	Environmental and Health Impact of Air Pollution	SK Monirul Islam
10	190340300077	201901040205	2019-20	SOURAV GHOSH	Greenhouse Gases and their Impact on Global Warming	Sourav Ghosh
11	190340300087	201901040215	2019-20	SUPRIYA PAUL	Noise and Light Pollution and their Effect on Public Health	Supriya Kar
12	190340300099	201901040227	2019-20	TRISHA PAL	Study on Adsorption Property of Nanoparticles	Trisha Pal

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CERTIFICATE

This is to certify that the project entitled Environmental Nanotoxicology submitted by Sri Dibyendu Paramanik,

student of CHEMISTRY (HONOURS) of BEJOY NARAYAN MAHAVIDYALAYA, ITACHUNA, HOOGHLY, WEST BENGAL, in the partial fulfillment of the requirement for the award of Bachelors Degree in Science from THE UNIVERSITY OF BURDWAN, WEST BENGAL, is a record of the student's own work carried under my supervision and guidance. This report has not been submitted to any other University or Institution for the award of any degree.

Shalmali Chakraborty

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B. N. MAHAVIDYALAYA ESTD.-1950 GOVT. SPONSORED P.O.-ITACHUNA, HOOGHLY

CERTIFICATE

This is to certify that the project entitled Importance of Colloids in the Field of Medicine submitted by Smt. Priya Neogi student of CHEMISTRY (HONOURS) of BEJOY NARAYAN MAHAVIDYALAYA, ITACHUNA, HOOGHLY, WEST BENGAL, in the partial fulfillment of the requirement for the award of Bachelors Degree in Science from THE UNIVERSITY OF BURDWAN, WEST BENGAL, is a record of the student's own work carried under my supervision and guidance. This report has not been submitted to any other University or Institution for the award of any degree.

Guide: Dr. PINAK DUTTA

Assistant/ Associate Professor

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MILK ADULTERATION

and their detection techniques

The University of Burdwan

Name : Chandan Samadder

Roll : 190340300017

Registration number : 201901040141 of 2019-20

Sem : VI

Course codes : DSE 4

Bejoy Narayan Mahavidyalaya

ABSTRACT :

Food adulteration is a global concern and development countries are at higher risk associated with due to lack of monetary and policies . In India adulteration and contamination are encountered in food consumed at the household level , in the food service establishment and business firms and also when sold as street foods. Food is essential for sustenance of life. Adulteration is a legal term meaning that a food product fail to meet the legal standards. This work presents a detailed review on common milk adulterations like urea as well as different kind of shops and as well as different methods to detect this substances quantitatively and qualitatively. In this work well we will discuss how milk is adulterated by urea soap detergent and other chemicals. Milk is a source of good quality protein ,calcium and many other nutrients . But nowadays milk is adulterated even with urea. Commercially urea is added to milk to increase non protein nitrogen content. This adulteration can cause serious health hazards leading to fatal disease. There are many techniques to detect this adult substance in milk including infrared Raman spectroscopy. This review intense to contribute towards common knowledge waste the grading milk adult by urea detergent soap and other chemicals and its detection techniques

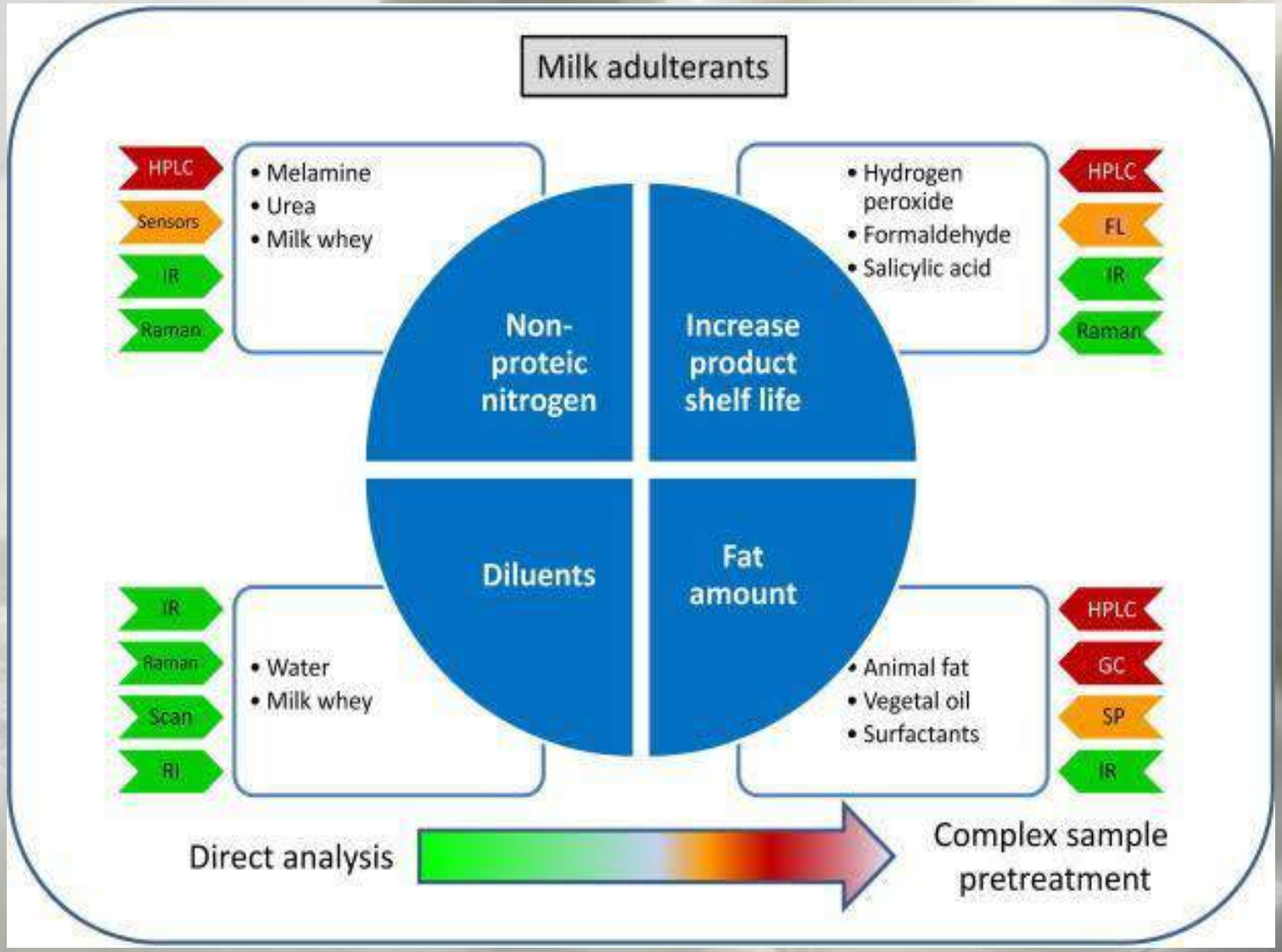
INTRODUCTION:

Food adulteration means anything adding or substacking with food making it infurious to health. Everyday we watching TV news how unhygienic and spurious foods are entering into our houses. This adulterations may be done intentionally or unintentionally . Internationally adulteration is it crime act and punisable offence. What the process of lowering the nutritive value of food either by removing a vital component orbital substances inferior quality . History and have recognised causes of food adulteration in ancient Rome and the middle age. Contemporary accounts of adulteration date from the 1850 to the present date . In the United States the food and drug administration regulates and enforce laws on food safety as well as food defence.

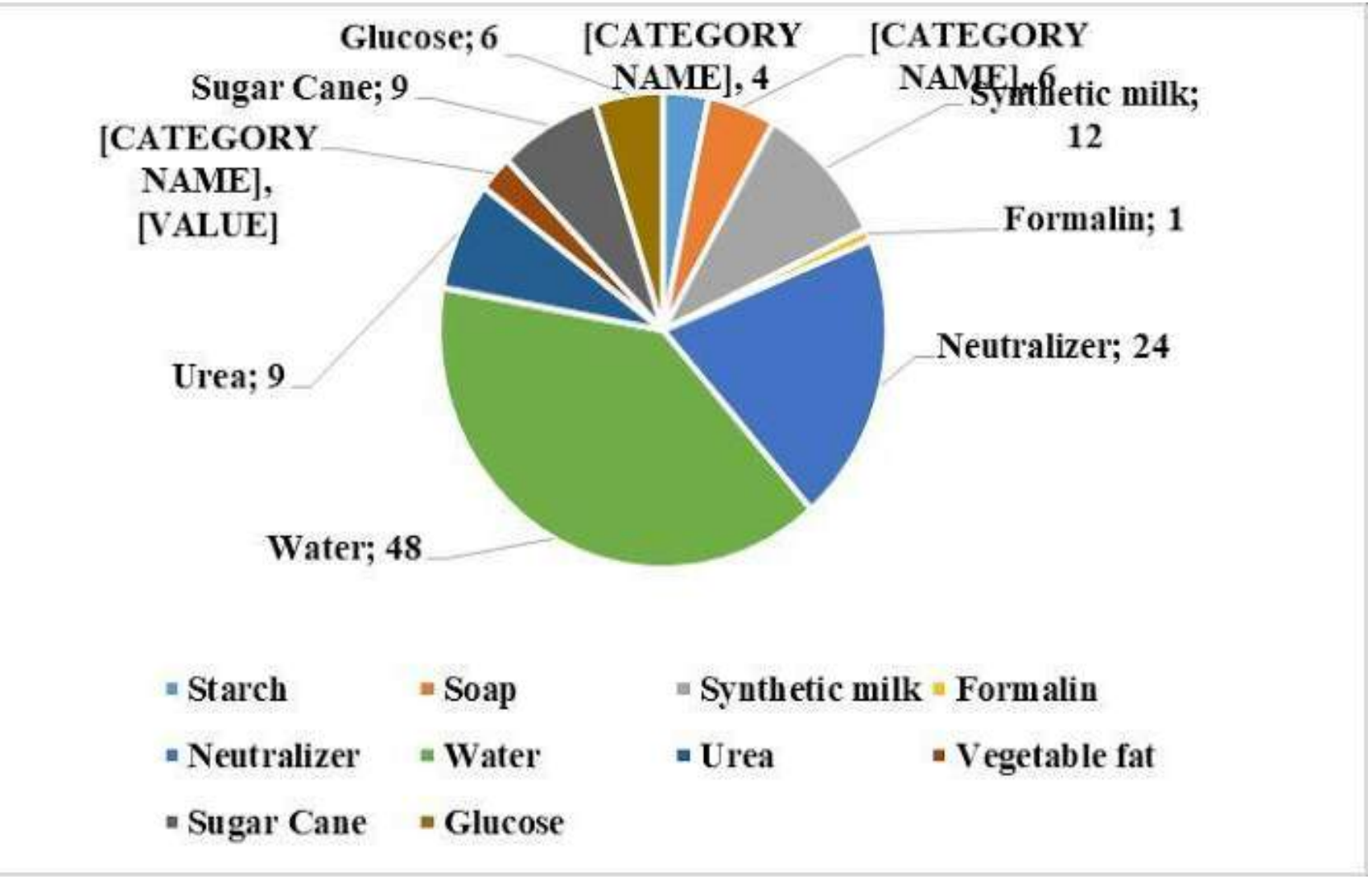
Milk is one of the essential commodities of human life. It is also the most common food in India. Milk is consider to be the **ideal food** because of its abundant nutrients required by both infants and adults. It is one of the best source of fat, protein, carbohydrate, vitamins and minerals. But unfortunately milk is being adulterated all over the world. This adulteration came to global concern after out breaking of the melamine contamination in Chinese infant milk product in 2008. However history of milk adulteration is very old as **Swill milk scandal** has been reported in 1850 which killed more than 8000 in child in New York alone . The motivation for food fraud is economic but its important is real public health concerned. This situations is getting oats day by day due to lack of monetization and proper law enforcement.

Milk adulterants are mainly vegetable proteins milk form different specie
water etc. These are known as chronically motivated adulteration. This
adulterations do not cause any effects to the health. But some adulteratio
as urea formalin boric acid detergent ammonium sulphate caustic soda b
acid salicylic acid hydrogen peroxide sugar Milaminet to harmful to be ov
Urea is added to milk to increase solid-non-fat . Uriya vineya natural cons
romil has a maximum limit in post by fssai (food safety and standard auth
India)
act 2006 and PFA (prevention of food adulteration) rules 1955 which is to
70mg/100 ml. Commercial uriya is added to milk to increase non protein
content. Composition of milk with urea concentration above this limit car
several health problems in human being . Is detection of urea in milk and
quantity analysis is important for the point of view if not only quality cont
diary industry but also in human healthcare .

SOME COMMONLY USED MILK ADULTERANTS



Pie chart of milk adulterants



Methodology:

Qualitative detection methods – quality detection of urea in milk is simply colour waste chemical reactions. This qualitative detection methods are advantages as their simple , rapid and very easy to perform . There are some simple detection techniques to detect urea and other substances in milk. Estimation of urea concentration in milk as a tool for checking the meance of adulteration ab natural milk with synthetic milk. Average India control in milk of Karan Swiss , Karan fries and sahiwal cows was reported to win 28.56 , 28.79 and 25.36 milligram for 100 ml. In buffalo milk the average urea content was found to be 35.10 milligram. Some simple detection techniques are done in table 1

Table -1

Rapid qualitative detection of urea in milk :

Reagents	Procedure	Observation
1. 1.6% DMAB reagent – desolve 1.5 gram DMAB (Dimethylaminobenzaldehyde) in 100 g ethyl alcohol and all teen email concentrated H2SO4 2. 24% TCA (Trichloro acetic acid)	DMAB method – take equal quantity of milk and equal quantity of 24% TCA in a glass stoppered test tube . Mix and filter it. Take 3 ml of the filtrate in a test tube and at 3 ml of 1.6% DM ab reagent ethyl alcohol and HCL	Appearance of a distinct yellow indicates the presence of urea in the milk. The control(milk sample containing no added urea) should a slide yellow colour due to the presence of natural urea in milk.
Urease , Bromothymol Blue (BTB) solution	Ek file milk in a test tube at 2 ML urease (20 milligram per ml). Shake well at room temperature and add 0.1 email bromothylmol blue (BTB) solution 0.5%	Happy Orange of blue colour after 10 to 15 minutes indicate the presence of urea in milk. Normal milk shows faint blue colour due to natural urea present in milk
Soybean powder	Take 10 ml of milk in a test tube . Add some soyabean powder and allow to stand for sometimes	The change in colour of a red litmus paper indicates the presence of urea
TCA Whatman filter paper(42), sodium hypochlorate , sodium hydroxide and phenol solution	Take 5 ml of milk sample in a test tube and equal volume of 24% TCA to precipitate the fat and protein of milk. Take 1 ml of clear filtrate , 0.5 ml 2% sodium hydrochloride 0.5 ml 2% sodium hydroxide and add 0.5 ml of 5% final and then mix	A characteristic blue or blue screen colour develops in the presence of added urea higher as pure milk remains colourless

QUANTITATIVE DETERMINATION METHODS :

i) pH measurement - this is a method to detect urea in milk. Uriya has -NH2 groups which is converted to ammonium ion. This ion change pH of milk

ii) Spectroscopy – urea urea in meals can be detected quantitatively spectroscopically. Jismein thoda work on the principle that inference absorption ammonia at wavelength 1530 nm

ii) liquid chromatography – isotope dilute mess spectroscopy also detect quantity urea in milk

iv) Automated Kjeldahl – the Kjeldahl instrument Include systems digestion and distillation . The kjeltec series in digestion to acting the waste possible acuary and precision.

V) infrared microscopy and chemomertics analysis

vi) voltamperometic discrimination

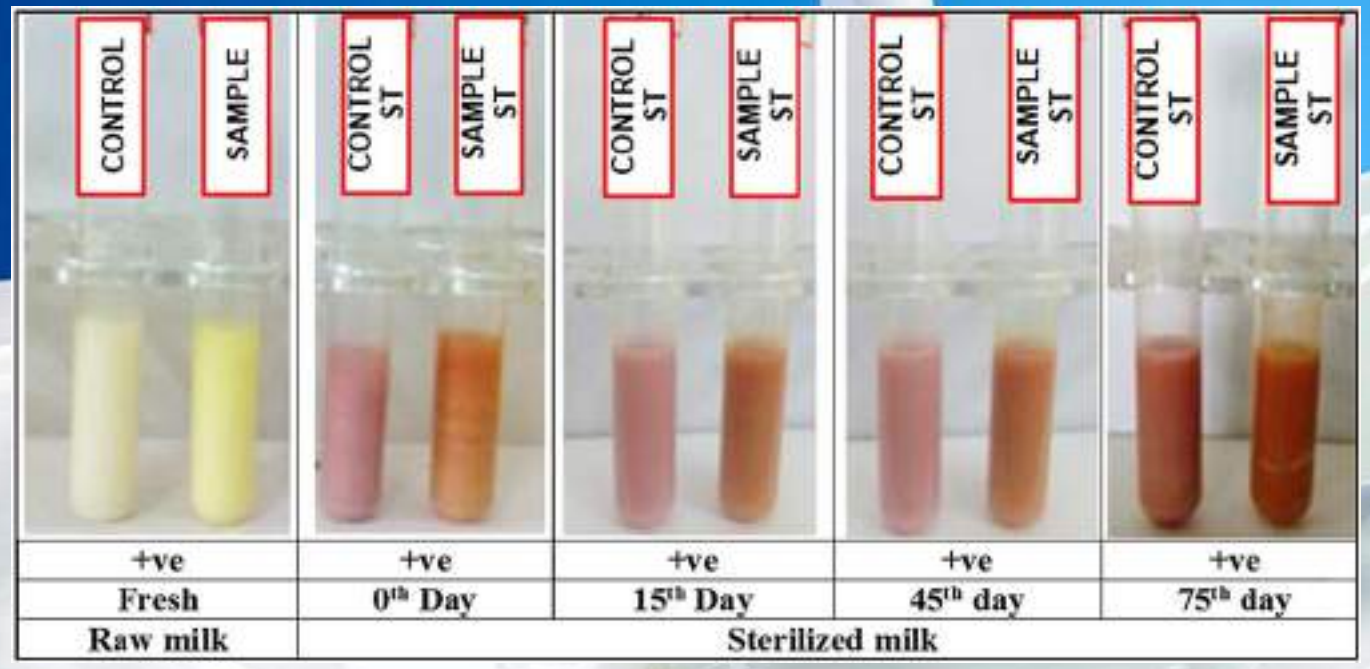
vii) near infrared Raman spectroscopy

viii) flow injection analysis biosensor for urea analysis in adulterate milk using enzyme thermistor.

Result and discussion:

Milk was adulterated with 135 and 7% of urea leading to increasing total solid content and reduce moisture. Lactose gates partially hydrolysed to de glucose and d glucose reacting with urea to lactosylurea at low pH. How ever slowly pH of milk increases with increase in urea content and their fore does not favour lactose urea formation . Does we obtained a slide increase in lactose content at higher levels of urea addition. Variation was also observed in **casein** present in milk.

The normal **casein** content of RAW milk 69 + - 0.07% which showed an increased with urea addition in table 2



+ve	+ve	+ve	+ve	+ve
Fresh	0th Day	15th Day	45th day	75th day
Raw milk	Sterilized milk			

Table 2 :

Quality characteristics of milk adulteration with urea

Parameters	Raw milk (Homogenized toned milk)	Adulterated with uria %				
		0.5	1	3	5	7
Moisture	88.36(+/-)0.06	87.85(+/-)0.02	87.53(+/-)0.05	86.26(+/-)0.15	84.77(+/-) 0.08	83.48(+/-) 0.02
Fat	3.1 (+/-) 0.04	3.2(+/-) 0.04	3.2(+/-)0.01	3.2(+/-) 0.01	3.2(+/-) 0.04	3.1(+/-) 0.00
Acidity	0.169 (+/-) 0.01	0.153(+/-)0.01	0.148(+/-)0.01	0.142(+/-)0.01	0.139(+/-)0.02	0.112(+/-) 0.03
SNF	8.53 (+/-) 0.01	8.95(+/-)0.03	9.25(+/-)0.04	10.54(+/-) 0.02	12.03(+/-) 0.05	13.42 (+/-) 0.04
TSS	11.63 (+/-) 0.00	12.15(+/-) 0.06	12.47(+/-) 0.06	13.74(+/-)0.04	15.23(+/-) 0.04	16.52(+/-) 0.04
pH	6.65 (+/-) 4.04	6.67(+/-) 0.01	6.79(+/-) 0.05	7.21(+/-)0.03	7.63(+/-)0.01	8.36(+/-) 0.03
Casein	2.69 (+/-) 0.07	2.80(+/-)0.03	2.84(+/-)0.01	3.06(+/-)0.05	3.24(+/-)0.01	3.24(+/-) 0.01
Lactose	4.73 (+/-) 0.03	4.73(+/-)0.05	4.73(+/-)0.05	4.83(+/-)0.01	5.05(+/-)0.02	5.21(+/-)0.02
Specific gravity	1.03(+/-) 0.00	1.0313(+/-)0.07	1.0325(+/-)0.01	>1.035	>1.035	>1.035
Ash	0.725 (+/-) 0.03	0.79(+/-)0.12	0.86(+/-) 0.15	0.98(+/-)0.01	1.64(+/-)0.03	1.76(+/-)0.07

Detection of detergent in Milk

Detection of detergent in milk

Testing method:

1. Take 5 to 10ml of sample with an equal amount of water.
2. Shake the contents thoroughly.
3. If milk is adulterated with detergent, it forms dense lather.
4. Pure milk will form very thin foam layer due to agitation..

Pure milk

Adulterated milk

Conclusion:

Although financial gain is considered to be one of the major reason for milk adulteration in adequate supply for the increase in population all over the world has ground for this as well. Milk and Milk products scenes time immemorial, have formed an important parts of our diet. Milk is naturally designed as a nutrient deans food source that narise's and provide immunological milk and Milk products certainly would discourage the consumption of milk and the world deep people of such a valuable healthy commodity. Altho methods exist for detection of urea and other adulterants in milk, every dairy industry in India is not using the methods.

Consumers of our country are also demanding simple test which they can ascertain the quality of milk devai. The existing detection method are based on the weight chemistry which essentially required mixing of milk sample with liquid reagents and at times boiling. Fore awarding hazels of purchase of chemical kit for detection of urea are now commercially available. Even this kit are not to be used at household levels . This work related a significance and direct relation between physical-chemical characteristic of milk against urea . When you re is added to meals eat affects it natural and overall combination and contaminated the sample with hazardous constituents. Prolonged accumulation of urea in the form of synthetic milk causes various disorders and disease in human beings. Milk quality DVS after adulteration from the natural milk constituent; moreover this harmful adultrants are dangerous for human health

Acknowledgement –

On the very outside of this work I would like to extent my science and hard fault obligation towards all the professors who have help me in this endeavor . Without their active guidance help co-operation and encouragement I would not have made head way in this work.

I am ineffably indept to Mrs. Shalmali Chakraborty HOD for consists guidance and encouragement to accompolish this assignment

I am extremely thankful and pay my gratitude to all department teachers for their valuable guidance and support for completing the work
I also acknowledged with a deep sense of reference mine gratitude what's my parents and member of my family who has always supported me Murali as well as economically

At last but not least gratitude goes to all of my friends who directly or indirectly help me to complete this project work any admission in this brief acknowledgement does not mean lack of gratitude

thank you
. - **Chandan Samadder**

Reference:

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7) Chang E, Arora I . Simultaneous , Fast analysis of melamine, cyanuric acid, urea and related compounds in milk and infant formula by LC/MS/MS.2008.
8) YouTube
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10) Some news channels

ENVIRONMENTAL NANOTOXICOLOGY

THE UNIVERSITY OF BURDWAN

BEJOY NARAYAN MAHAVIDYALAYA

DEPARTMENT OF CHEMISTRY

DIBYENDU PARAMANIK

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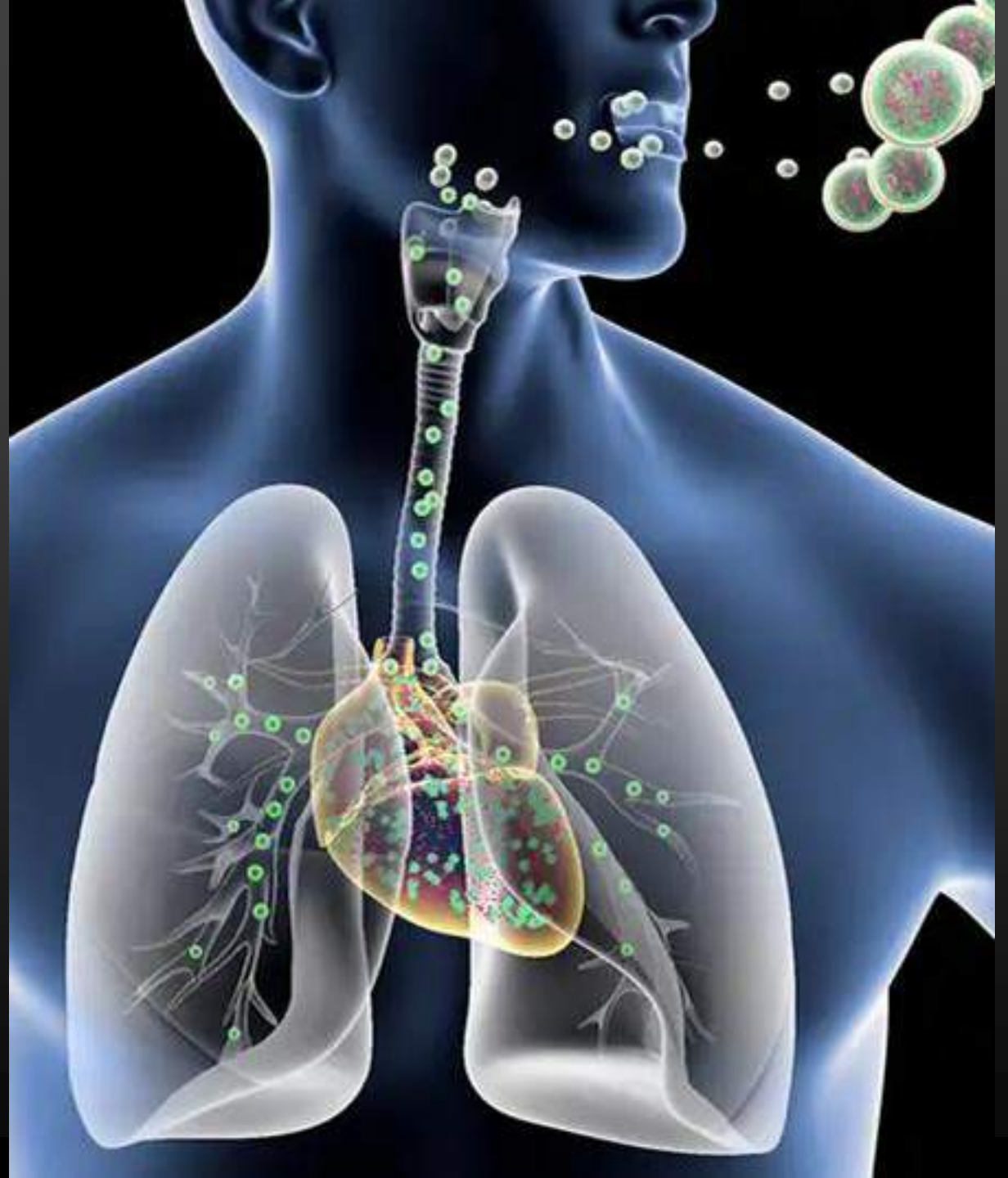
PAPER CODE-DSE 3

ENVIRONMENTAL NANOTOXICOLOGY

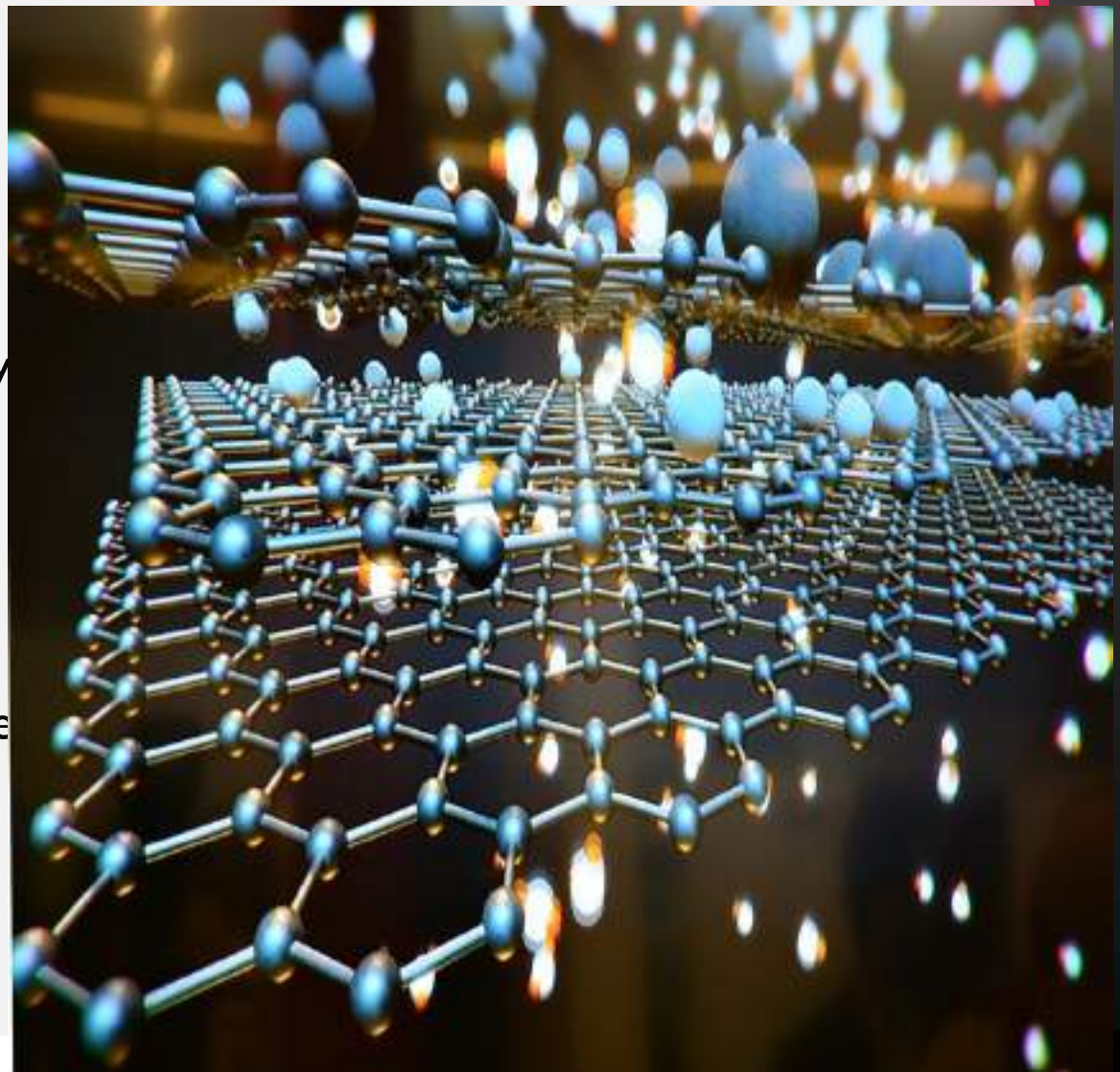
Nanotoxicology is a new area of study that deals with the toxicological profiles of nanomaterials.

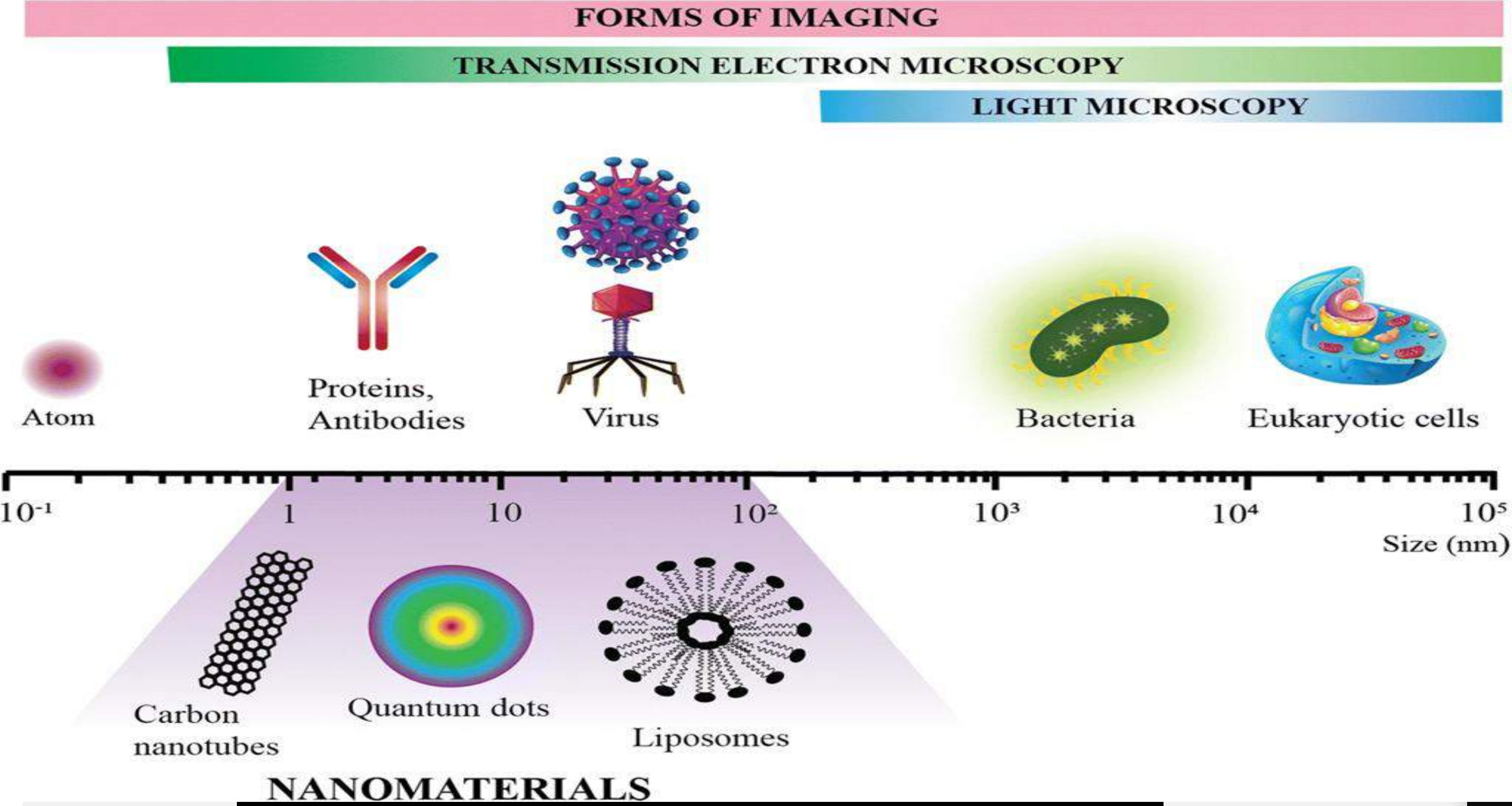


What are nanomaterials?

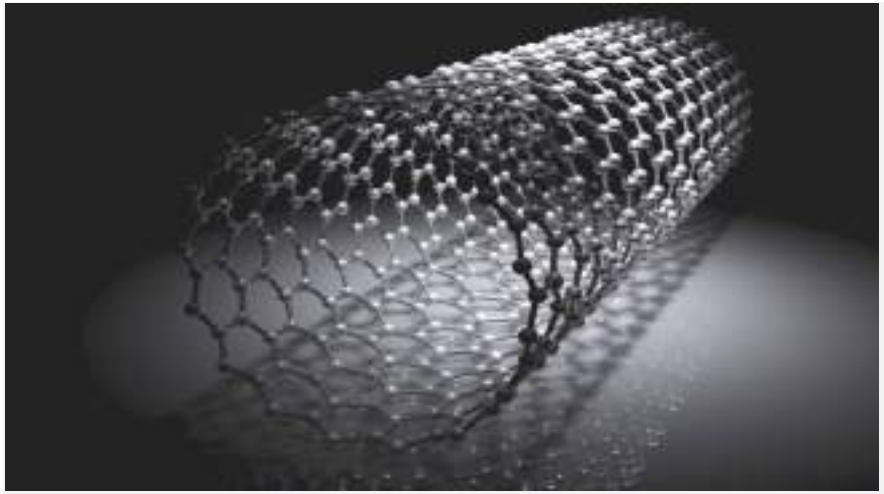
Nanomaterials are materials which have structural components smaller than 1 micrometer in at least one dimension.

- Nanomaterials can occur naturally, be created as the by products of combustion reactions, or be produced purposefully through engineering to perform a specialised function.
- The main difference between these nano materials and bulk material is that the predominant thermal, mechanical, optical , electric, magnetic properties of the material changes at a large rate in nano scale from that of in bulk scale. The material properties of nanostructures are different from the bulk due to the high surface area over volume ratio and possible appearance of quantum effects at the nanoscale.

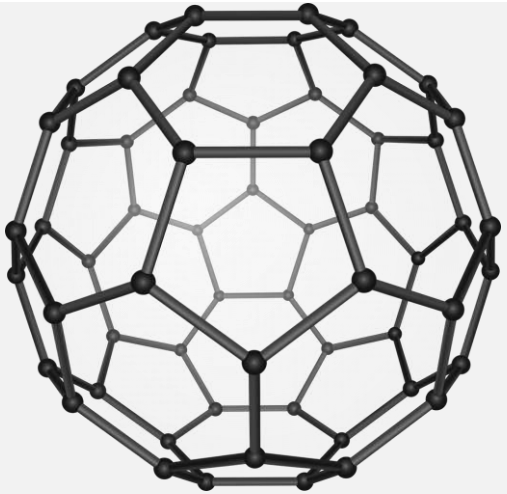




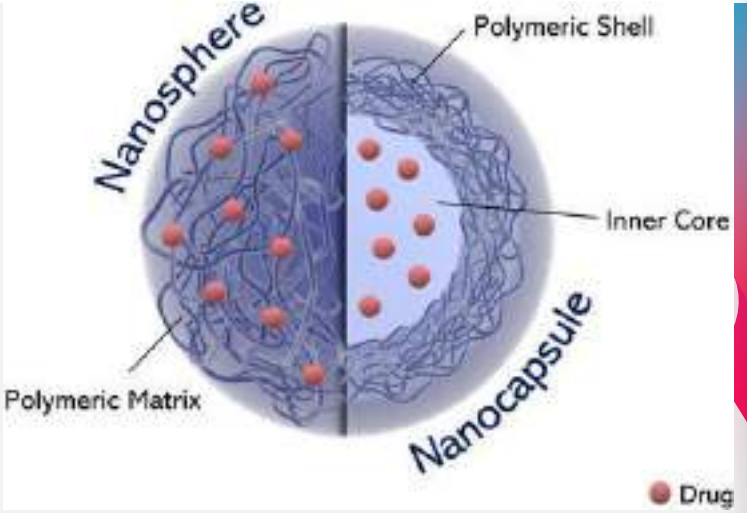
Relative size comparison of nanoparticles



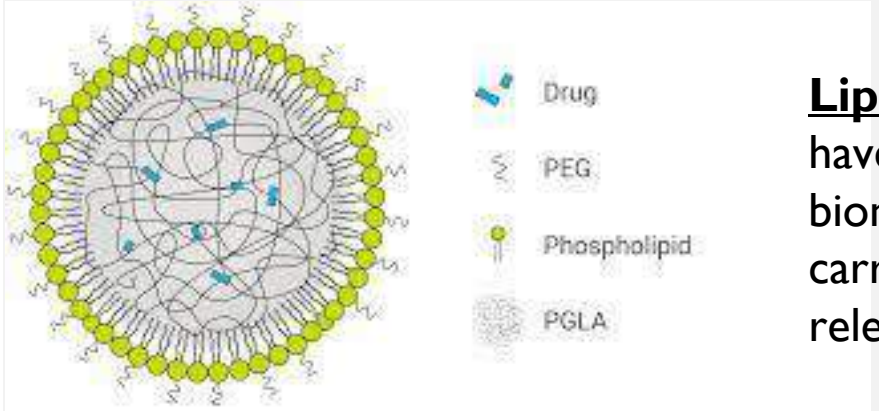
Carbon nanotubes are cylindrical molecules containing rolled up sheets of single layer carbon.



Buckminsterfullerene is used in drug delivery system, in lubricants and as catalysts

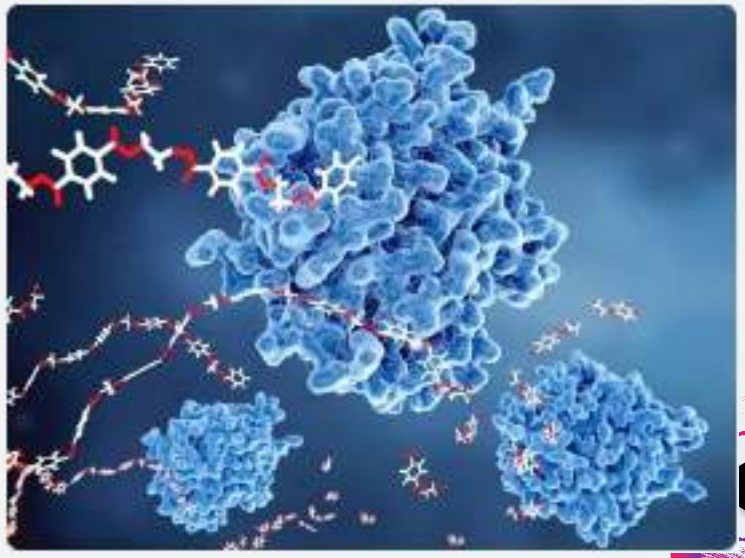


Biodegradable **polymeric nanoparticles** are being used for for drug delivery to solid tumours.

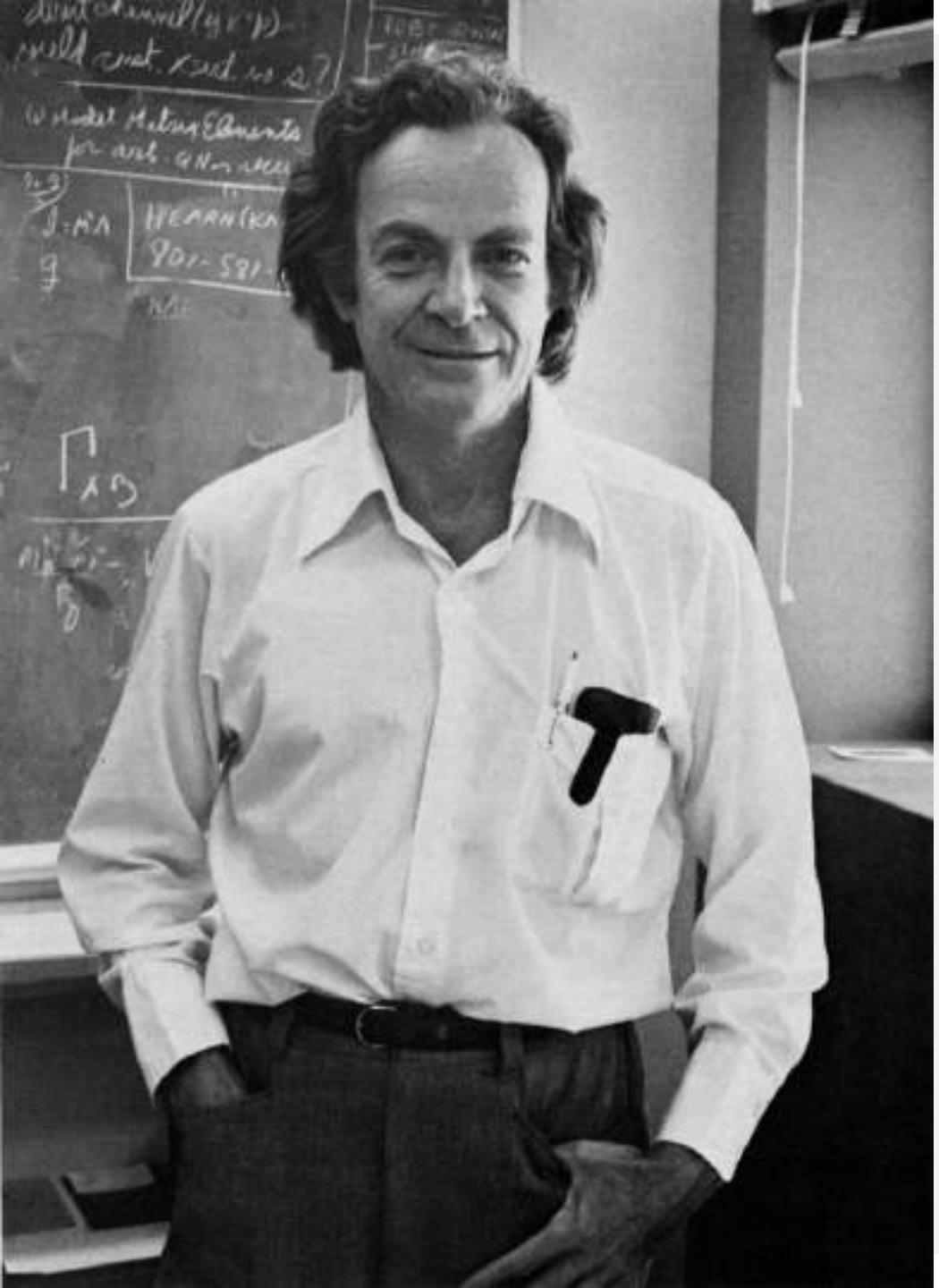


Lipid based nanoparticles have application in the biomedical field as a drug carrier and delivery and RNA release in cancer therapy.

Nanozymes are nanomaterials that display enzyme like characteristics.



Jens Martensson



Modern nanotechnology was the brain child of Richard Feynman

- During the 1959 American Physical Society meeting at Caltech, he presented a lecture titled, "**There's Plenty of Room at the Bottom**", in which he introduced the concept of manipulating matter at the atomic level.
- Almost 15 years after Feynman's lecture, a Japanese scientist, Norio Taniguchi, was the first to use "nanotechnology" to describe semiconductor processes that occurred on the order of a nanometer.
- The golden era of nanotechnology began in the 1980s when Kroto, Smalley, and Curl discovered fullerenes.

NANOTECHNOLOGY IN ACTION

- Commercial applications have adapted gold nanoparticles as probes for the detection of targeted sequences of nucleic acid.

- In one technique, researchers created a nanoparticle that mimics the body's "good" cholesterol, known as HDL (high-density lipoprotein), which helps to shrink plaque.

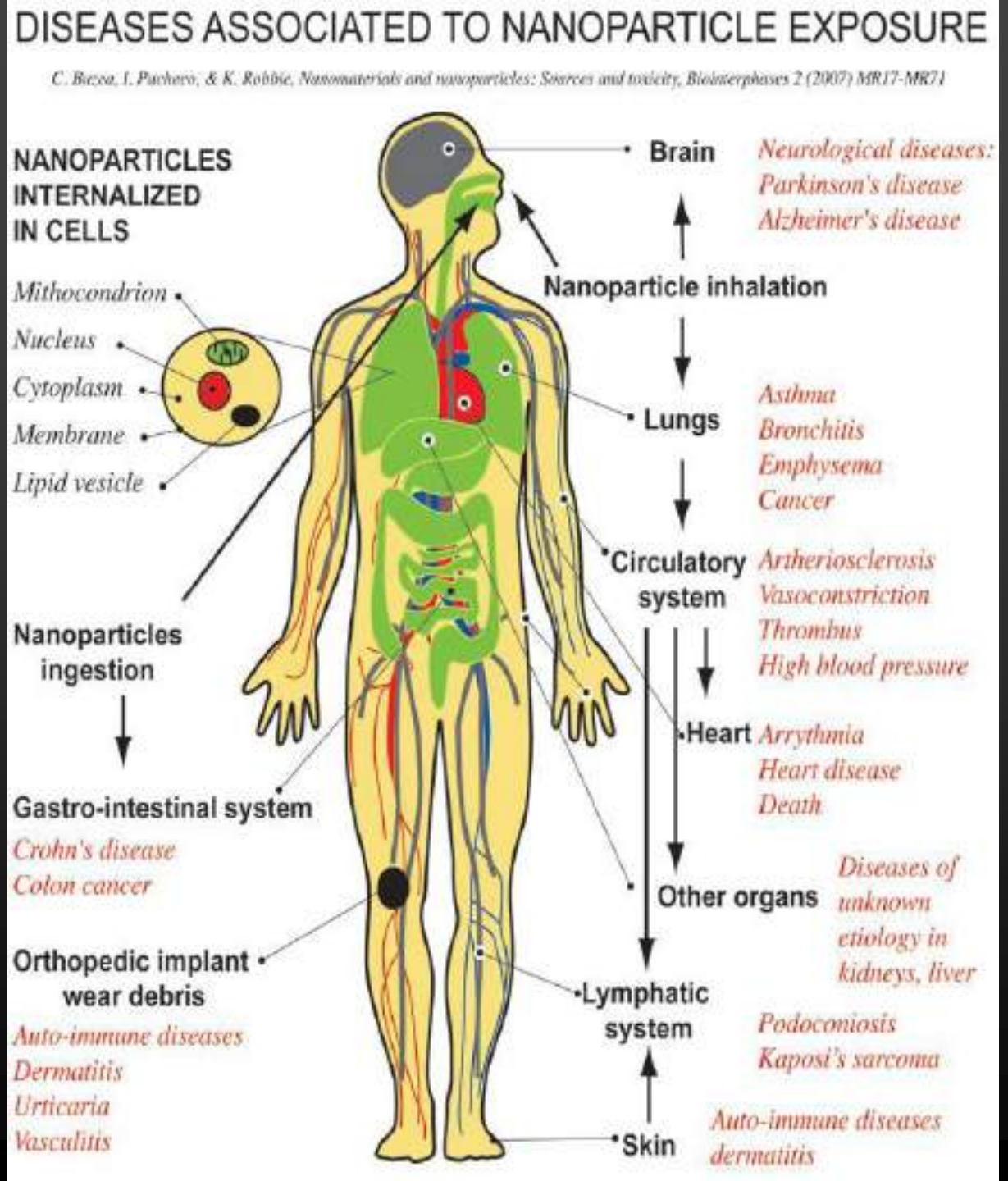
- Two particular types of nanoparticles commonly added to sunscreen are titanium dioxide and zinc oxide. These tiny particles are not only highly effective at blocking UV radiation, they also feel lighter on the skin.

- When used in textiles, nanoparticles of silica can help to create fabrics that repel water and other liquids. Silica can be added to fabrics either by being incorporated into the fabric's weave or sprayed onto the surface of the fabric to create a waterproof or stainproof coating.

- Researchers are developing wires containing carbon nanotubes that will have much lower resistance than the high-tension wires currently used in the electric grid, thus reducing transmission power loss.

Harmful effects of nanoparticles on the environment and on human body

There are several health and environmental issues related to the use and release of nanomaterials or nano based products responsible for the toxicological concerns of the nanomaterial



Why Are Nanomaterials Toxic ?

- Due to very small size nanoparticles have an ability to cross cell membranes and reach internal organs. They have very high surface area to volume ratio therefore a huge number of them can fit in a very small volume and nanoparticles can potentially be more toxic than macroparticles of the same chemical.
- Inhaled nanoparticles can easily pass into the blood stream and accumulate in internal organs
- Some nanoparticles are lipid soluble and the small molecular sizes ensures their penetration through skin
- Some nanoparticles in current use are composed of non biodegradeable materials like metals,ceramics,metal oxides and are not expected to biodegrade.
- Bacteria and cellular organisms can take up nano sized particles providing the basis for potential bioaccumulation in food chain.

Jens Martensson

Environmental risks posed by nanomaterials :

Several studies have confirmed that nanoparticle toxicity is extremely complex and multi-factorial, potentially being regulated by a variety of physico-chemical properties, size and shape, as well as surface properties like charge, area, and reactivity.

Toxicity through air

In rural areas, nanoparticles generally originate from the oxidation of volatile compounds of biogenic or anthropogenic origin, including secondary organic aerosols. In urban areas, the primary sources of these particles are diesel engines or cars with defective or cold catalytic converters.

Respiratory tract is the major portal of entry for airborne nanoparticles. Nanoparticles can travel great distances in air by Brownian diffusion and are respirable and can deposit in the alveolar regions of the lung and from there it can disperse to the other part of the body. After deposition in the respiratory tract, translocation of nanoparticles may potentially occur to the lung interstitium, brain, liver, spleen and possibly to the foetus in pregnant females.

The average half-life (t1/2) for nanoparticles in the respiratory tract is about 700 days in humans

Nanoparticles may cross the mucous membrane inside the nose and then reach the brain through the olfactory nerve. Inhaled nanoparticles can traverse the alveolar endothelium and enter the capillaries, and particles can penetrate the skin and translocate to the lymph nodes. When nanoparticles enter the circulatory system, they are transported to the liver, spleen, lymph nodes and bone marrow. Additionally, nanomaterial can traverse cell membranes and accumulate in the mitochondria.

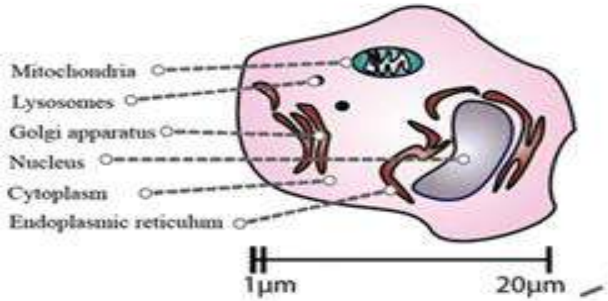
In a study, carbon nanotubes injected into mice to see what effect, if any, was observed. Some targeted mice were found to have internal swelling and cuts which are symptoms similar to those of asbestos damage.

IMPACT OF NMs ON OLFACTORY & RESPIRATORY SYSTEMS

BRAIN
Neurological diseases:
Alzheimer's disease
Parkinson disease

LUNGS
Asthma
Bronchitis
Emphysema
Cancer

ALVEOLAR MACROPHAGES OR OTHER CELLS
Genotoxicity
Oxidative stress
Cellular damage
Pro-inflammatory mediators



CIRCULATORY SYSTEM
Artherosclerosis
Vasoconstriction
Thrombus
Hypertension

OTHER ORGANS
Diseases of unknown etiology in kidneys, liver

HEART
Arrhythmia
Heart diseases

LYMPHATIC SYSTEM
Kaposis's sarcoma
Podoconiosis

Nanoparticles can contaminate waterbodies :

The most prominent way nanoparticles enter the environment is as a by-product of industrial production, where they can be transferred as industrial waste, through either the air or fluid waste streams.

- In aquatic ecosystems, nanoparticles generally referred as colloids comprises of organic materials like fulvic and humic acids form after the degradation of various natural complexes, proteins and peptides as a result of breakdown of dead organic matters and many inorganic species such as oxides of manganese and hydrous iron.
- Nanoparticles also form a group of strongly associated particles that cannot easily be re-dispersed by mechanical means, and in this case the collection is known as an aggregate (Schierz et al. 2014). They form aggregates which are random in nature and enter the food chain through aquatic organisms.

- Oberdorster et al. (2004) studied effects of fullerenes in the brain of juvenile largemouth bass and concluded that C60 fullerenes induce oxidative stress, based on their observations that (a) there was a trend for reduced lipid per-oxidation in the liver and gill, (b) significant lipid per-oxidation was found in brains and (c) the metabolic enzyme glutathione s-transferease (GST) was marginally depleted in the gill.

Jens Martensson

- Toxicity studies and structure-activity relationship predictions for carbon black and suspended clay particles suggest that some suspended natural nano-sized particles in the aquatic environment have low toxicity to aquatic organisms, with effects thresholds ranging from tens to thousands of parts per million.

- They persist more in the sea water and this tendency further results in exhibition of novel effects as the behaviour of aggregated complexes will be significantly different from those of the individual nanoparticles.

Bioaccumulation of Nanoparticles in Living Beings:

- Many of the nanomaterials in current use are composed of inherently non-biodegradable inorganic chemicals, such as ceramics, metals and metal oxides, and are not expected to biodegrade

- Researchers at Rice University's Center for Biological and Environmental Nanotechnology have shown that nanomaterial can accumulate in living things over time, with ever-increasing concentrations in microbes, in the worms that eat the microbes and in animals higher up the food chain Nanoparticles can easily enter the food chain and can cause severe harm to human and environment.

- Earlier studies in 2002 by Rice University's CBEN (Centre for Biological and Environmental Nanotechnology) showed that nanoparticles accumulated in the bodies of lab animals and other studies showed fullerenes travel freely through soil and could be absorbed by earthworms. This is a potential link up the food chain to humans

- Other nanoparticles have also been shown to have adverse effects like a research revealed cadmium selenide (CdS) nanoparticles, also called quantum dots, can cause cadmium poisoning in humans

- Another study showed gold nanoparticles might move through a mother's placenta to the foetus.

Other Pathways of Invasion of Nanomaterials into Human body :

- **Dermal:** Dermal exposure to nanomaterials has received much attention due to concerns with occupational exposure and the introduction of nanomaterial's such as nano-sized titanium dioxide into cosmetic and drug products. Dermal exposure to NPs also occurs with consumer products such as TiO2 and ZnO NPs in sunscreens
- **Injection:** Injection of nanoparticles has been studied in drug delivery and medicine based o on nanotechnology. 90% of injected functionalized fullerenes are retained after one week of exposure. Nanoparticles have been found to be distributed to the colon, lungs, bone marrow, liver, spleen, and the lymphatics after intravenous injection.
- **Oral:** After oral exposure, nanoparticles distribute to the kidneys, liver, spleen, lungs, brain, and the gastrointestinal (GI) tract. Some nanoparticles can pass through the GI tract and are rapidly eliminated in faeces and in urine, indicating that they can be absorbed across the GI barrier and into the systemic circulation . However, some nanoparticle systems can accumulate in the liver during the first-pass metabolism

CONCLUSION

- The risks of nanomaterial vary according to the route of exposure, such as dermal, oral, respiratory and intravenous.
- As there is tremendous diversity among nanomaterial, it is not possible to make any generalizations about the safety of all nanomaterial; one must consider each type of material separately.
- The risks of exposure to manufactured nanomaterial may be different from the risks of exposure to the naturally occurring nanoscale materials, since humans have had millions of years of evolution to adapt to natural exposures.
- Internationally harmonized standards and methods are necessary for the evaluation of environmental, health and safety risks . The OECD (Organization for Economic Cooperation and Development), the standardization bodies and the European Committee for Standardization (CEN) have established working groups and technical committees that play a key role in the development of measurement standards and formally recognized test methods and guidelines for nanomaterials (Thomas and Sayre, 2005). In 2006, the OECD established the Working Party on Manufactured Nanomaterial's (WPMN), to promote international co-operation in the health, safety and environmental issues of manufactured nanomaterials

Thank You

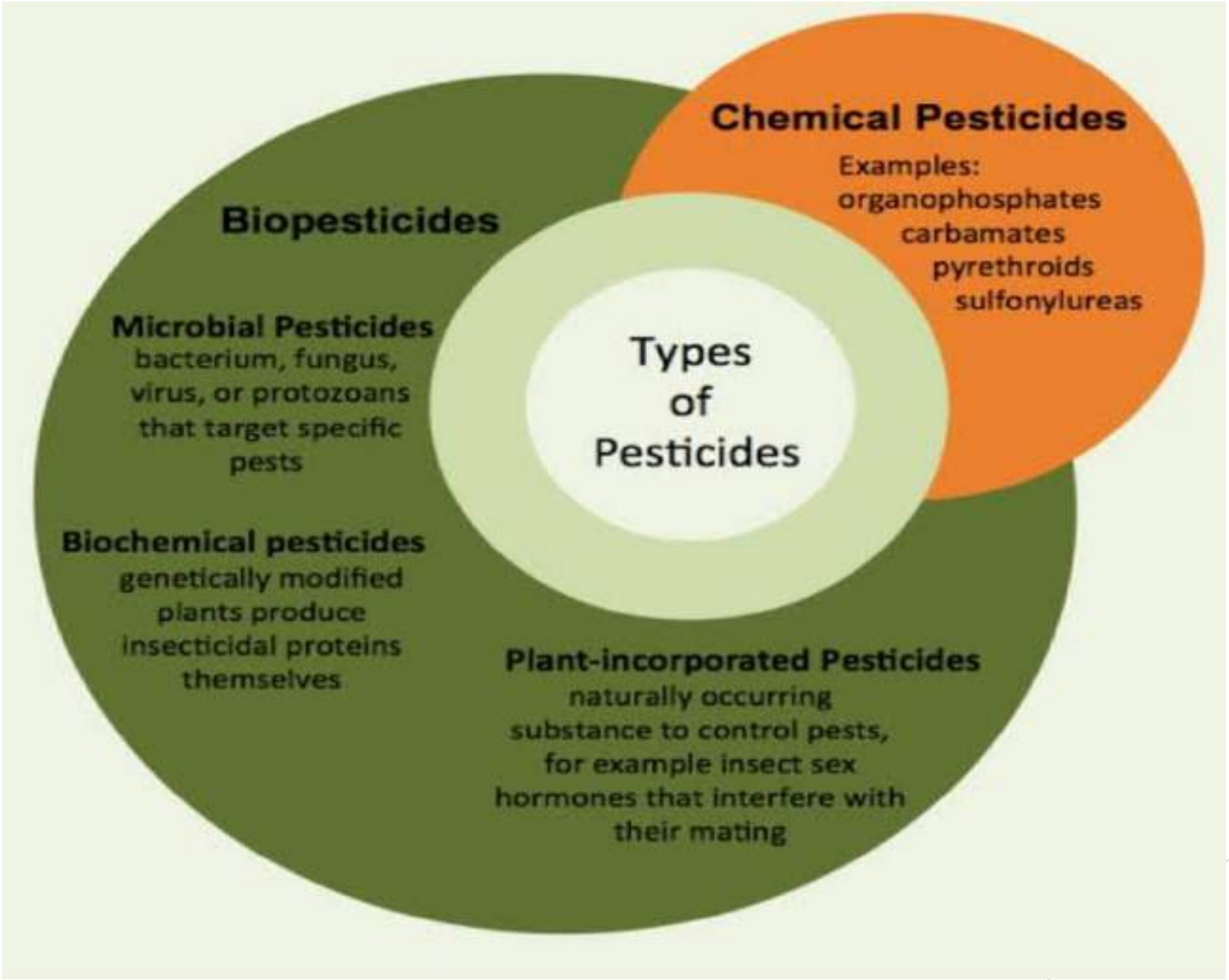
CHEMICAL INFLUENCE OF PESTICIDES

ITACHUNA BN COLLEGE

- NAME-JAYITA MONDAL
- ROLL NO-190340300022
- PAPER-DSE-4
- SUB-CHEMISTRY

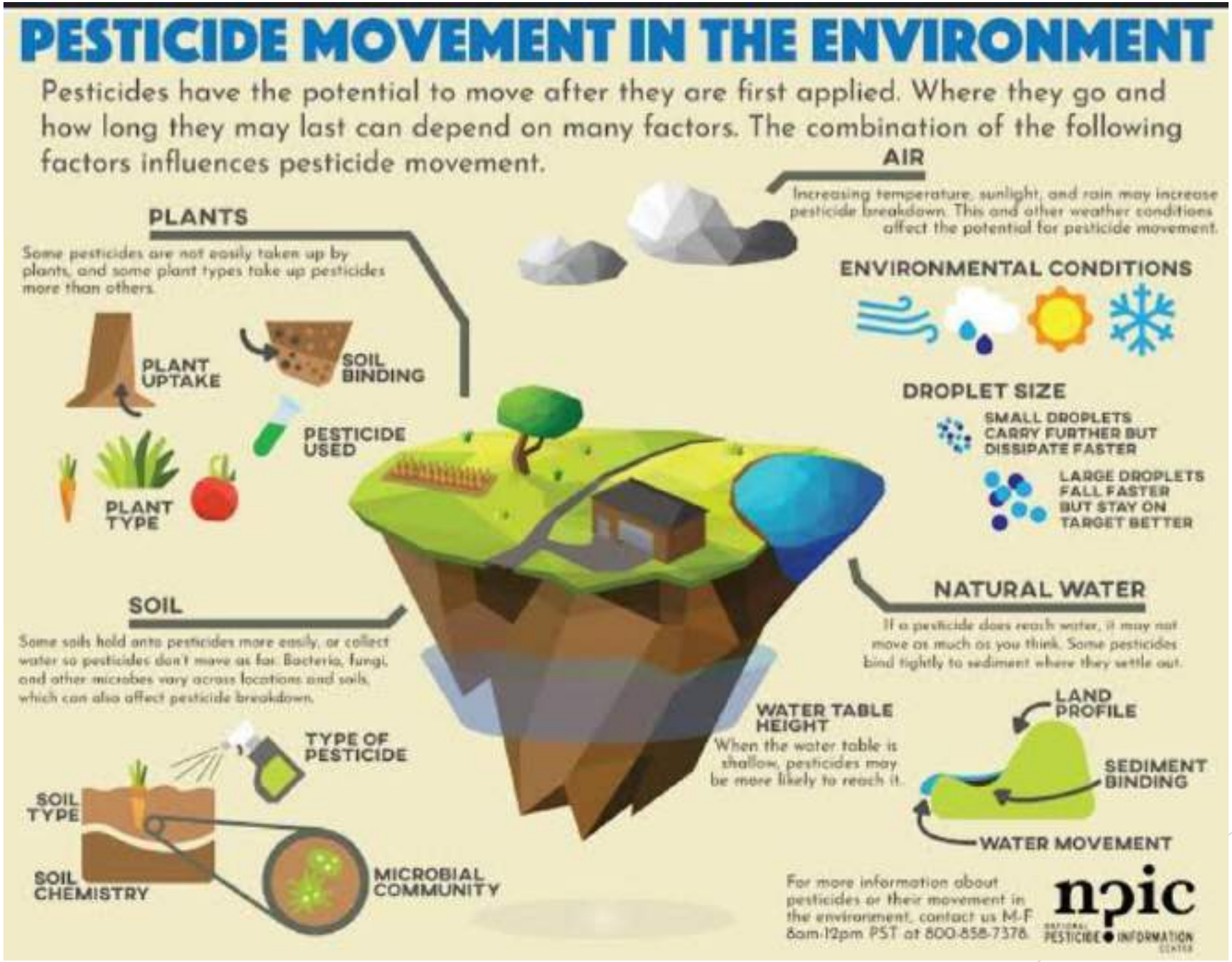
WHAT IS PESTICIDES ?

- Pesticides are substances that are meant to control pests.[1] This includes herbicide, insecticide, nematicide, molluscicide, piscicide, avicide, rodenticide, bactericide, insect repellent, animal repellent, microbicide, fungicide, and lampricide.[2][3] The most common of these are herbicides which account for approximately 80% of all pesticide use.[4] Most pesticides are intended to serve as plant protection products (also known as crop protection products), which in general, protect plants from weeds, fungi, or insects. As an example, the fungus Alternaria solani is used to combat the aquatic weed Salvinia.In general, a pesticide is a chemical (such as carbamate) or biological agent (such as a virus, bacterium, or fungus) that deters, incapacitates, kills, or otherwise discourages pests. Target pests can include insects, plant pathogens, weeds, molluscs, birds, mammals, fish, nematodes (roundworms), and microbes that destroy property, cause nuisance, or spread disease, or are disease vectors. Along with these benefits, pesticides also have drawbacks, such as potential toxicity to humans and other species.


Chemical Pesticides
Examples:
organophosphates
carbamates
pyrethroids
sulfonylureas
Biopesticides
Types of Pesticides
Microbial Pesticides
bacterium, fungus, virus, or protozoans that target specific pests
Biochemical pesticides
genetically modified plants produce insecticidal proteins themselves
Plant-incorporated Pesticides
naturally occurring substance to control pests, for example insect sex hormones that interfere with their mating

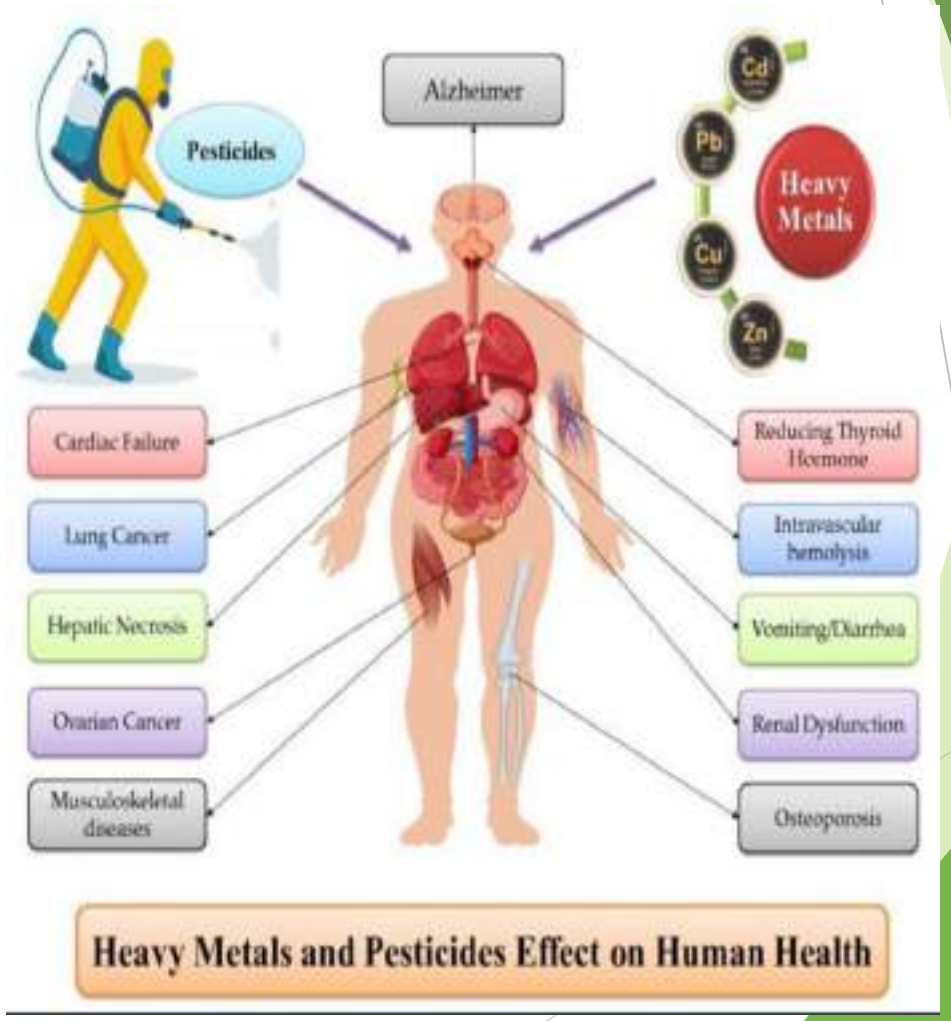
PESTICIDE MOVEMENT IN THE ENVIRONMENT

Pesticides have the potential to move after they are first applied. Where they go and how long they may last can depend on many factors. The combination of the following factors influences pesticide movement.



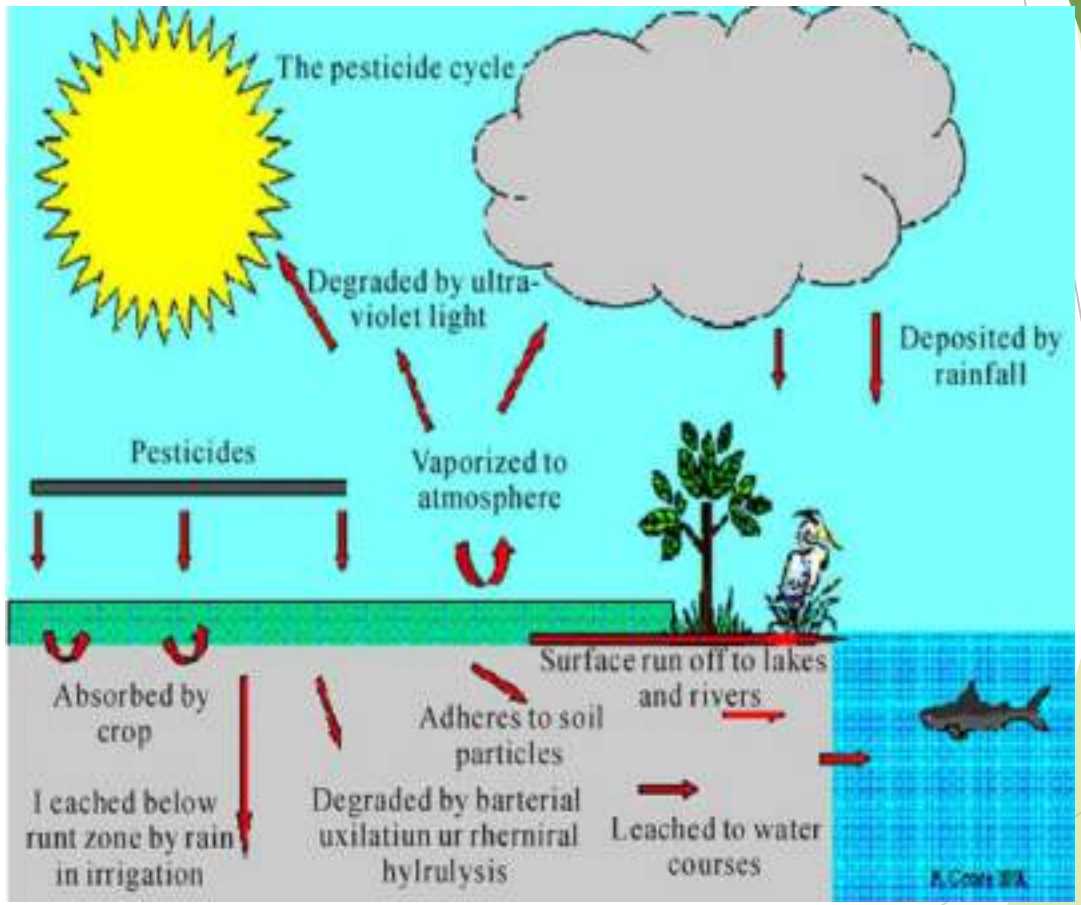
EFFECTS OF PESTICIDES ON HUMAN HEALTH.

Pesticides and human health:
Pesticides can cause short-term adverse health effects, called acute effects, as well as chronic adverse effects that can occur months or years after exposure. Examples of acute health effects include stinging eyes, rashes, blisters, blindness, nausea, dizziness, diarrhea and death. Examples of known chronic effects are cancers, birth defects, reproductive harm, immunotoxicity, neurological and developmental toxicity, and disruption of the endocrine system.



PESTICIDES AND WATER POLLUTION

Another factor affecting pesticide pollution of water is rainfall, as high levels of rainfall increase the risk of pesticides contaminating water. Movement into bodies of water occurs when runoff, after rainfall, moves through areas have been spread with pesticides.When pesticides are found in water supplies, they normally are not present in high enough concentrations to cause acute health effects such as chemical burns, nausea, or convulsions. Acute effects are those which show up soon after exposure and are likely to be relatively severe .

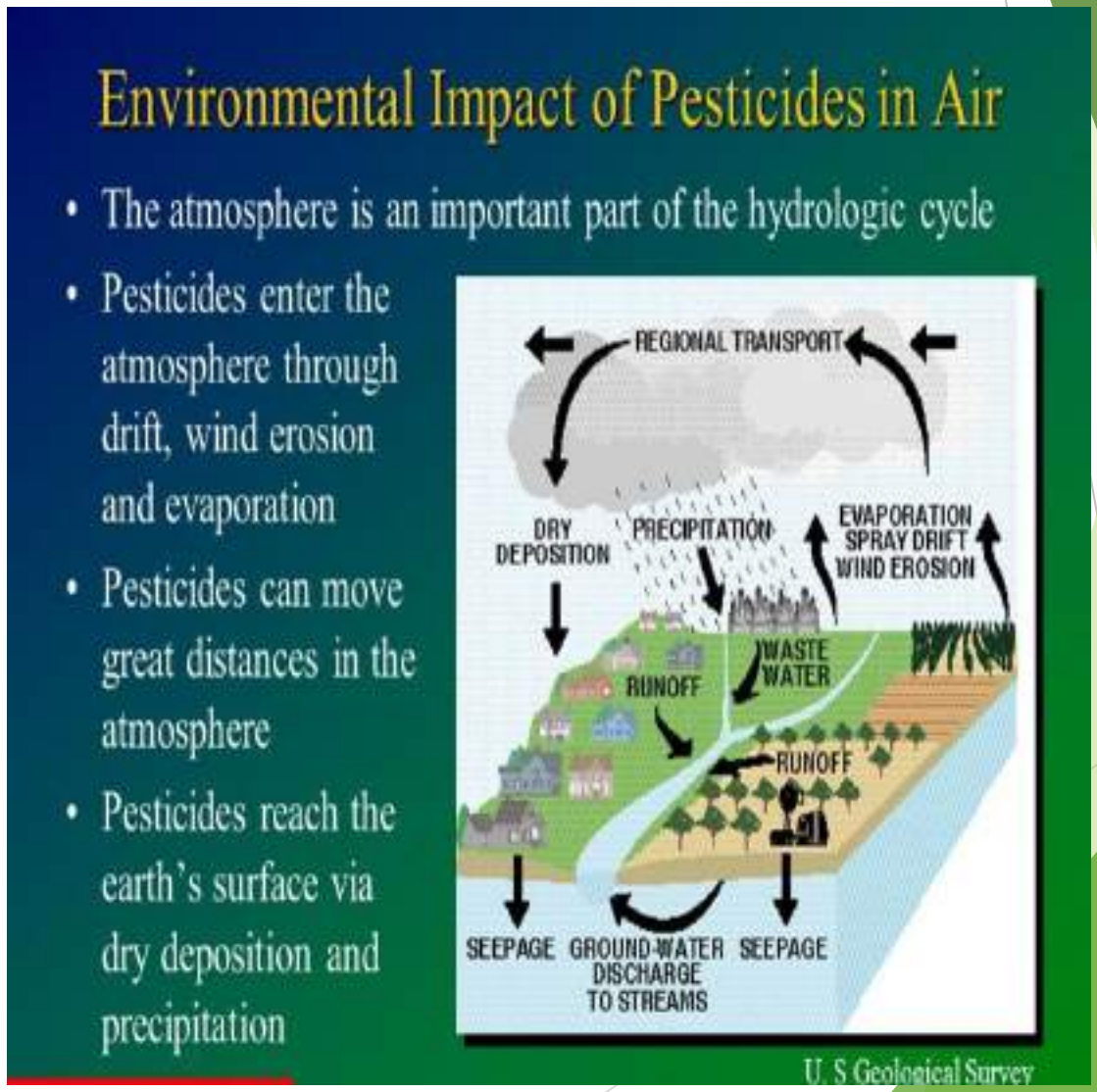


SOIL POLLUTION BY PESTICIDES

AIR POLLUTION BY PESTICIDES

Pesticides emit pollutants such as hazardous air pollutants (HAPs) and volatile organic compounds (VOC). These pollutants can contribute to health problems that may affect residents, the neighborhood, and the community. Exposure to pesticides may cause the following: Irritation to the eyes, nose, and throat.

How can pesticides cause pollution? =Contamination of air, soil, and non-target vegetation. Pesticide sprays can directly hit non-target vegetation, or can drift or volatilize from the treated area and contaminate air, soil, and non-target plants.

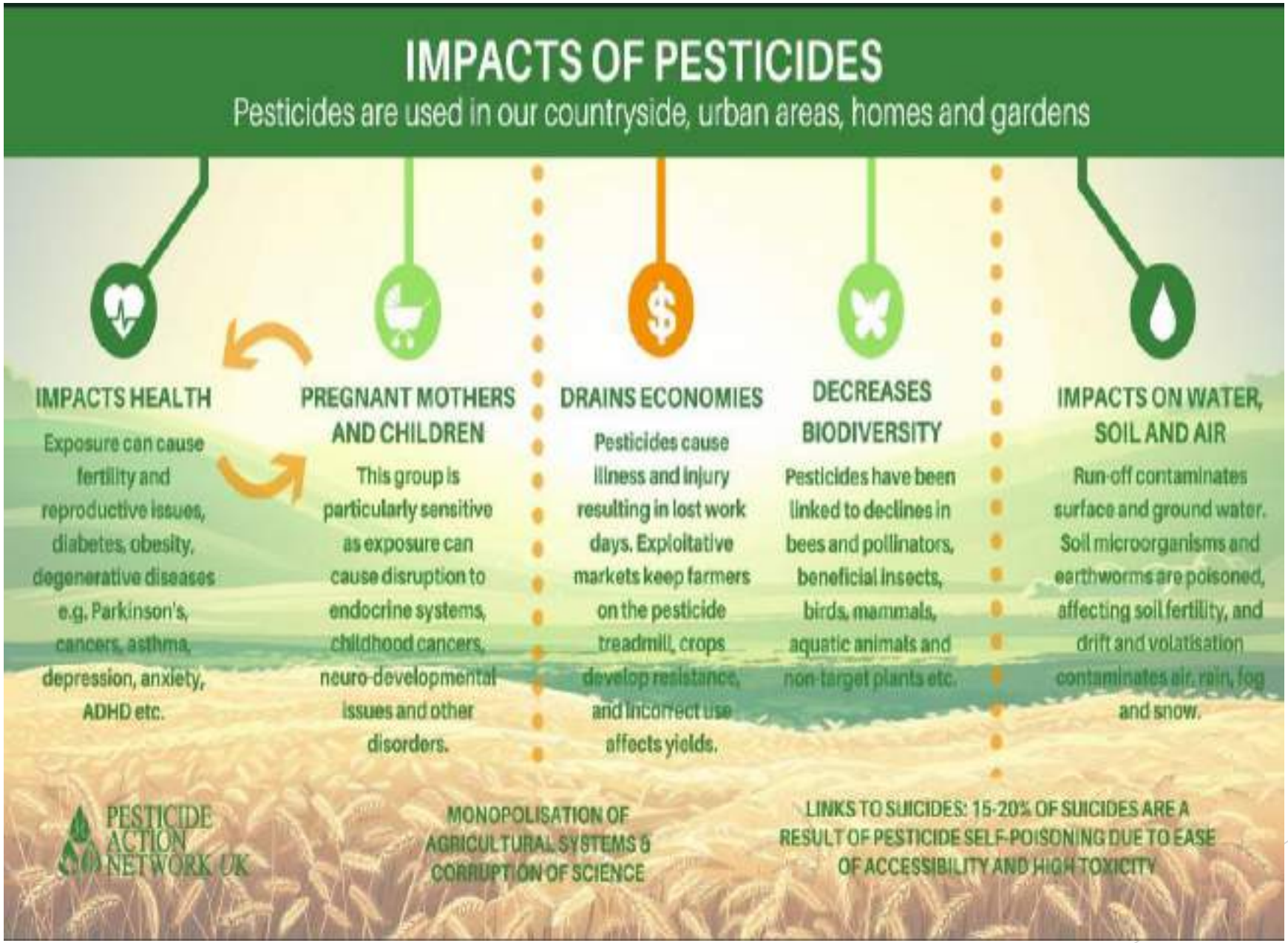


Environmental Impact of Pesticides on Wildlife

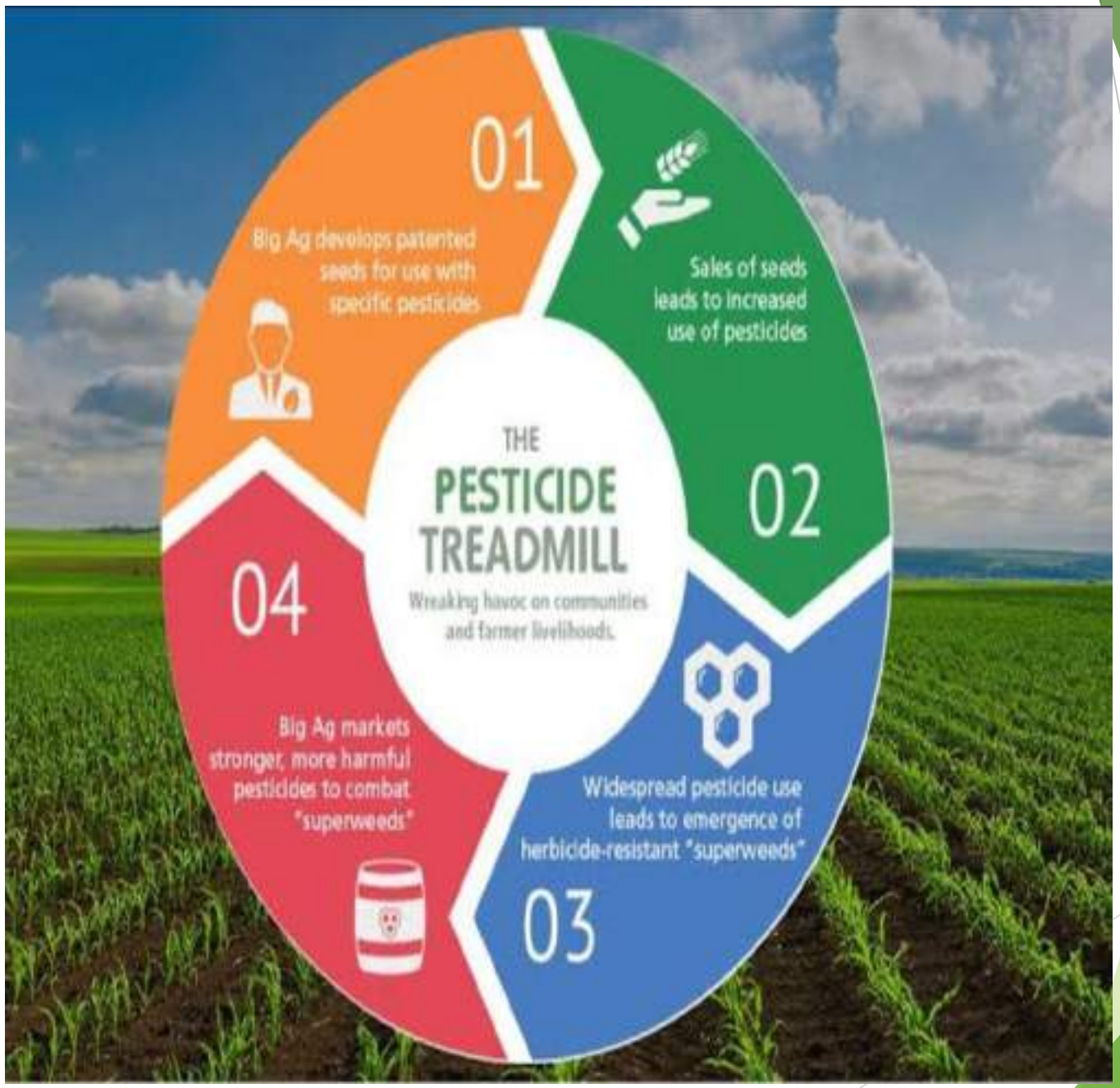
Indirect Effects: adverse effects caused by the modification or elimination of wildlife habitat or food supply

- Herbicides can reduce food, cover and nesting sites for wildlife
- Insecticides can reduce insects that serve as food supply for other animals
- Plant pollination can be effected by reductions in populations of bees and other plant pollinators

Ken Hammond


IMPACTS OF PESTICIDES
Pesticides are used in our countryside, urban areas, homes and gardens
IMPACTS HEALTH
Exposure can cause fertility and reproductive issues, diabetes, obesity, degenerative diseases e.g. Parkinson's, cancers, asthma, depression, anxiety, ADHD etc.
PREGNANT MOTHERS AND CHILDREN
This group is particularly sensitive as exposure can cause disruption to endocrine systems, childhood cancers, neuro-developmental issues and other disorders.
DRAINS ECONOMIES
Pesticides cause illness and injury resulting in lost work days. Exploitative markets keep farmers on the pesticide treadmill, crops develop resistance, and incorrect use affects yields.
DECREASES BIODIVERSITY
Pesticides have been linked to declines in bees and pollinators, beneficial insects, birds, mammals, aquatic animals and non-target plants etc.
IMPACTS ON WATER, SOIL AND AIR
Run-off contaminates surface and ground water. Soil microorganisms and earthworms are poisoned, affecting soil fertility, and drift and volatisation contaminates air, rain, fog and snow.
PESTICIDE ACTION NETWORK UK
MONOPOLISATION OF AGRICULTURAL SYSTEMS & CORRUPTION OF SCIENCE
LINKS TO SUICIDES: 15-20% OF SUICIDES ARE A RESULT OF PESTICIDE SELF-POISONING DUE TO EASE OF ACCESSIBILITY AND HIGH TOXICITY

What is the “pesticide treadmill?” Also referred to as the “pesticide trap,” farmers get caught on the treadmill as they are forced to use more and more — and increasingly toxic — chemicals to control insects and weeds that develop resistance to pesticides

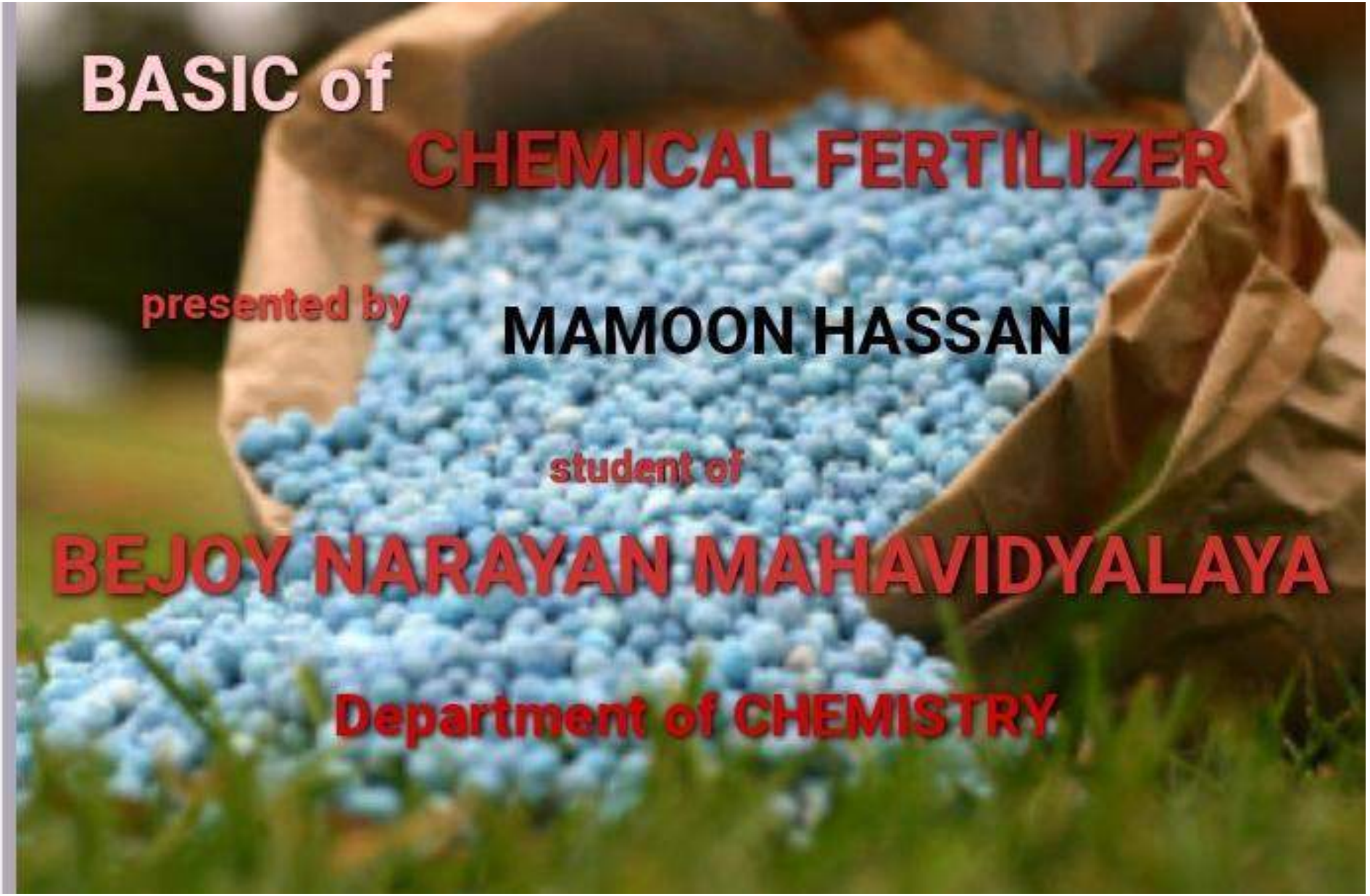


Conclusion. In summary, the widespread use of insecticides is ineffective and economically wasteful in the long run. Many insecticides do in fact accomplish the intended task of controlling pest populations. However, their detrimental health and environmental effects make them an inadequate long term solution.


BASIC of
CHEMICAL FERTILIZER

INTRODUCTION TO FERTILIZERS

- In the same way that humans need to eat properly to stay healthy, so plants need certain nutrients to grow properly.
- Fertilizer is a substance added to soil to improve plant's growth and yield. Basically it is a chemical or natural substance is added to soil or land to increase its fertility.
- Fertilizers are food supplements for plants and need 16 nutrients to be healthy.


BASIC of
CHEMICAL FERTILIZER
presented by
MAMOON HASSAN
student of
BEJOY NARAYAN MAHAVIDYALAYA
Department of CHEMISTRY

WHAT IS A FERTILIZER ?

A fertilizer is any material of natural or synthetic origin that is applied to soils or to plant tissues to supply one or more plant nutrients essential to the growth of plants.

Fertilizers

- Straight
- Complex
- Mixed

- Straight fertilizers are those which supply only one primary plant nutrient (N, P & K).
- E.g. Urea, Ammonium sulphate, Potassium chloride and Potassium sulphate.

- Complex fertilizers contain 2 or 3 primary plant nutrients of which two primary nutrients are in chemical combination.
- Usually produced in granular form.
- Diammonium phosphate, Nitrophosphates, Ammonium phosphate

- Mixed fertilizers are physical mixtures of straight fertilisers.
- They contain two or three primary plant nutrients.
- made by thoroughly mixing the ingredients either mechanically or manually.

Plant Nutrients

N → Nitrogen

P → Phosphorus

K → Potassium

Nitrogenous fertilizers:

- The fertilizer materials containing nitrogen are called nitrogenous fertilisers.
- They may contain secondary nutrients like Calcium and Sulphur.

NITRATE FERTILIZERS

- Sodium nitrate ($NaNO_3$)
- Calcium nitrate ($Ca(NO_3)_2$)

1. They are highly mobile in soil therefore suitable for top dressing.
2. Highly soluble subjected and to leaching.
3. Subjected to denitrification in waterlogged soils.
4. Increase alkalinity as they are basic in their residual effect.

AMMONIACAL FERTILISERS

- Ammonium sulphate ($(NH_4)_2SO_4$)
- Ammonium chloride (NH_4Cl)
- Anhydrous ammonia (NH_3)

- Easily available to the plants as they are readily soluble in water.
- Leaching losses are less as ammonium ions are adsorbed on clay complex.
- Reduce alkalinity as they are acidic in their residual effect on the soils.
- Well suited to submerged soils.

NITRATE & AMMONIACAL FERTILISERS

- Ammonium nitrate (NH_4NO_3)
- $CaNH_4NO_3$ - Calcium ammonium nitrate (CAN)

- Easily available to the plants as they are readily soluble in water.
- Leaching losses are less.
- Reduce alkalinity as they are acidic in their residual effect on the soils.

AMIDE FERTILISERS OR ORGANIC FERTILIZERS

- Urea ($CO(NH)_2$)
- Calcium cyanide ($CaCN_2$)

Fertilizers	Forms of nutrient	N%	Others	Nature
KNO_3	Nitrate	13.85	K_2O-46-47	Basic
$Ca(NO_3)_2$	Nitrate	15.5	Ca-19.4	Basic
$NaNO_3$	Nitrate	16		Basic
$(NH_4)_2SO_4$	Ammoniacal	20.6-21	S-24.5	Acidic
NH_4Cl	Ammoniacal	25.5-26	Cl-66	Acidic
$(NH_4)_2SO_4$. NH_4NO_3	Ammoniacal	26	S-15	Acidic
CAN	Ammoniacal and Nitrate	25-28		Neutral
NH_4NO_3 (Highly hygroscopic)	50%- Ammonium 50%- Nitrate	33-35		Acidic
Anhydrous ammonia	Ammoniacal	80-82		Highly Acidic
Urea $[CO(NH_2)_2]$	Amide	46		Acidic
$CaCN_2$	Amide	20.6-21		Basic

Phosphatic Fertilizers

Super Phosphate

$CaH_6O_8P_2$

$(NH_4)_3PO_4$

Ammonium Phosphate

$(NH_4)_2HPO_4$

Ammonium Hydrogen Phosphates

Potassium Fertilizers

Potassium Nitrate

KNO_3

K_2SO_4

Potassium Sulphate

KCl

Potassium Chloride

Fertilizer Analysis

- Fertilizer analysis expresses weight as a percent of nitrogen, phosphorus and potassium

20-10-20

N P K

Fertilizer Analysis

For Example

A 100 kg bag of fertilizer has an grade of 15-5-18.

- Nitrogen: 100 X 15%=15 Kg
- Phosphorus: 100 X 5%=5 Kg
- Potassium: 100 X 18%=18 Kg

ADVANTANGES USING INORGANIC FERTILIZER

- WORKS IMMEDIATELY
  - as a "rescue treatment" that are unhealthy or even dying.

- AFFORDABLE
  - Relatively cheap.
  - Very good deal already.

- CONVENIENT TO USE
  - Save a lot of time and effort.
  - Quite cheap and even easier to use and prepare.

DISADVANTANGES USING INORGANIC FERTILIZER

- TO MUCH IS NOT A GOOD THING.
  - Applying the fertilizer directly to the plants may burn the delicate plants structures such as the roots.

- LEECHING HAPPEN.
  - Very often as a you water plants.
  - Nitrogen is one elements the easily get washed away.


Thank
You
MAMOON
THE
END

IMPORTANCE OF COLLOIDS IN THE FIELD OF MEDICINE

PRESENTED BY PRIYA NEOGI

ROLL NO.- 19034030040

REGISTRATION NO.- 201901040165 OF 2019-2020

COLLOIDS

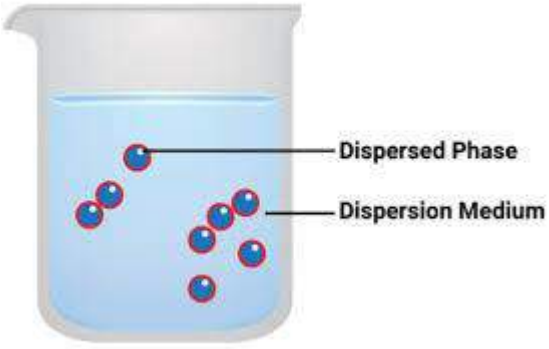
- A mixture of two phases of matter .

  smoke , fog , foams, gels, milk and clouds etc .

Dispersed Systems

Dispersed systems consist of particulate matter (dispersed phase), distributed throughout a continuous phase (dispersion medium).

- They areclassified according to the particle diameter of the dispersed material .



1- Molecular dispersions (less than 1 nm)

Molecular dispersions are the true solutions of a solute phase in a solvent.

- Particles invisible in electron microscop .
- Pass through semipermeable membranes and filter paper .
- Particles do not settle down on standing
- Undergo rapid diffusion .
- E.g. ordinary ions, glucose etc .

2- Colloidal dispersions (1 nm - 0.5 um)

- Particles not resolved by ordinary microscope, can be detected by electron microscope.
- Pass through filter paper but not pass through semipermeable membrane.
- Particles made to settle by centrifugation Diffuse very slowly .
- E.g. colloidal silver sols, naural and synthetic polymers .

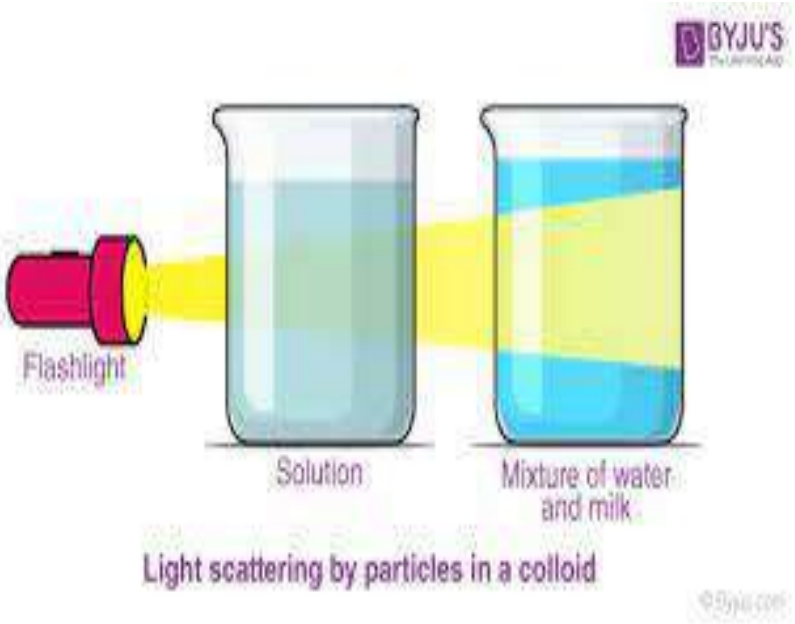
3- Coarse dispersions (> 0.5 um)

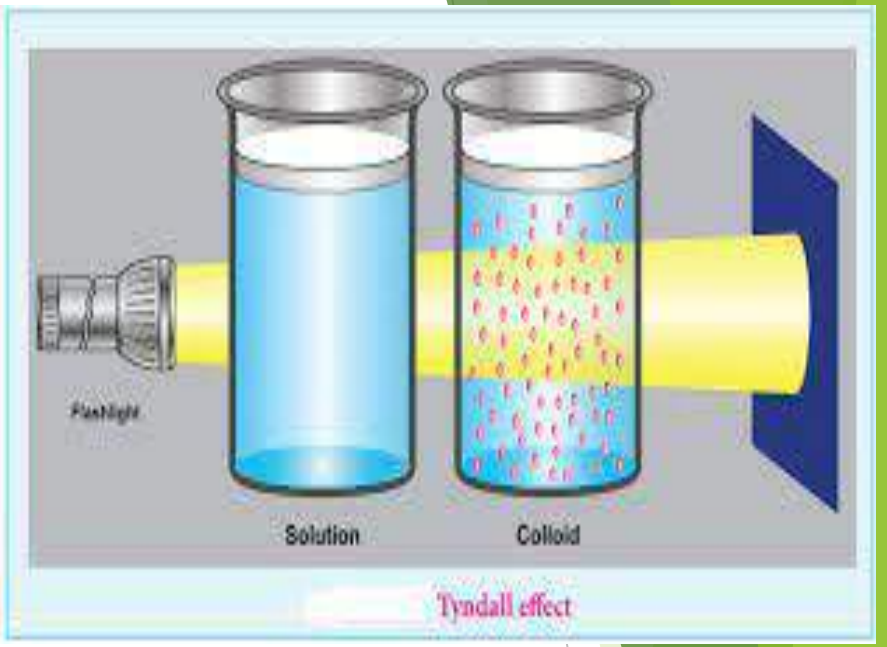
- Particles are visible under ordinary microscope .
- Do not pass through filter paper or semipermeable membrane.
- Particles settle down under gravity .
- Do not diffuse .
- E.g. emulsions, suspensions and red blood cells .

Dispersed Systems

Classification Based on Size

Class	Size	Examples
Molecular dispersion	< 1.0 nm	Oxygen gas, ordinary ions, glucose
Colloidal dispersion	1.0 nm to 0.5 μm	Silver sols, natural and synthetic polymer latices
Coarse dispersion	> 0.5 μm	Sand, pharmaceutical emulsions & dispersions, red blood cells


BYJU'S
Flashlight
Solution
Mixture of water and milk
Light scattering by particles in a colloid


Flashlight
Solution
Colloid
Tyndall effect


SUBSTANCE A
GAS
LIQUID
SOLID
SUBSTANCE B
GAS
LIQUID
SOLID
NONE
All gases are mutually miscible, so they do not form any sort of colloid
LIQUID AEROSOLS
SOLID AEROSOLS
EMULSION
SOL
SOLID FOAM
GEL
SOLID SOL
Source: Wikipedia

colloids

- The term **'colloid'** has been derived from two Greek words 'kolla' and 'eidos'.
- Kolla means glue and eidos means like, so colloid means glue like.
- A colloid may be defined as a heterogenous (two phase system consisting of minute particulate of 0.5um-Inm)substance dispersed into a continuous phase or dispersion medium.

Example:

- Natural colloids: *fogs, moist, smoke etc .*
- *Ferric hydrosol .*

Advantages of colloidal preparation:

1) *Higher degree of catalytic activity:*

Due to increased surface area in colloidal preparation, the activity of a catalyst is generally accelerated.

2) *Colour:*

Colloidal preparations generally possess attractive colour.

3) *Taste:*

Colloidal preparation may also be used to pronounce the taste of a pharmaceutical preparation.

4) Better solubility, absorption and bioavailability .

5) ***Compatibility with biological system:***

Ionic silver salt may itself produce toxicity-argyria and less bioavailability due to the formation of silver chloride which is insoluble and rapidly excreted from body. But it does not occur when colloidal preparations are used.

6) ***Stability:***

Colloidal preparation are stable than suspension and emulsion.

Pharmaceutical application:

- Colloidal silver preparation are effective germicides and do not cause GI irritation that is the characteristic of ionic silver state.
- Colloidal preparations are used in treatment and diagnosis of diseases.

  1. Colloidal Hg (for syphilis)
  2. Colloidal Cu (In the treatment of cancer)

- Protein is a colloidal preparation. Plasma protein binds with certain drugs in our body, which affects the pharmacological activity of the drug.

- Colloidal hydroxyethyl starch (HES) are used as plasma substitutes .
- Colloidal macromolecules are used for coating purpose of the pharmaceutical products.
- Colloidal electrolytes are sometimes used to increase the solubility, stability and taste of certain products.
- Colloidal Al(OH), shows better rate of neutralization of stomach acid.
- Dextran injection is a colloidal dispersion which acts plasma substitute.

Classification:

- On the basis of the interaction or attraction of the particle molecules, colloid are of three types
- *Lyophilic colloids*
- *Lyophobic colloids*
- *Association colloids*

Lyophilic colloids

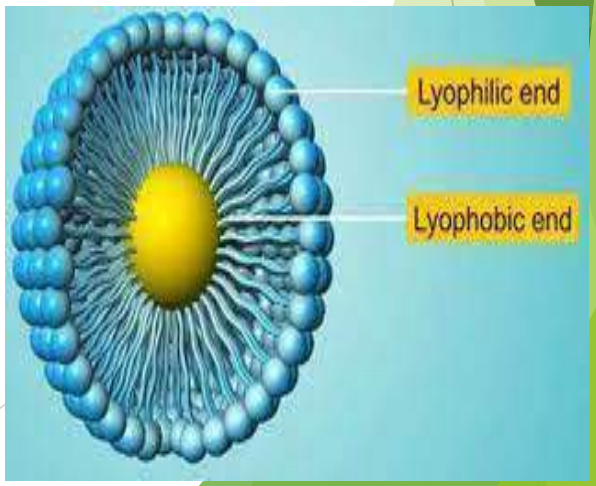
- The term lyophilic means 'solvent loving', where there is a considerable attraction between the disperse phase and disperse medium. Lyophilic colloids are more stable than lyophobic colloids. Lyophilic (hydrophilic) colloids are very common in biological systems and in foods. Ordinary gelatine is a common example of a lyophilic colloid.

They can be classified into two groups :

- ***Hydrophilic colloid:*** These are water-loving colloids. The colloid particles are attracted toward water.
- Example :***acacia in water*** .
- ***Lipophilic colloid:*** These are nonaqoues loving colloids. The colloid particles are attracted toward organic solvent.
- Example: ***rubber***

Lyophobic Colloids:

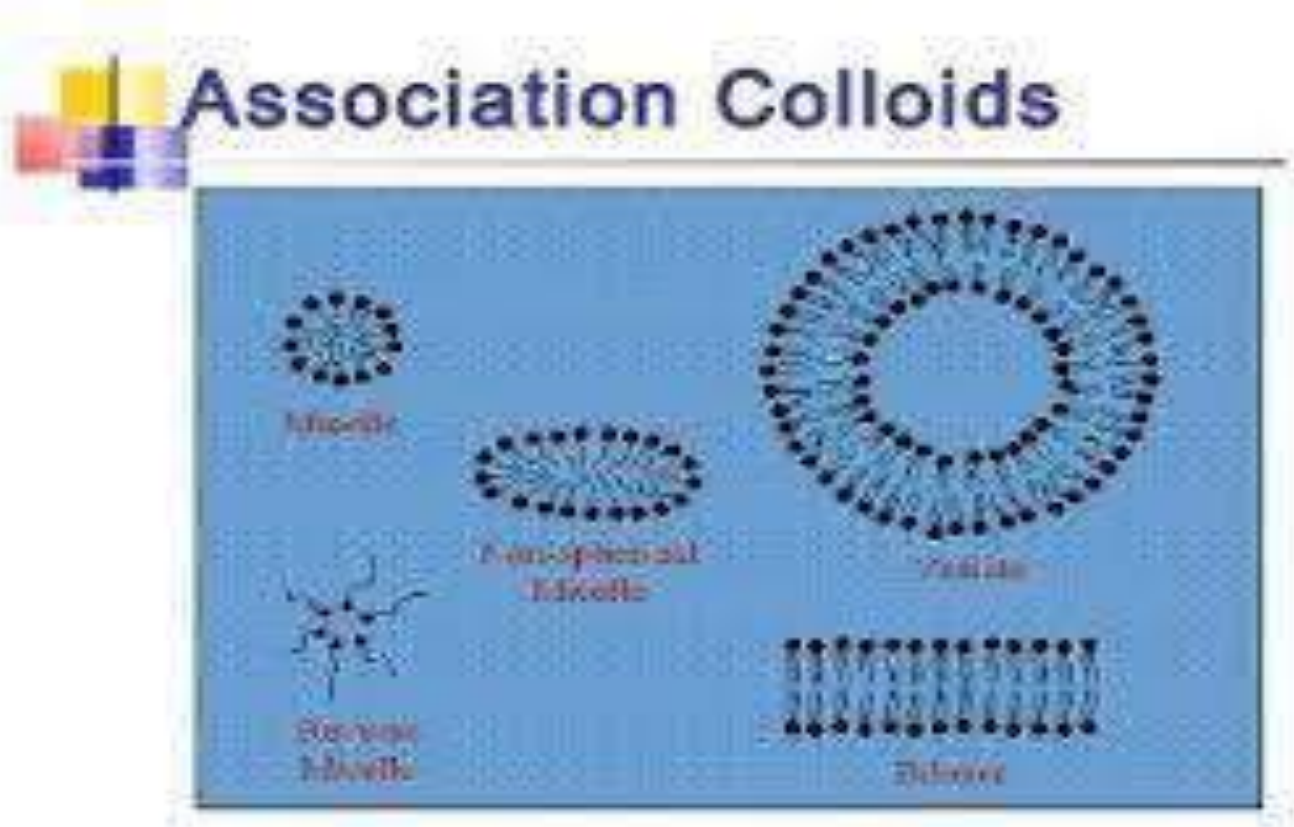
- Lyophobic means solvent hating ,where there is a little attraction between the dispersed phase and dispersion medium.
- Lyophobic colloids are all inherently unstable, they will eventually coagulate. However ,eventually can be a very long time (the settling time for some clay colloids in the ocean is 200-600 yeard).
- Example:Gold sol



Association colloid :

- Organic compounds which contain large hydrophobic moieties together with strongly hydrophilic groups in the same molecule are said to be amphiphilic.
- The individual molecules are generally too small to bring their solution into colloidal size range; they tend to associate in aqueous or oil solution into micells. Such preparations are called association colloids.

- Surface active molecules such as soaps and synthetic detergents form associated colloids in water.



Differences between Lyophilic & Lyophobic colloids

Lyophilic colloids	Lyophobic colloids
1. Prepared by direct mixing with dispersion medium	1. Not prepared by direct mixing with the medium
2. Little or no charge on particles	2. Particles carry positive or negative charge
3. Particles generally solvated	3. No salvation of particles
4. Viscosity higher than dispersion medium; set to a gel	4. Viscosity almost the same as of medium; do not set to a gel
5.Precipitated by high concentration of electrolytes	5. Precipitated by low concentration of electrolytes
6. Reversible	6. Irreversible
7. Do not exhibit Tyndall effect	7. Exhibit Tyndall effect
8. Particles migrate to anode or cathode or not at all	8. Particles migrate to either anode or cathode.

Comparison of properties of colloidal sol

	Lyophilic (solvent-loving).	Lyophobic (solvent-hating).	Association (amphophilic).
Dispersed phase	Large organic molecules lying within colloidal size	Inorganic partides such as gold or silver	Aggregates (micelles) of small organic molecules or ions whose size is below the colloidal size
Solvation	Solvated	little	Hydrophilic or lipophilic portion of the molecules is solvated depending on the medium
Preparation	Spontaneous by dissolving in solvent	Needs special procedure	Spontaneous when conc. Of amphiphiles exceeds cmc
Viscosity	Viscosity increased as the conc. increase.	Not greatly increased	Increased as conc. Of amphiphile increase
Effect of electrolytes	Stable in presence of electrolytes	Unstable due to neutralization of charges on particles	Cmc is reduced and salting out occur at high salt conc.

Preparation of lyophilic colloid:

- It is very easy,simple and cheap method.
- Lyophilic sols may be prepared by simply warming the solid with the liquid dispersion medium .
- For examples,Only heating with water is enough for preparing the sols of starch , gelatin,gum arabic etc.

Preparation of lyophobic colloid:

- Lyophobic colloids are very difficult to prepare and requires the use of special technique .Basically the method of preparing lyophobic colloids fall into categories-

1. Disintegration/dispersion metod
2. Association /aggregation metod

Thank you

B.SC(H) SEM-VI (2022)

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Department of Chemistry

Bejoy Narayan Mahavidyalaya, Hooghly

Course Code : DSE-4

The University of Burdwan

AIR POLLUTION
and
CLIMATE CHANGE

Air Pollution and Climate

1. Air pollutants have a radiative forcing too
2. Air pollutants and greenhouse gases have common sources
3. Linking air pollution and climate change

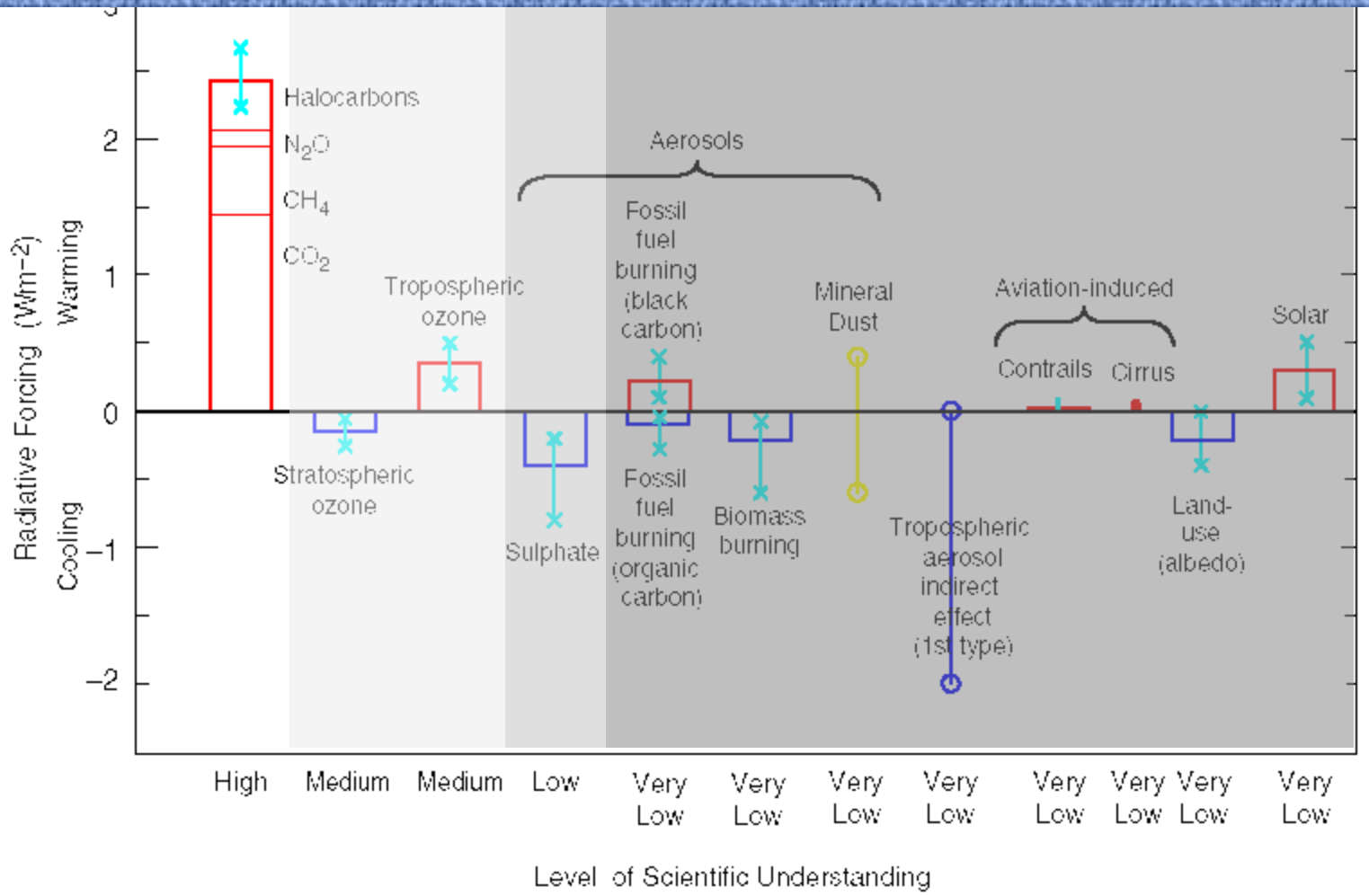
I. Air Pollutants have a radiative forcing

GHGs and air pollutants with radiative forcing

- **Kyoto GHGs:**
  - O_3, CH_4, N_2O, HFC, PFC, SF_6
- **Air pollutants with direct radiative forcing:**
  - O_3, SO_2, aerosols (black and organic carbon, PM2.5)
- **Air pollutants with indirect effects on radiative forcing:**
  - All gases that influence OH (NO_x, CO, VOC, H_2O, etc.),
  - O_3 precursors (NO_x, VOC, CO),
  - Aerosol precursors (primary and secondary, including NH_3)

Radiative forcing 1750-1900

Source: IPCC TAR WG1



Critical role of OH

Hydroxyl radical (OH) steers lifetime of CH_4, HFCs, O_3

OH determined by:

- Nitrogen oxides (NO_x)
- Carbon monoxide (CO)
- Volatile organic compounds (VOCs)
- Methane (CH_4)
- etc., including stratospheric H_2O

NO_x and climate change

Increase in NO_x leads to

- **decreased lifetime of CH_4 and HFCs (via OH):**
  ↓ radiative forcing
- **increase in O_3:**
  ↑ radiative forcing
- **increased N deposition → fertilization → CO_2 uptake:**
  ↓ radiative forcing

Net effect not yet clear, but significant impacts on radiative forcing expected for 2100 (IPCC TAR, 2001)

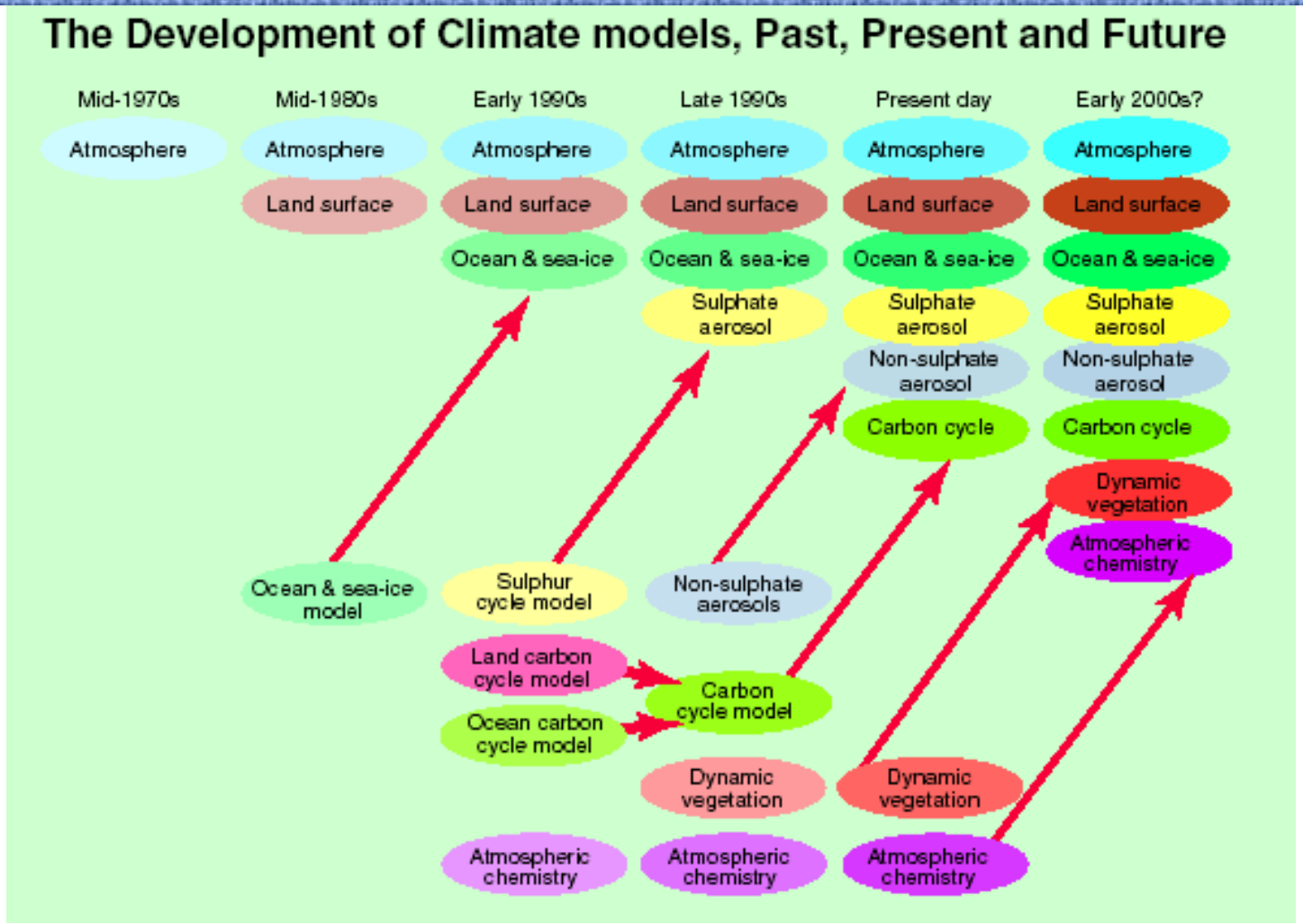
Regional climate effects of aerosols

Present GCMs indicate that aerosols (may) influence local climate

- **Sulfates:**
  - Cooling effect
  - Changes in precipitation observed in China related to increase in China's SO_2?
  - Did European SO_2 affect precipitation in Africa (Sahel)?
- **Black carbon:**
  - Warming effect
  - Issue for bio-fuels
- **Organic carbon:**
  - Cooling effect
  - Net effect of PM from different sources?

Next GCMs will include air chemistry

Source: IPCC TAR WG1



II. Air Pollutants and Greenhouse Gases have common sources

(1) Ancillary benefits of GHG reductions

Structural changes aimed at GHG control have ancillary benefits for air pollution:

- **SO_2:**
  - reduced acidification (vegetation and fauna),
  - health impacts
- **O_3:**
  - agricultural/vegetation damage,
  - health impacts
- **Aerosols (from SO_2, NO_x, primary PM, VOC, NH_3):**
  - strong health impacts (loss in life expectancy),
  - reduced solar radiation leads to less agricultural production

Ancillary benefits are local and short/medium term!

(2) Controlling common sources offers cost-saving potential

Costs for meeting EU air quality targets (bill. €/yr):

Pre-Kyoto	*Kyoto, no trade*	*Kyoto, full trade*
66.1	*58.7 (-11%)*	*61.0 (-8%)*

(Syri *et al.*, *Energy Policy* 2001)

(3) Trade-offs in emission controls between air pollutants and GHGs

Effects of NH_3 control on N_2O/CH_4:

- With maximum NH_3 reductions in agriculture (-36%)
  - *N_2O increases by +15% (+11 to +25%)*
  - *CH_4 decreases by -2% (-1 to -3%)*

(Brink & Klimont, *Atm.Env*. 2001)

(4) Inclusion of air pollutants may alter net radiative forcing

Including air pollution in calculations might alter net radiative forcing and thus modify policy recommendations, e.g.:

- **Diesel:**
  Black carbon could compensate fuel saving effect in terms of GHGs (M. Jacobsen, 2001)

- **Bio-fuels for cooking:**
  Fossil LPG might cause less radiative forcing than bio-fuels
  (due to incomplete combustion products, e.g., VOC, CO, BC, OC, etc.) (K. Smith, 2001)

(5) Multiple benefits of methane control

1. Ozone:

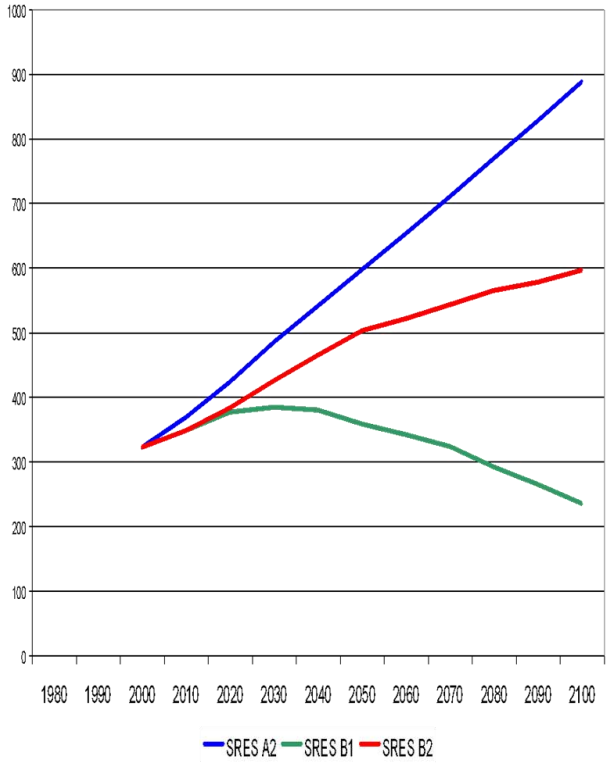
- CH_4 is another precursor of ground-level O_3, contributes to hemispheric O_3 background:
  Could (hemispheric) control of methane substitute for further NO_x+VOC reductions?

2. Radiative forcing:

- CH_4 emission cuts reduce radiative forcing directly + indirectly via shorter lifetime of CH_4
- CH_4 is Kyoto GHG
- Less radiative forcing via less tropospheric ozone

Methane reductions are possible

- SRES projects CH_4 to increase



- Technical control potential about 50% (in EU)

- Control measures:
  - Biogas
  - Controlled landfills
  - Reduced losses in gas distribution
  - Recovery in oil and gas production

  Cheap, often with negative costs and multiple benefits

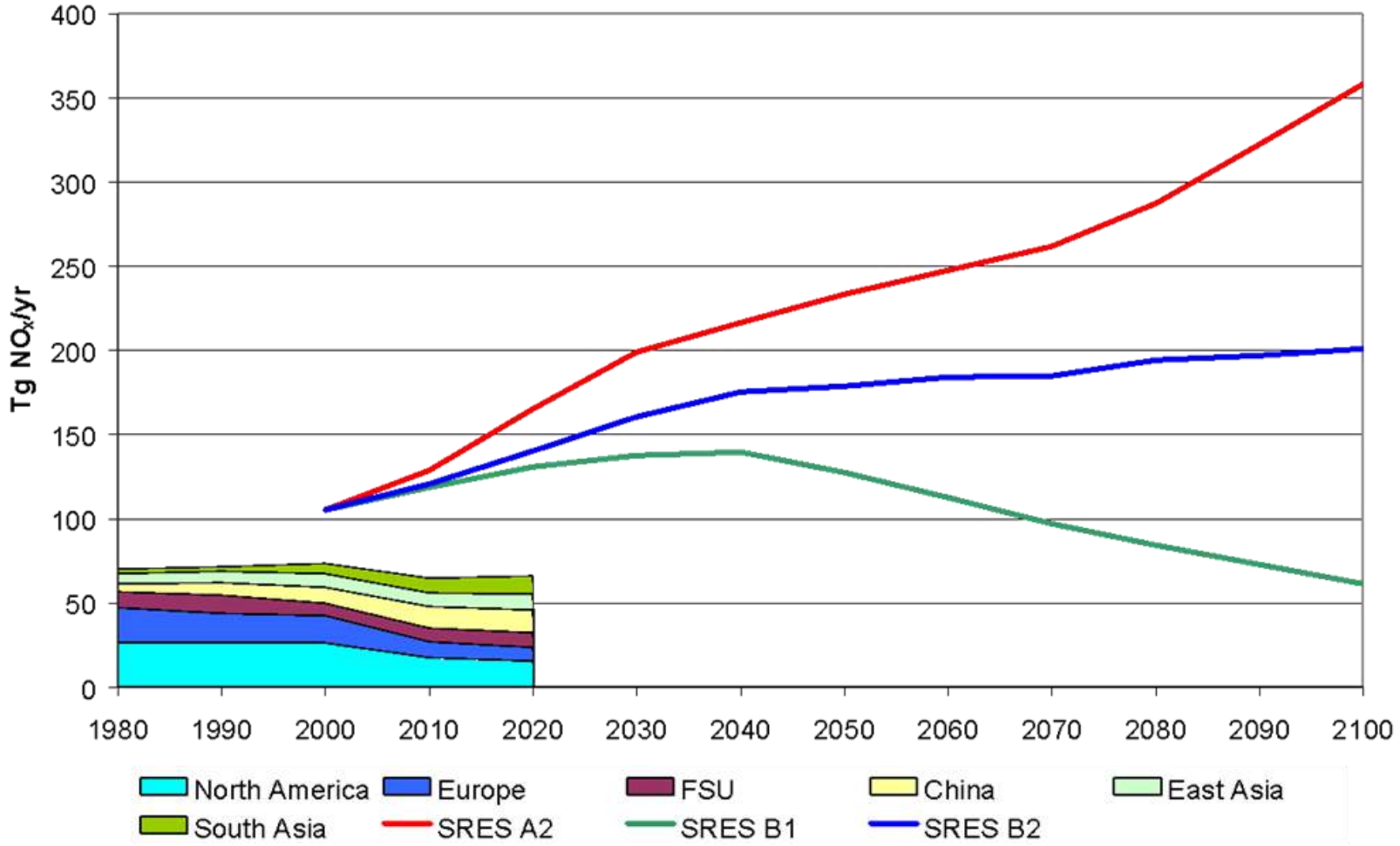
III. Linking air pollution and climate change

Linking air pollution and climate change

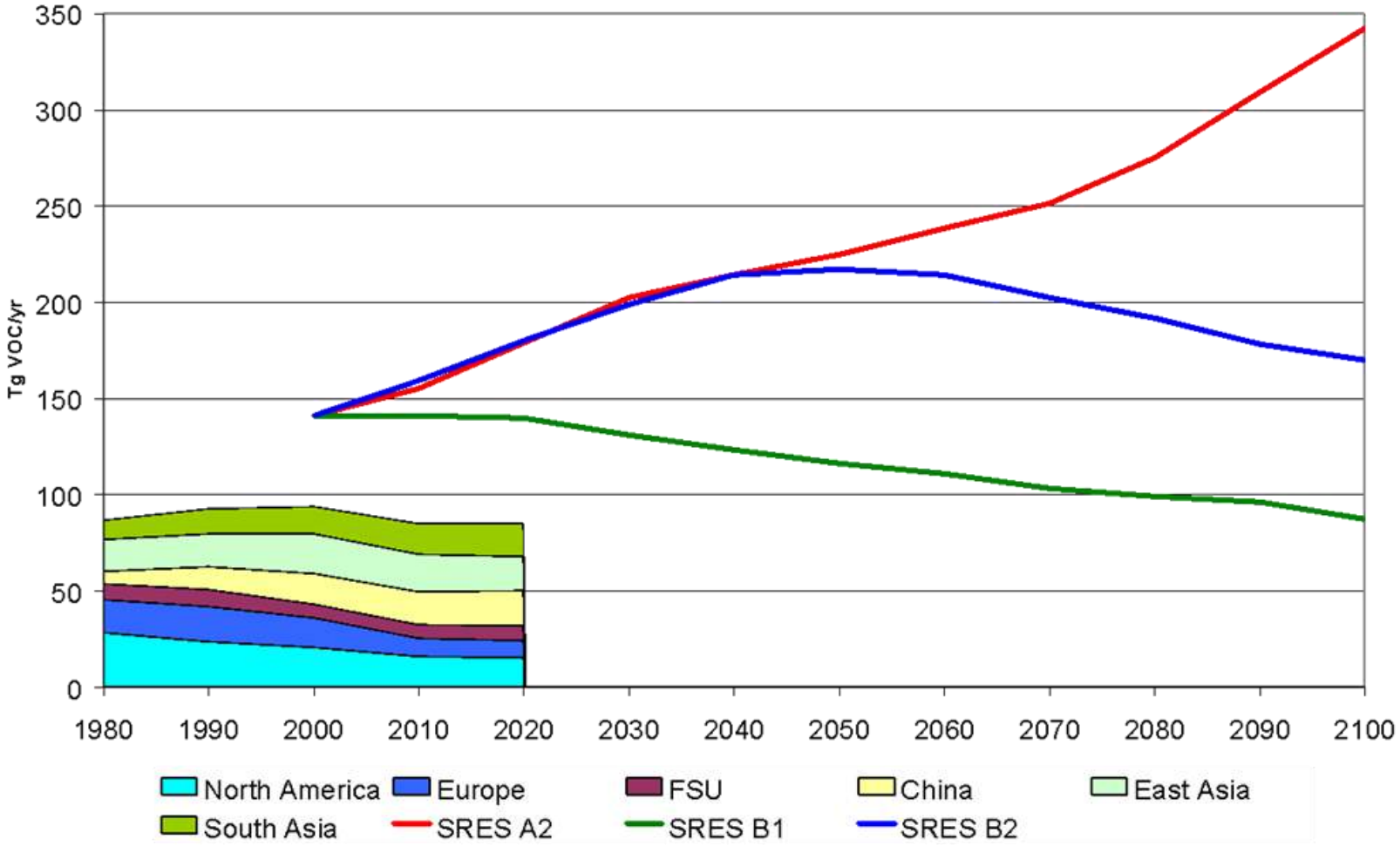
- **Link between air pollution and radiative forcing did not receive full attention from science and policy**

- **IPCC did not focus on air pollution scenarios**
  - SRES NO_x, CO, VOC, BC projections not in line with SRES storylines. Proposed emission increases would lead to catastrophic air quality
  - Recent legislation in Europe, Asia, US suggests significant and sustainable reductions

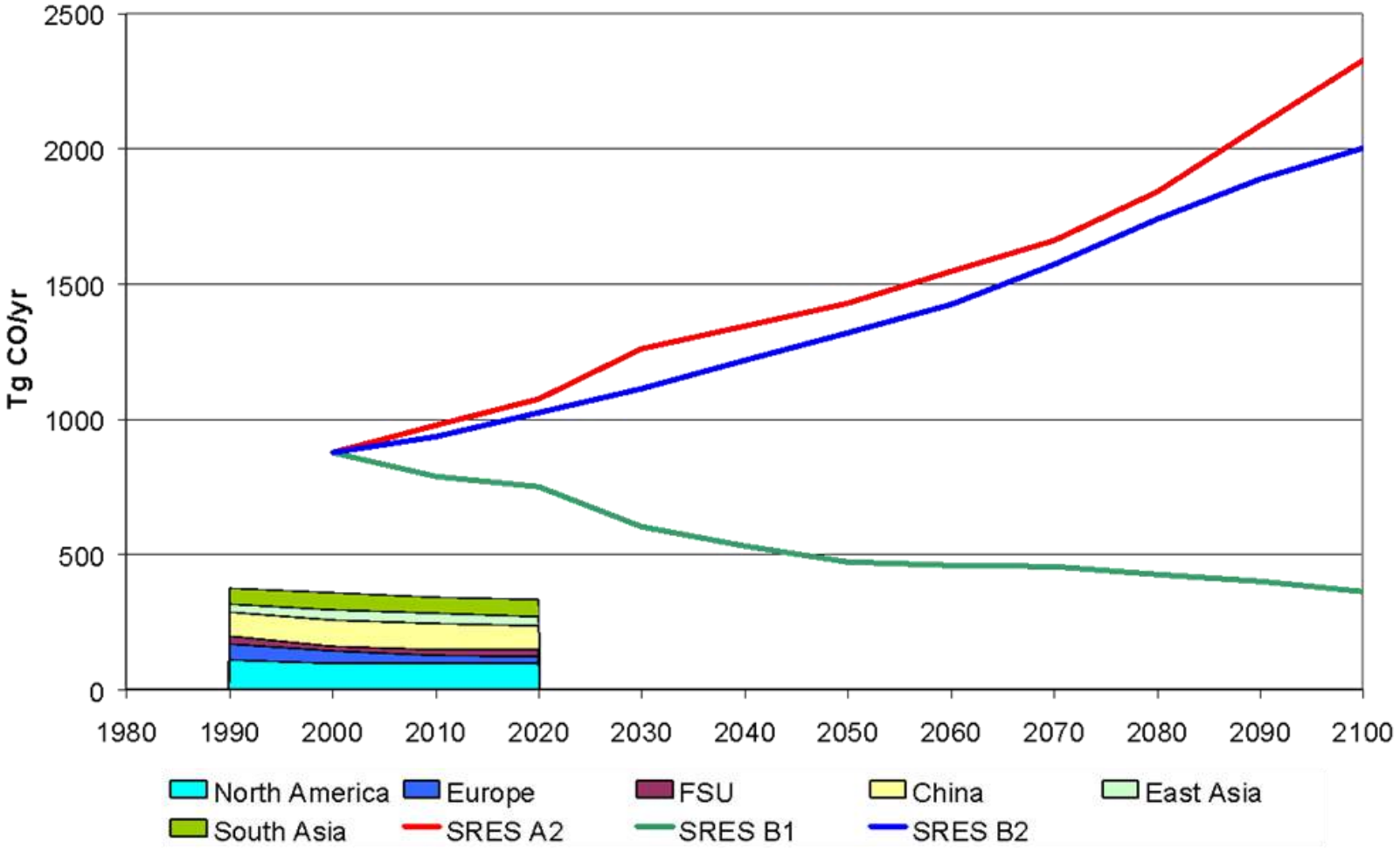
NO_x emissions in IPCC-SRES scenarios



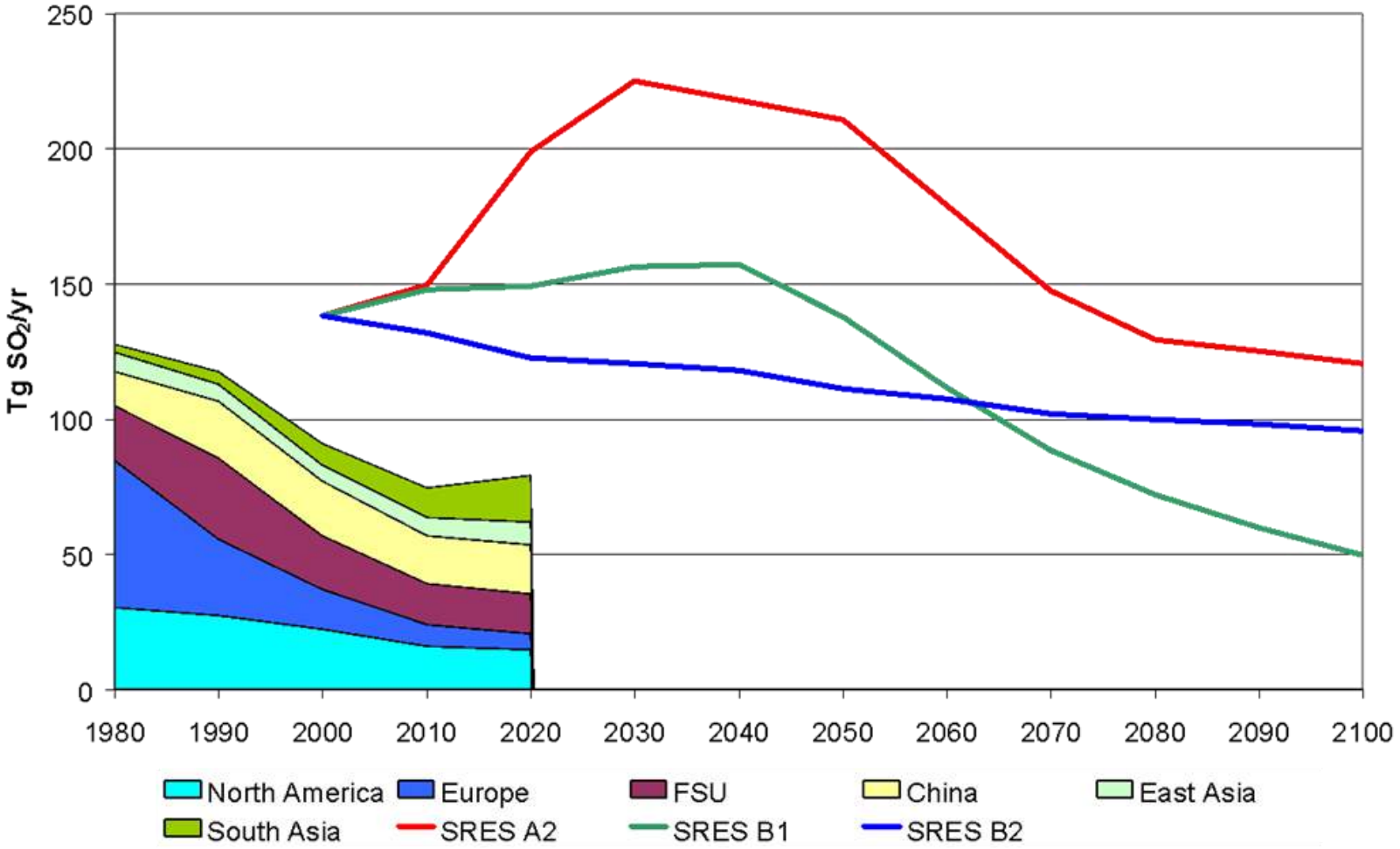
VOC emissions in IPCC-SRES scenarios



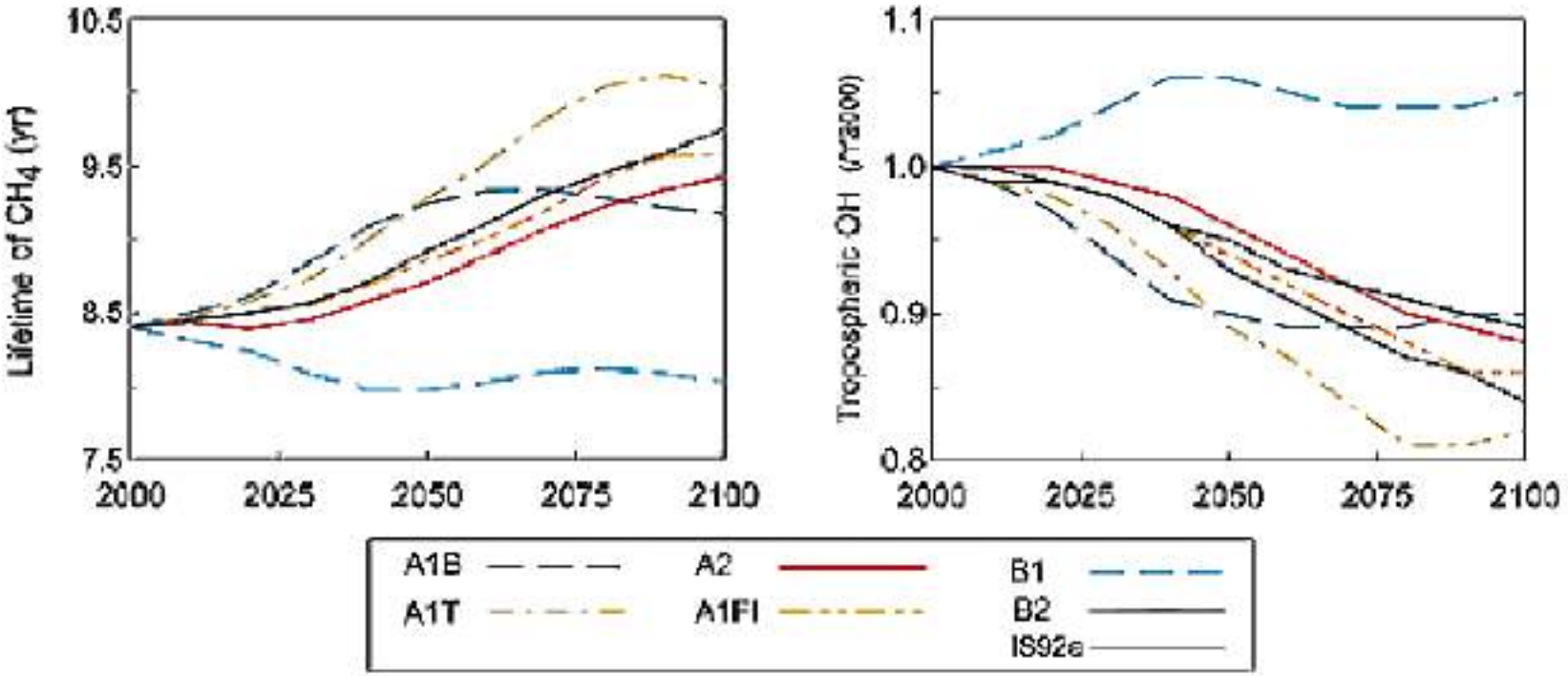
CO emissions in IPCC-SRES scenarios



SO_2 emissions in IPCC-SRES scenarios



SRES scenarios: OH and lifetime of CH_4



Source: IPCC TAR, 2001

Scope for cost-effective multi-pollutant strategies

Climate impacts are long-term. Limited response to emission changes expected for next 50 years.

- **Ancillary benefits offer short/medium-term gains in non-climate fields**
- **Air pollutants are short-lived GHGs.**
  Can control of radiative effects of air pollutants offer faster response of climate system?
- **Cost-savings of multi-pollutant approaches?**

A multi-pollutant/multi-effect problem extended towards radiative forcing

	SO_2	NO_x	NH_3	VOC	Primary PM+BC	CH_4	CO_2+ GHGs
Acidification	√	√	√				
Eutrophication		√	√				
Ground-level ozone		√		√		√	
Health impacts					√		
via sec. aerosols	√	√	√	√			
Radiative forcing						√	√
via aerosols	√	√	√	√	√		
via OH		√		√		√	

Linking air pollution and climate

Not to remove need for CO_2 control,
but to moderate warming
and to harvest co-benefits

SOIL POLLUTION AND TRACE ELEMENTS

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COURSE CODE –DSE4

THE UNIVERSITY OF BARDWAN

SOIL POLLUTION

- SOIL POLLUTION IS DEFINED AS THE PRESENCE OF TOXIC CHEMICALS(POLLUTANTS OR CONTAMINANTS) IN SOIL, IN HIGH ENOUGH CONCENTRATION TO POSE A RISK TO HUMAN HEALTH OR THE ECOSYSTEM . IN THE CASE OF CONTAMINANTS WHICH OCCUR NATURALLY IN THE SOIL , EVEN WHEN THE LEVELS ARE NOT HIGH ENOUGH TO POSE A RISK , SOIL POLLUTION IS STILL SAID TO OCCUR IF THE LEVELS OF THE CONTAMINANTS IN SOIL EXCEEDS THE LEVELS THAT SHOULD NATURALLY BE PRESENT.

TYPES OF SOIL POLLUTANTS

- SOIL POLLUTION CONSISTS OF POLLUTANTS AND CONTAMINANTS . THE MAIN POLLUTANTS OF THE SOIL ARE THE BIOLOGICAL AGENTS AND SOME OF THE HUMAN ACTIVITIES. SOIL CONTAMINANTS ARE ALL PRODUCTS OF SOIL POLLUTANTS THAT CONTAMINANTE THE SOIL . HUMAN ACTIVITIES THAT POLLUTE THE SOIL RANGE FROM AGRICULTURAL PRACTICES THAT INFEST THE CROPS WITH PESTICIDES CHEMICALS TO URBAN OR INDUSTRIAL WASTES OR RADIOACTIVE EMISSIONS THAT CONTAMINANTE THE SOIL WITH VARIOUS TOXIC SUBSTANCES.
- **BIOLOGICAL AGENTS**
- BIOLOGICAL AGENTS WORK INSIDE THE SOIL TO INTRODUCE MANURES AND DIGESTED SLUDGE(COMING FROM THE HUMAN , BIRD AND ANIMAL EXCRETA) INTO THE SOIL.

- **AGRICULTURAL PRACTICES**
- THE SOIL OF THE CROPS IS POLLUTED TO A LARGE EXTENT WITH PESTICIDES , FERTILISERS, HERBICIDES , SLURRY,DEBRIES AND MANURE.
- **RADIOACTIVE POLLUTANTS**
- RADIUM, THORIUM, URANIUM, NITROGEN, ETC. CAN INFILTRATE THE SOIL AND CREATE TOXIC EFFECTS.
- **URBAN WASTE**
- IT CONSISTS OF GARBAGE AND RUBBISH MATERIALS, DRIED SLUDGE AND SEWAGE FROM DOMESTIC AND COMMERCIAL WASTE.
- **INDUSTRIAL WASTE**
- STEEL, TEXTILES, DRUGS, GLASS, CEMENT, PETROLEUM, ETC. ARE PRODUCED BY PAPER MILLS, OIL REFINERIES, SUGAR FACTORIES, PETROLEUM INDUSTRIES AND OTHER AS SUCH.

EXAMPLES OF SOIL CONTAMINANTS

- THERE ARE A LARGE VARIETY OF POLLUTANTS THAT COULD POISON THE SOIL. EXAMPLES OF MOST COMMON AND PROBLEMATIC SOIL POLLUTANTS CAN BE FOUND BELLOW.
- **LEAD**
- POTENTIAL SOURCES: MINING, LEAD PAINT, VEHICLE EXHAUST, CONSTRUCTION ACTIVITIES, FOUNDRY ACTIVITIES, AGRICULTURE ACTIVITIES.
- **MERCURY**
- POTENTIAL SOURCES: MINING , MEDICAL WASTE, ALKALI AND METAL PROCESSING, VOLCANO, GEOLOGICAL DEPOSITS, ACCUMULATION IN PLANTS AND VEGETABLES GROWN ON POLLUTED SOILS.
- **ARSENIC**
- POTENTIAL SOURCES: MINING, COAL-FIRED POWER PLANTS, ELECTRONIC INDUSTRIES, LUMBER FACILITIES, AGRICULTURE, NATURAL ACCUMULATION.
- **COPPER**
- POTENTIAL SOURCES: MINING, FOUNDRY ACTIVITIES, CONSTRUCTION ACTIVITIES.
- **ZINC**
- POLENTIAL SOURCES: MINING, FOUNDRY ACTIVITIES, CONSTRUCTION ACTIVITIES.

- **NICKEL**
- POTENTIAL SOURCES: MINING, FOUNDRY ACTIVITIES , CONSTRUCTION ACTIVITIES.
- **PAH(POLYAROMATIC HYDROCARBONS)**
- POTENTIAL SOURCES: COAL BURNING, VEHICLE EMISSIONS, CIGARETTE SMOKES, CONSTRUCTION, WOOD BURNING, ACCUMULATION IN PLANTS AND VEGETABLES GROWN ON POLLUTED SOILS.
- **HERBICIDES OR INSECTICIDES**
- POTENTIAL SOURCES: AGRICULTURAL ACTIVITIES, GARDENING.

SOIL POLLUTION CAUSES

- ALL SOILS WHETHER POLLUTED OR UNPOLLUTED, CONTAIN A VARIETY OF COMPOUNDS (CONTAMINANTS) WHICH ARE NATURALLY PRESENT. SUCH CONTAMINANTS INCLUDE METALS, INORGANIC IONS AND SALTS (EG. PHOSPHATES, CARBONATES, SULFATES, NITRATES), AND MANY ORGANIC COMPOUNDS (SUCH AS LIPIDS, PROTIENS, DNA, FATTY ACIDS, HYDROCARBONS, PAH, ALCOHOL, ETC.).

THESE COMPOUNDS ARE MAINLY FROMED THROUGH SOIL MICROBIAL ACTIVITY AND DECOMPOSITION OF ORGANISMS (EG., PLANTS AND ANIMALS).

ADDITIONALLY, VARIOUS COMPOUNDS GET INTO THE SOIL FROM ATMOSPHERE, FOR INSTANCE WITH PRECIPITATION WATER , AS WELL AS BY WIND ACTIVITY OR OTHER TYPES OF SOIL DISTURBANCES, AND FROM SURFACE WATER BODIES AND SHALLOW GROUND WATER FLOWING FROM THE SOIL. WHEN AMOUNTS OF SOIL CONTAMINANTS EXCEEDS NATURAL LEVEL(WHAT IS NATURALLY PRESENT IN THE SOILS), POLLUTION IS GENERATED).

THERE ARE TWO MAIN CAUSES THROUGH WHICH SOIL POLLUTION IS GENERATED:

- ANTHROPOGENIC (MAN-MADE CAUSES)
- NATURAL CAUSES

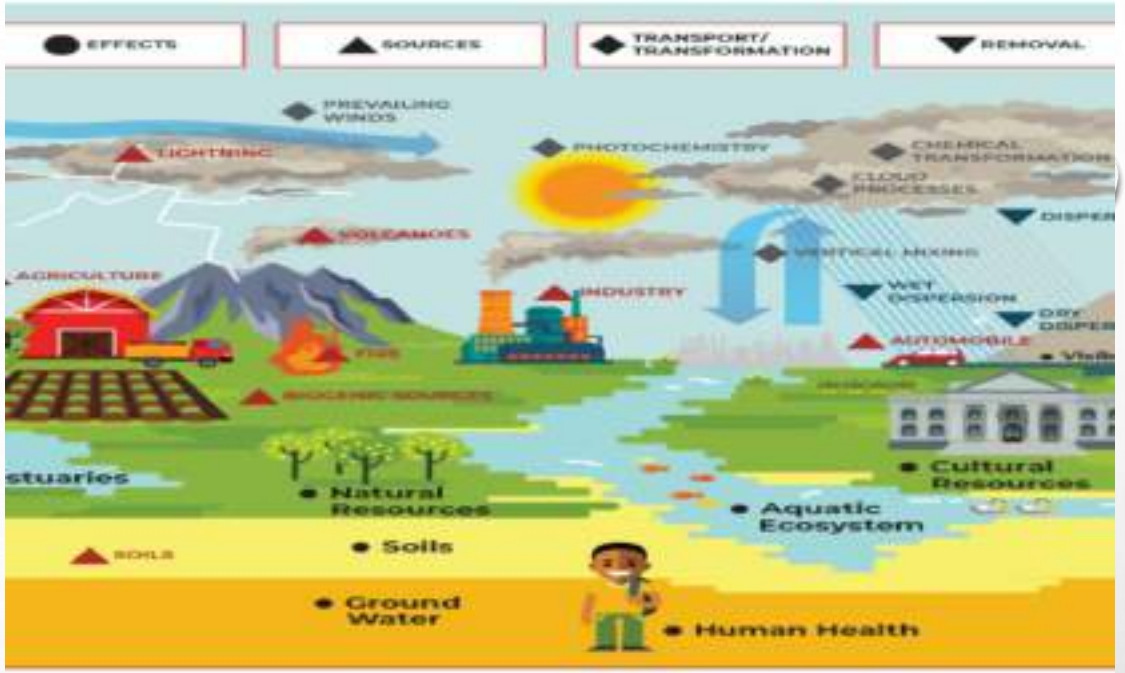
NATURAL POLLUTANTS

- **NATURAL POLLUTANTS**
- NATURAL PROCESSES LEADS TO AN ACCUMULATION OF TOXIC CHEMICALS IN THE SOILS.

THESE TYPES OF CONTAMINATION HAS ONLY BEEN RECORDED IN FEW CASES , SUCH AS THE ACCUMULATION OF HIGHER LEVELS OF PERCHLORATE IN SOIL FROM THE ATACAMA DESERT IN CHILE, A TYPE OF ACCUMULATION WHICH IS PURELY DUE TO NATURAL PROCESSES IN ARID ENVIRONMENTS.

MAN-MADE POLLUTION

- MAN- MADE CONTAMINANTS ARE THE MAIN CAUSES OF SOIL POLLUTION AND CONSISTS OF A LARGE VARIETY OF CONTAMINANTS OR CHEMICALS, BOTH ORGANIC AND INORGANIC. THEY CAN POLLUTE THE SOIL EITHER ALONE OR COMBINED WITH SEVERAL NATURAL SOIL CONTAMINANTS. MAN-MADE SOIL POLLUTION IS USUALLY CAUSED BY IMPROPER DISPOSAL OF WASTES.


EFFECTS
SOURCES
TRANSPORT/ TRANSFORMATION
REMOVAL
PREVAILING WINDS
LIGHTNING
PHOTOCHEMISTRY
CHEMICAL TRANSFORMATION
CLOUD PROCESSES
VOLCANOES
INDUSTRY
WET DISPERSION
AUTOMOBILE
Natural Resources
Cultural Resources
Aquatic Ecosystem
Soils
Ground Water
Human Health

DISEASES CAUSED BY SOIL POLLUTION

Diarrhea

Vomiting

Typhoid

Diphtheria

Hepatitis

Kidney Damage

Nerve Disorders

Skin Lesions

DISEASES CAUSED BY SOIL POLLUTION

- HUMAN CAN BE EFFECTED BY SOIL POLLUTION THROUGH THE INHALATION OF GASES EMITTED FROM SOIL MOVING UPWARDS, OR THROUGH THE INHALATION OF MATTER THAT IS DISTURBED AND TRANSPORTED BY WIND BECAUSE OF VARIOUS HUMAN ACTIVITIES ON THE GROUND.

SOIL POLLUTION MAY CAUSE A VARIETY OF HEALTH PROBLEMS, STARTING WITH HEADACHES, NAUSEA, FATIGUE, SKIN RASH, EYE IRRITATION AND POTENTIALLY RESULTING IN MORE SERIOUS CONDITIONS LIKE NEUROMUSCULAR BLOCKAGE, KIDNEY AND LIVER DAMAGE AND VARIOUS FORMS OF CANCER.

REFERENCE

- 1. TRACE ELEMENTS IN SOIL AND PLANTS BY ALINA KABATA-PENDIAS
- 2. SOIL POLLUTION BY J.C.CALVET
- 3. THE TELEGRAPH
- 4. THE TIMES OF INDIA

Presentation on Global Warming

DEPARTMENT OF CHEMISTRY

Bejoy narayan mahavidyalaya

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Stream:- B.Sc Paper:- DSE 4
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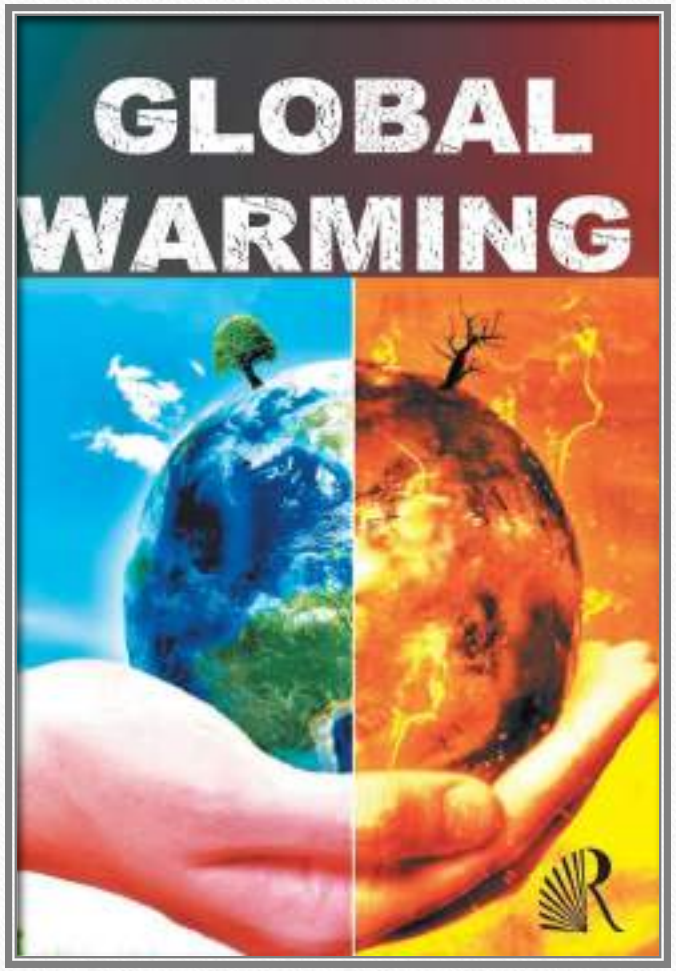
Reg no:- 201901040186 of 2019-20

CONTENTS:

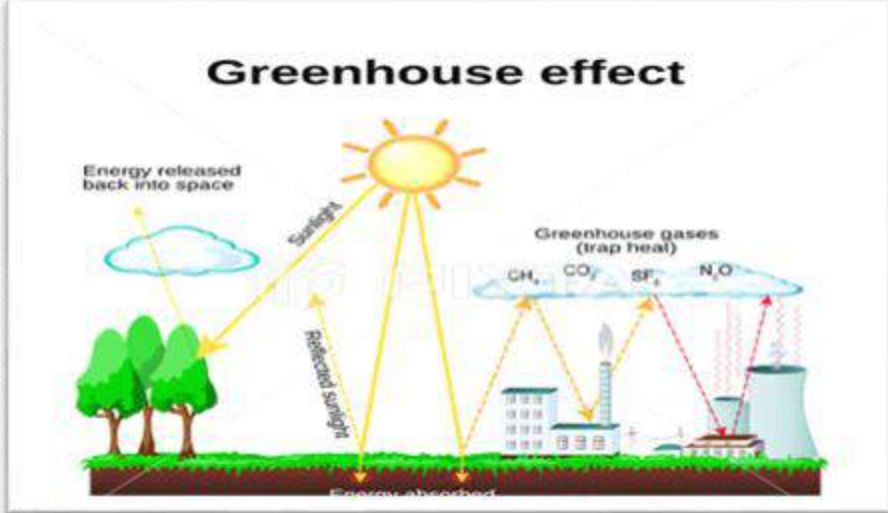
- What is Global Warming?
- Greenhouse Effects.
- Causes of Global Warming.
- Effects of Global Warming.
- Ozone Layer Depletion.
- Global Warming Statistics.
- Projection of Global Warming.
- Future Prediction.
- Precaution to prevent Global Warming.



❑ WHAT IS GLOBAL WARMING ?

- Global warming relates to the increase in the average temperature of the Earth's surface that has been observed in the recent years , and it is projected to continue. It is debated as to weather this is a natural occurrence or whether human activity has impacted or accelerated it.

▪ GREEN HOUSE EFFECT:

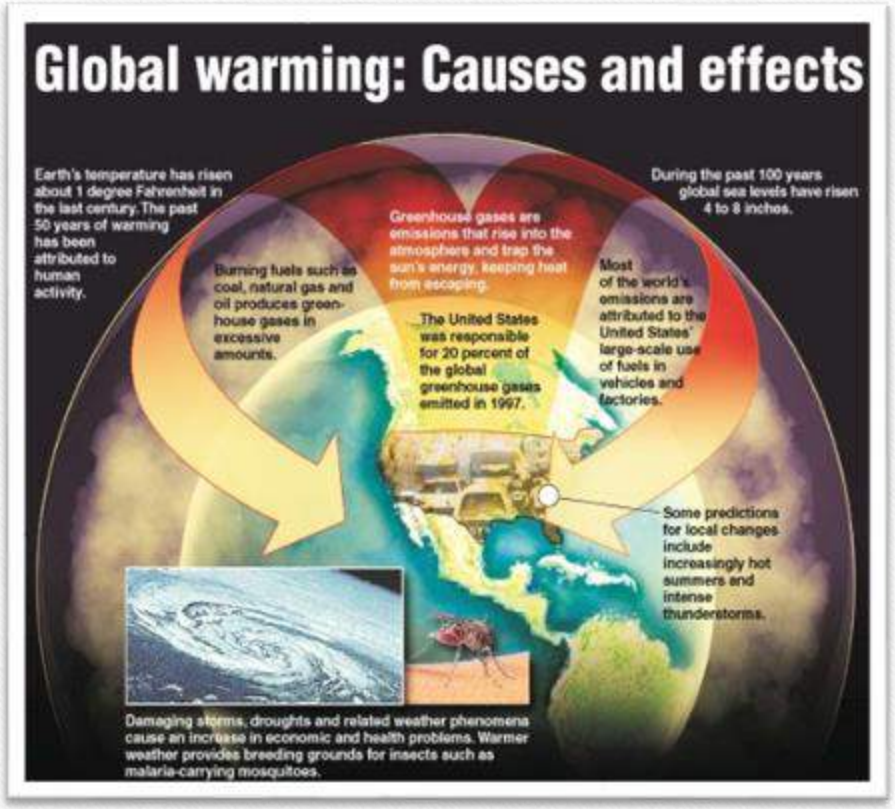


- The green house effect is the process by which absorption and emission of infrared radiation by gases in the atmosphere are purported to warm a planet's lower atmosphere and surface.
- Naturally occurring greenhouse gases have a mean warning effect of about **33˚C (59˚F).**
- The major green house gases are **water vapour**, which causes about 36-70 present of the green house effect; **Carbon dioxide (CO_2),** which causes **9-26 percent; Methane(CH_4),** which causes **4-9 percent**; and **Ozone(O_4),** which causes **3-7 percent**. Clouds also affect the radiation balance, but they are composed of liquid water or ice and so have different effects on radiation from water vapour.

❑ CAUSES OF GLOBAL WARMING

- Global warming is caused by several things, which include man-made or anthropogenic causes, and global warming is also caused by natural causes.

- There are many causes, some are as follows:
  - **Natural Causes**
  - **Man-made Causes of Global warming**



❑ NATURAL CAUSES

- Natural causes are causes that are created by nature. One natural cause is a release of methane gas from arctic tundra and wetlands. Methane is a greenhouse gas and a very dangerous gas to our environment. A greenhouse gas is a gas that traps heat in the earth's atmosphere. Another natural cause is that the earth goes through a cycle of climate change. This climate change usually lasts about 40,000 years.

❑ MAN-MADE CAUSES

- Man-made causes probably do the most damage to our planet. There are many man-made causes of global warming. Pollution is one of the biggest man-made problems. Pollution comes in many shapes and sizes. Burning fossil fuels is one thing that causes pollution. Fossil fuels are fuels made of organic matter such as coal, or oil. When fossil fuels are burned they give off a green house gas called CO2. When you dig up the fossil fuels you dig up the methane as well letting it escape into the atmosphere.

❑ EFFECTS OF GLOBAL WARMING

- The effects of Global Warming can already be seen
  - The IPCC's Third Assessment Report finds that in the last 40 years, the global average sea level has risen, ocean heat content has increased, and snow cover and ice extent have decreased, which threatens to inundate low-lying island nations and coastal regions throughout the world.
  - Effects of global warming already being felt on plants and animals worldwide.
  - Global Warming Effects that will happen in the future.

❑EFFECTS OF GLOBAL WARMING FELT ON PLANTS ANDANIMALS

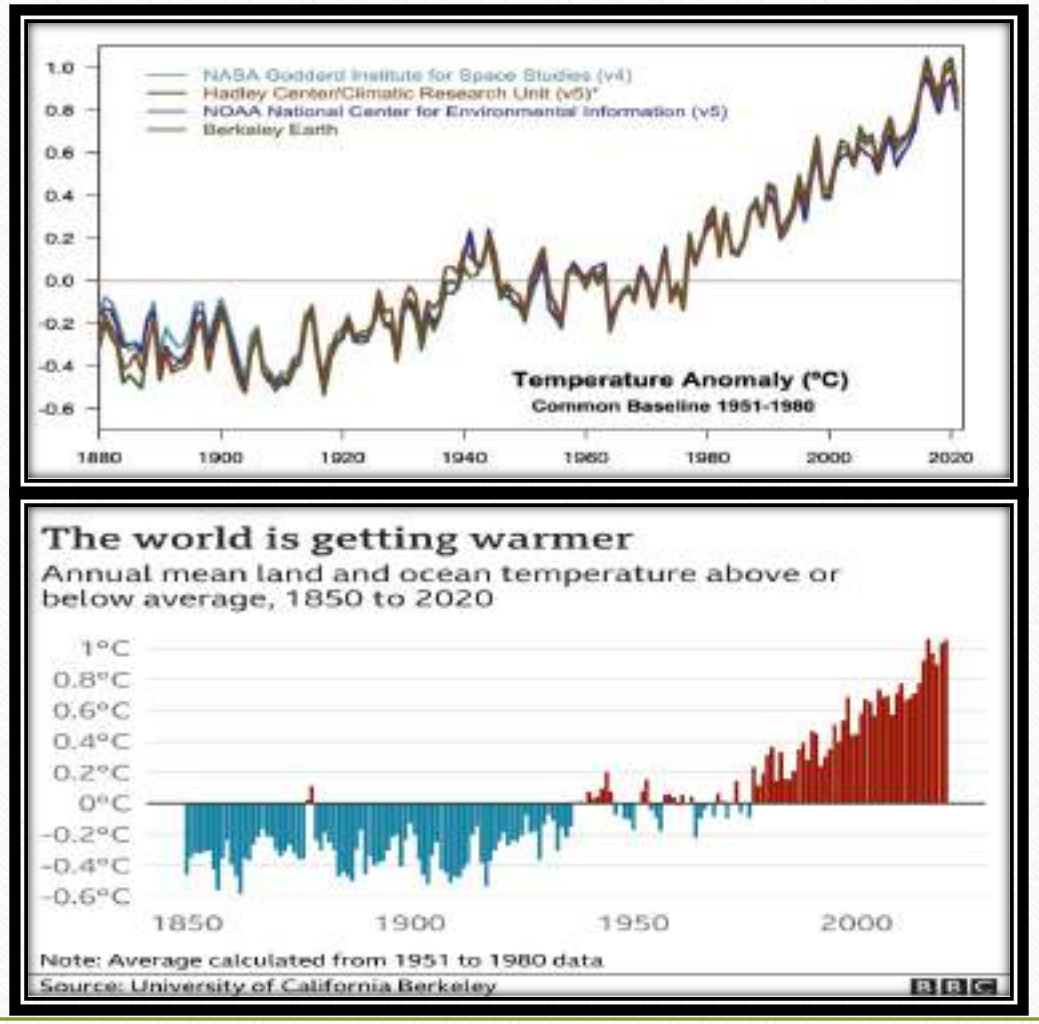
- Global warming is having a significant impact on hundreds of plant and animal species around the world -- although the most dramatic effects may not be felt for decades, according to a new study in the journal Nature.

❑ OZONE LAYER DEPLETION

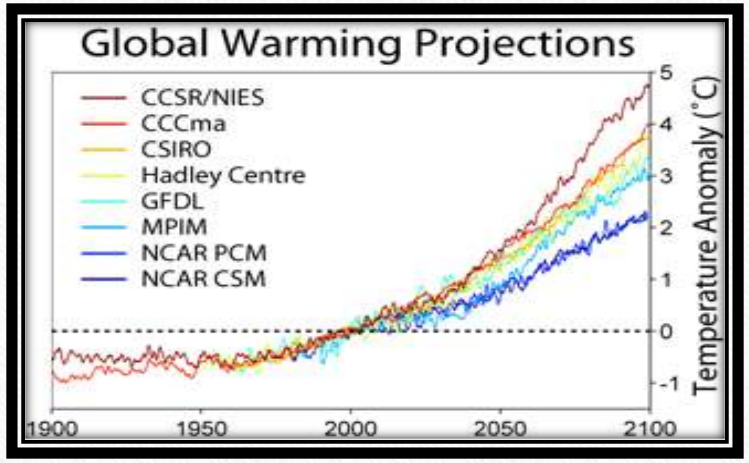
- The ozone layer protects the Earth from the ultraviolet rays sent down by the sun. If the ozone layer is depleted by human action, the effects on the planet could be catastrophic.
- Ozone is a bluish gas that is formed by three atoms of oxygen. The form of oxygen that humans breathe in consists of two oxygen atoms, O2. When found on the surface of the planet, ozone is considered a dangerous pollutant and is one substance responsible for producing the greenhouse effect.

❑ GLOBAL WARMING STATISTICS

- According to NASA, the hottest year on record was 2005, which matched 1998.
- According to the National Climactic Data Centre estimates, $100 billion of damage was caused by hurricanes hitting the U.S. coast in 2005 alone.
- It is also projected that 15-37% of all plant and animal species could be wiped out by global warming by the year 2050, which could further cause considerable damage to our planet's ecosystem.

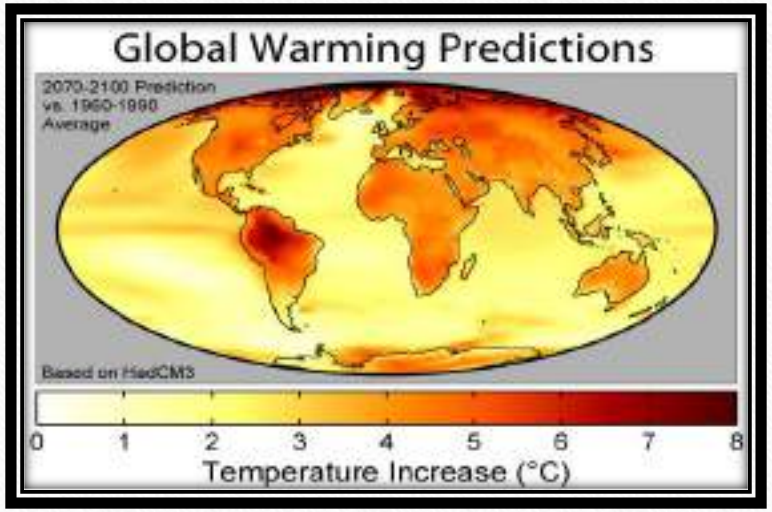


❑ PROJECTION OF GLOBAL WARMING



Calculations of global warming prepared in or before 2001 from a range of climate models under the **SRES** A2 emissions scenario, which assumes no action is taken to reduce emissions and regionally divided economic development.

The geographic distribution of surface warming during the 21st century calculated by the HadCM3 climate model if a business as usual scenario is assumed for economic growth and greenhouse gas emissions. In this figure, the globally averaged warming corresponds to 3.0 °C (5.4 °F).



❑ FUTURE PREDICTIONS

Some basic predictions of global warming on temperature and sea level:

- Global mean temperature should increase by between 1.4 and 5.8˚C (2.5 to 10˚F).
- The Northern Hemisphere cover should decrease further, but the Antarctic ice sheet should increase.
- The sea level should rise by between 9 and 88 cm (3.5" to 35").
- Other changes should occur, including an increase in some extreme weather events.
- The United States is ranked nr.1 among large nations of being a global warming polluter
- The sooner we take heed of these statistics and implement changes that address global warming, the quicker we can reverse the disturbing trends and the less damage will occur to our planet and way of life.

❑ PRECAUTION TO PREVENT GLOBAL WARMING

- Useless usage of AC's and Refrigerators should be stopped because from them harmful rays cfc's are emitted which results in depletion of ozone layer and from that hole UV rays of Sun comes to the earth and cause many diseases to both animals and plants i.e. Skin cancer etc. , CNG and hydrogen operated vehicles should be used, more no. of trees should be planted, Chimneys in the Industries should be upgraded so that most of the effluents should get filtered down there.

REFERENCE

- ✓WWW.Slideshare.Net
- ✓WWW.WIKIPEDIA.COM
- ✓YOU TUBE

ENVIRONMENTAL AND HEALTH IMPACT OF AIR POLLUTION

PREPARED BY

SK MONIRUL ISLAM

ROLL NO:19034030006 4

REG.NO:201901040192

OF 2019-20

Introduction

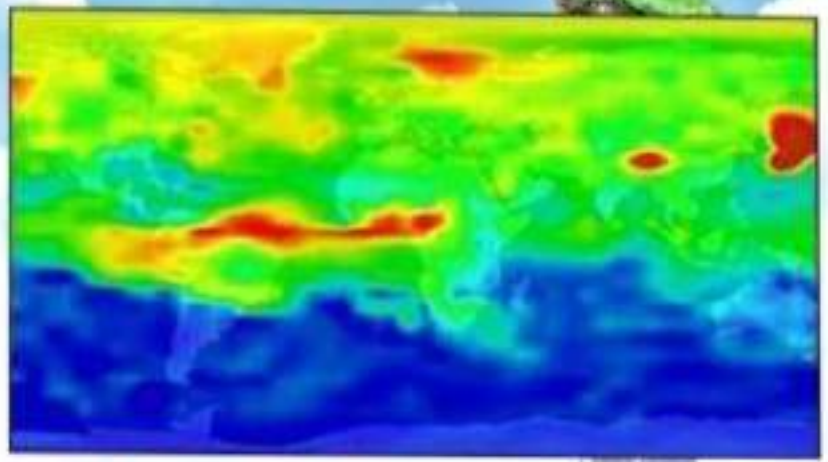
- ✓ Air pollution : one of the greatest **"ENVIRONMENTAL EVIL"**
- ✓ The air we breathe has not only **LIFE SUPPORTING** properties but also **LIFE DAMAGING** properties.
- ✓ An average man breathes **22,000 times** a day and takes in **16 kg of air** each day.
- ✓ All the impurities in the inhaled air do not necessarily cause harm. Some may be harmful when present in air in small concentration and others only if they are present in high concentration.

DEFINITION

- occurs when the air contains gases, dust, fumes or odor in harmful amounts.
- it is when concentrated gases exceed safe limits.

AIR POLLUTION

- According to W.H.O, an increase in any of the constituents of the atmosphere which is harmful to the living beings and their environment, is known as air pollution



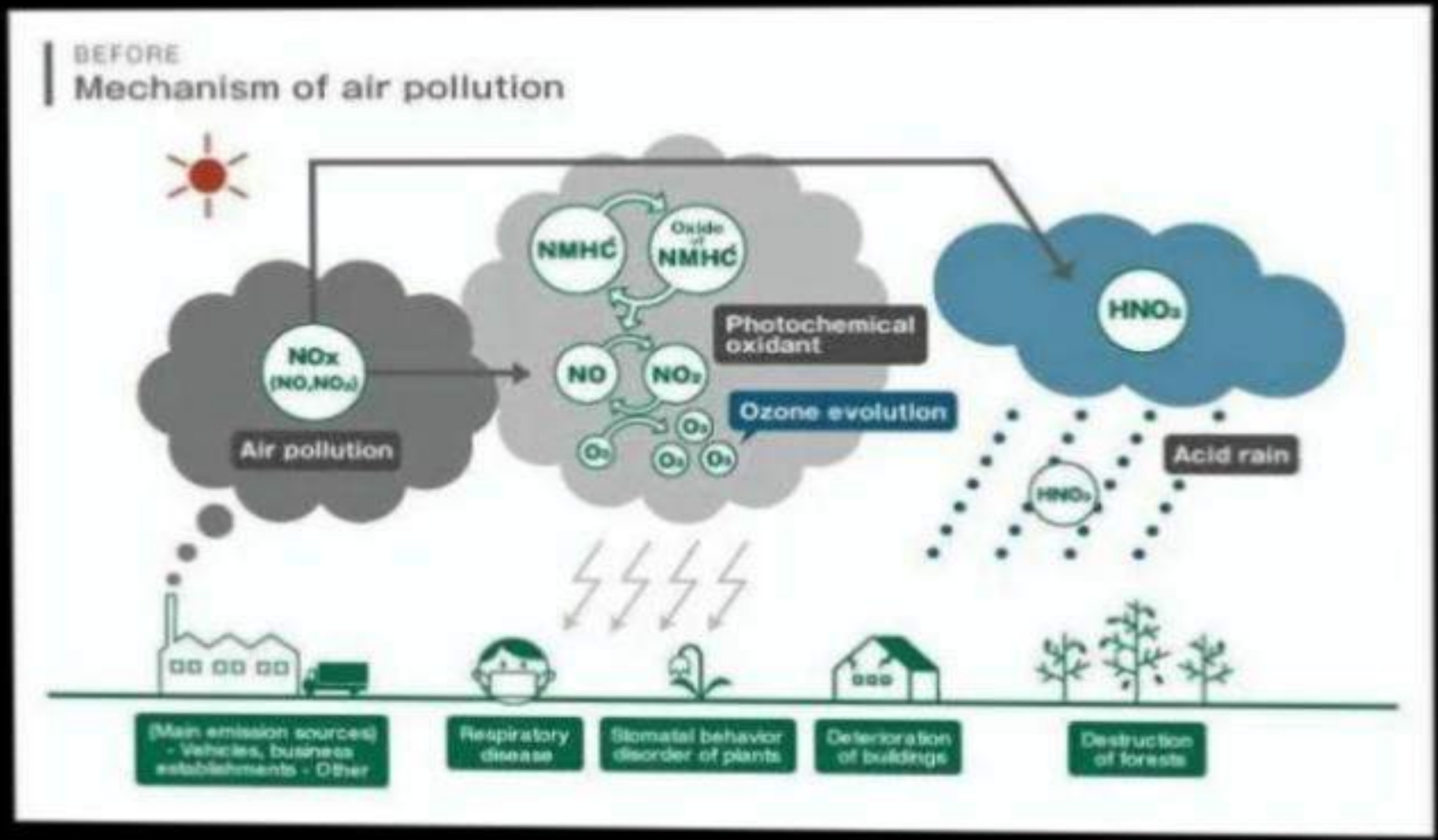
The view from the space

TYPES OF AIR POLLUTION

- Outdoor Air Pollution
  - Smog
  - Particulates
  - Acid Rain
  - Greenhouse Gases

- Indoor Air Pollution

MECHANISM


BEFORE
Mechanism of air pollution
NMHC
Oxide of NMHC
Photochemical oxidant
NOx (NO,NO2)
NO
NO2
Ozone evolution
Air pollution
HNO3
Acid rain
(Main emission sources) - Vehicles, business establishments - Other
Respiratory disease
Stomatal behavior disorder of plants
Deterioration of buildings
Destruction of forests

SOME CAUSE OF AIR POLLUTION

EFFECTS

- Human Effects

  e.g. diseases

- Environmental Effects
  - Acid rain
  - Eutrophication
  - Haze
  - Wildlife
  - Ozone Depletion
  - Crop and forest damage
  - Global Climate Change

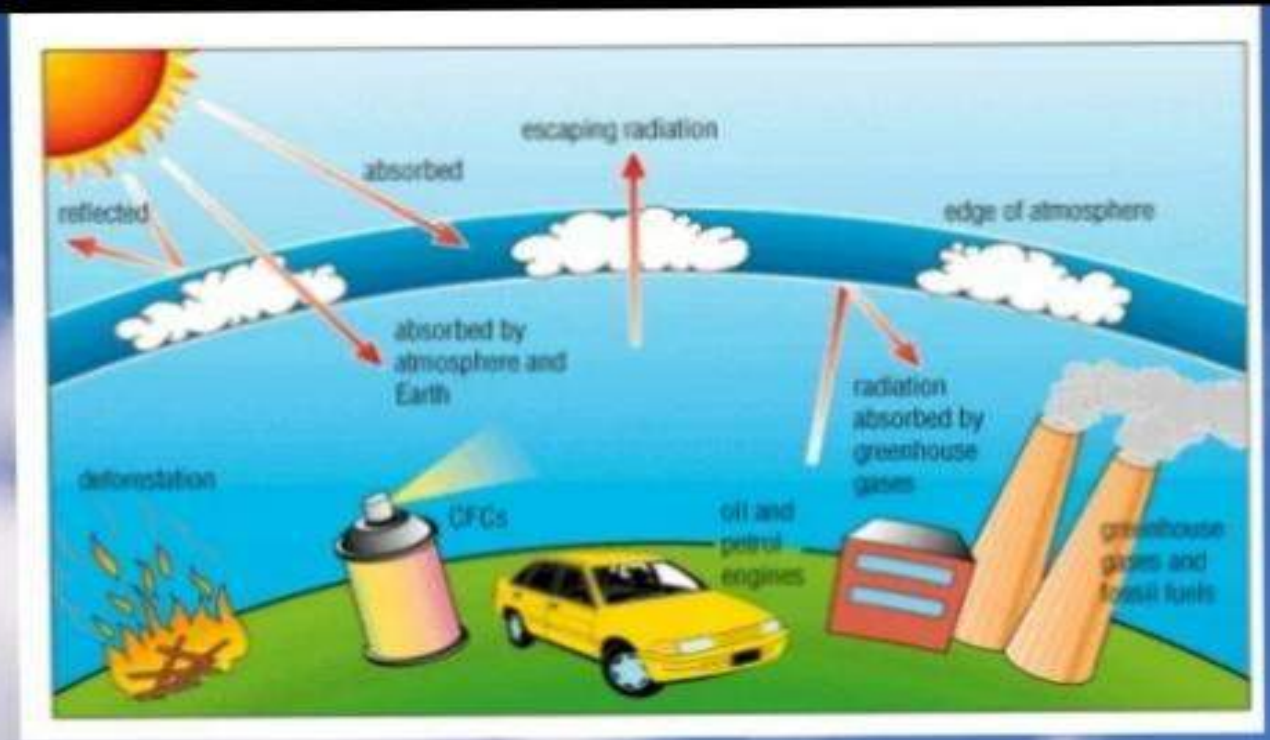
IMPACT ON ENVIRONMENT :

Acid Lakes and Streams

- Review: Lower pH means higher acidity.
- pH of lakes, streams, and rivers can drop when acid rain falls.
- Many organisms require an environment with a narrow range of pH.

Air Pollution Damage to Materials and Structures

- A/P also damages many materials.
  - Acid rain corrodes metals and deteriorates stone and paint.
- Smoke and soot coat buildings, paintings and sculptures requiring expensive cleaning.



·Greenhouse effect

-It generally comes from the build up of carbon dioxide gas in the atmosphere. *Carbon dioxide* is produced when fuels are burned.

-In this type of pollution sun rays go into the atmosphere and they are trapped by greenhouse-gasses. So the temperature on the earth raise.

Effects of Air Pollution on Organisms

- **Animals also are exposed to air pollution.**
  - When they inhale gases and small particles.
  - When they ingest pollutants in food and water
  - Some animals can ingest pollutants directly through skin.
    - Soft bodied animals such as worms, amphibians

Factors affecting human health

- ✓ Nature of the pollutants
- ✓ Concentration of the pollutants
- ✓ Duration of exposure
- ✓ State of health of the receptor
- ✓ Age group of the receptor

IMPACT ON HEALTH:

Solution for Air pollution:-

- Learn more; stay up to date
- Tell your friends and family about pollution.
- Make sure get pollution checks on our cars.
- Join a group to stop pollution.
- Encourage your parents to carpool to work.
- Switch off lights, fan, heat, etc. when you leave the room.

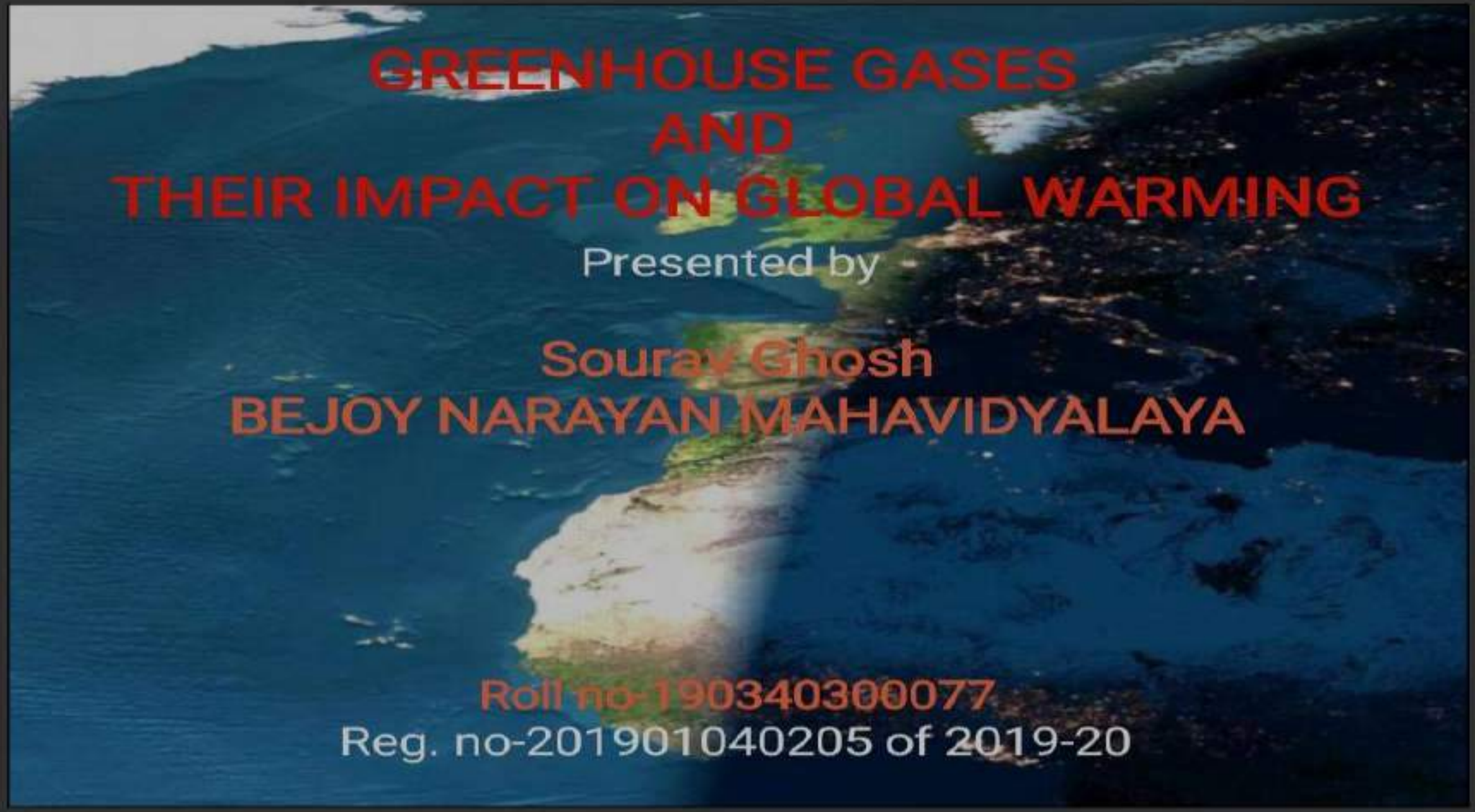
Control of Air Pollution.

- Air pollution can be controlled by a thorough understanding of its causes.
- Establishment of industries away from the towns and cities.
- Increasing the length of the chyeysmn in industries.
- Growing more plants and trees.
- Use of efficient engines in automobiles.
- Use of smokeless choola.
- Use of petrol without lead (Unleaded petrol)

CONCLUSION AND RECOMMENDATION

- Air pollution has long been a serious problem in the world.
- Without air, Earth would be unable to sustain life.
- Spread the Word.


Thank you


GREENHOUSE GASES
AND
THEIR IMPACT ON GLOBAL WARMING
Presented by
Sourav Ghosh
BEJOY NARAYAN MAHAVIDYALAYA
Roll no-19034030007 7
Reg. no-201901040205 of 2019-20

Global Warming

- **Global warming** is the increase in the average measured temperature of the Earth's near-surface air and oceans since the mid-20th century, and its projected continuation. In media, it is synomonous with the term "climate change."
- Global surface temperature increased 0.74 ± 0.18 °C during the 100 years ending in 2005.The Intergovernmental Panel on Climate Change (IPCC) concludes "most of the observed increase in globally averaged temperatures since the mid-twentieth century is very likely due to the observed increase in greenhouse gas concentrations"via an

Greenhouse Effect

- It is the process by which absorption and emission of infrared radiation by atmospheric gases warm a planet's lower atmosphere and surface.
- Naturally occurring greenhouse gases have a mean warming effect of about 33 °C (59 °F), without which Earth would be uninhabitable.
- On Earth, the major greenhouse gases are water vapor, which causes about 36–70 percent of the greenhouse effect (not including clouds); carbon dioxide (CO_2), which causes 9–26 percent; methane (CH_4), which causes 4–9 percent; and ozone, which causes 3–7 percent. The issue is how the strength of the greenhouse effect changes when human activity increases the atmospheric concentrations of some greenhouse gases.


Causes Of Global Warming
• Greenhouse Emissions
Caused due to
• Rapid Industrialization
• Population Explosion
• Depletion Of Natural Resources
• Natural Phenomena
• Modification Of Ecosystems


Effects Of Global Warming
• Increase in sea levels.
• Increase in the intensity of extreme weather events
• Significant changes to the amount and pattern of precipitation
• Modifications of trade routes
• Glacier retreat
• Mass species extinctions
• Increases in the ranges of disease vectors

RISING IMPACTS OF GLOBAL WARMING

WITH CONTINUED INTENSIVE RELIANCE ON FOSSIL-FUELS AND EMISSIONS INCREASES

EXTINCTION OF MORE THAN 40% OF KNOWN SPECIES
GLOBAL ECONOMIC LOSSES OF UP TO 5% GDP
COMMITMENT TO AT LEAST PARTIAL MELTING OF GREENLAND AND W. ANTARCTIC ICE SHEETS, EVENTUALLY RAISING SEA-LEVEL 13-20 FEET

SUBSTANTIAL BURDEN ON HEALTH SERVICES
GLOBAL FOOD PRODUCTION DECREASES
ABOUT 30% OF GLOBAL COASTAL WETLANDS LOST

MAJOR CHANGES IN NATURAL SYSTEMS CAUSE PREDOMINANTLY NEGATIVE CONSEQUENCES FOR BIODIVERSITY, WATER AND FOOD SUPPLIES
WIDESPREAD CORAL MORTALITY
MILLIONS MORE PEOPLE FACE FLOODING RISK EVERY YEAR

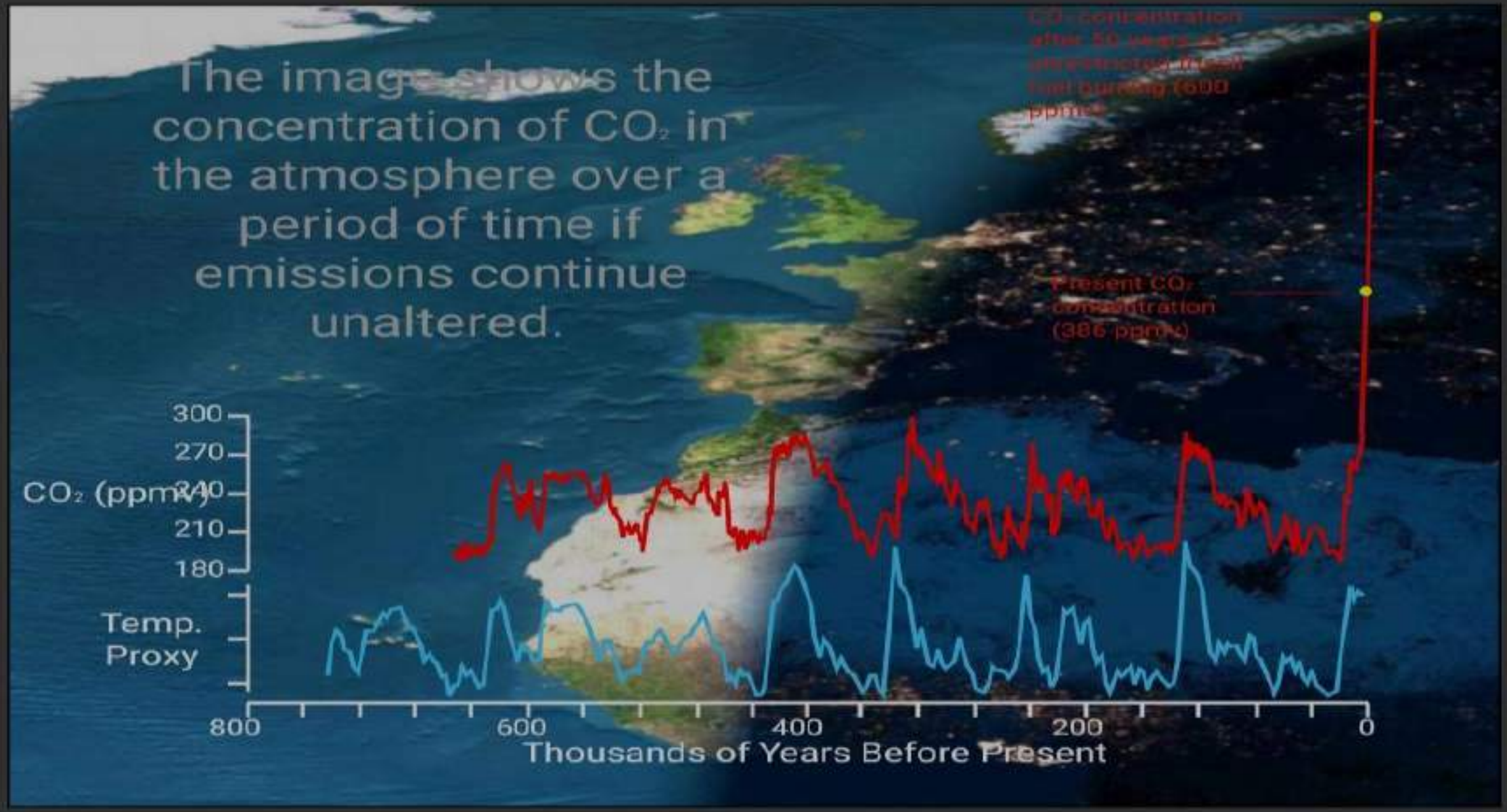
INCREASED RISK OF EXTINCTION FOR 20-30% OF KNOWN SPECIES
MOST CORALS BLEACHED
INCREASING MORTALITY FROM HEAT WAVES, FLOODS AND DROUGHTS

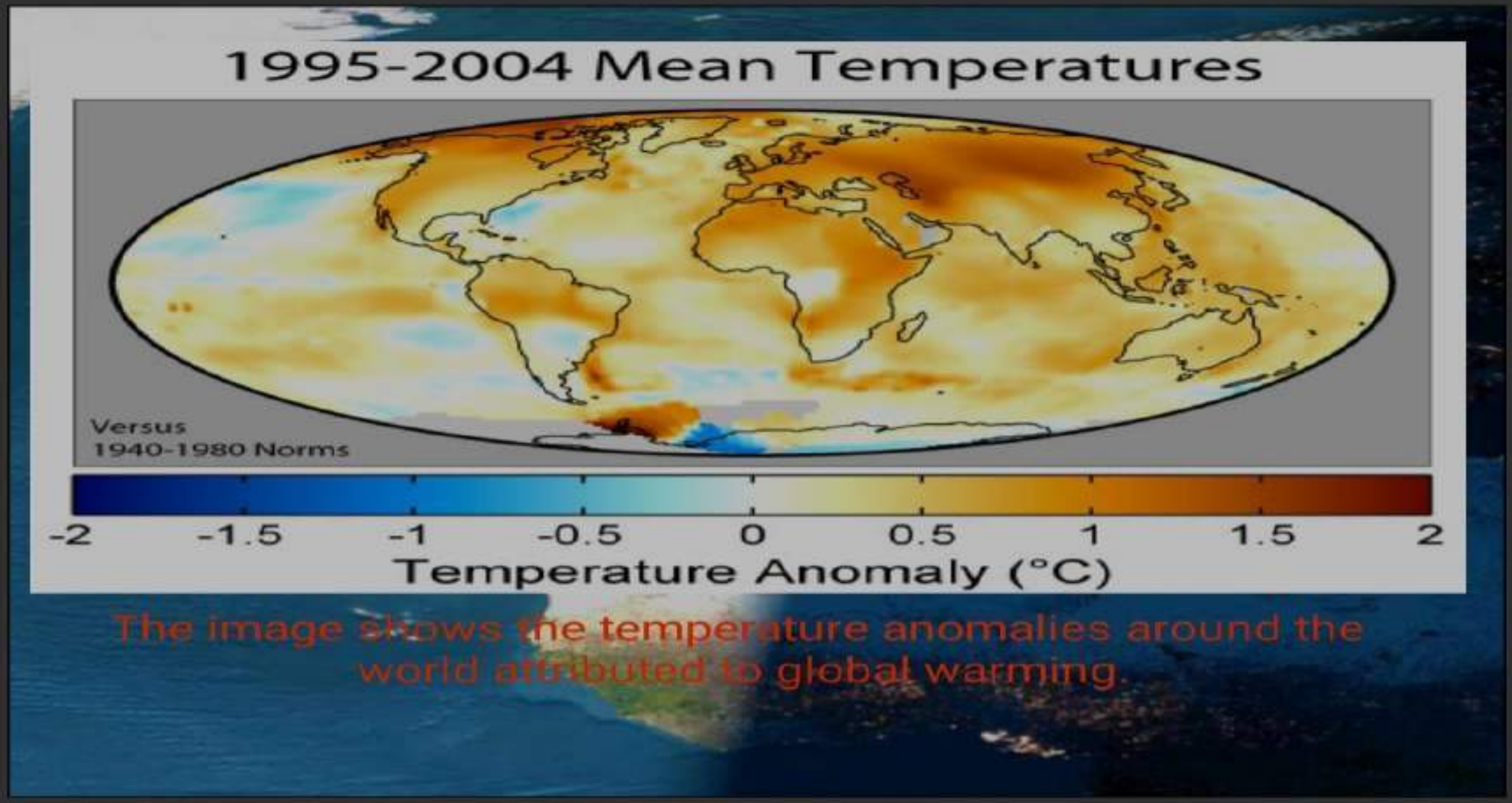
DECREASING WATER AVAILABILITY, INCREASING DROUGHT IN MANY REGIONS
INCREASING WILDFIRE RISK, INCREASED FLOOD AND STORM DAMAGE
INCREASING BURDEN FROM MALNUTRITION, DIARHOEAL, CARDIO-RESPIRATORY AND INFECTIOUS DISEASES

NET www.net.org

Source: IPCC Fourth Assessment Report, Working Group II Summary for Policymakers. Timing of temperature increases based on IPCC scenarios that assume continued intensive reliance on fossil-fuels and emissions increases. Emissions reductions would reduce the amount and rate of warming.
Conversion of temperature increases—Celsius to Fahrenheit: 1°C = 1.8°F; 2°C = 3.6°F; 3°C = 5.4°F; 4°C = 7.2°F.

Produced by National Environmental Trust.


The image shows the concentration of CO_2 in the atmosphere over a period of time if emissions continue unaltered.
Present CO_2 concentration (386 ppmv)
300
270
240
210
180
CO_2 (ppmv)
Temp. Proxy
800
600
400
200
0
Thousands of Years Before Present



The image shows the temperature anomalies around the world attributed to global warming.

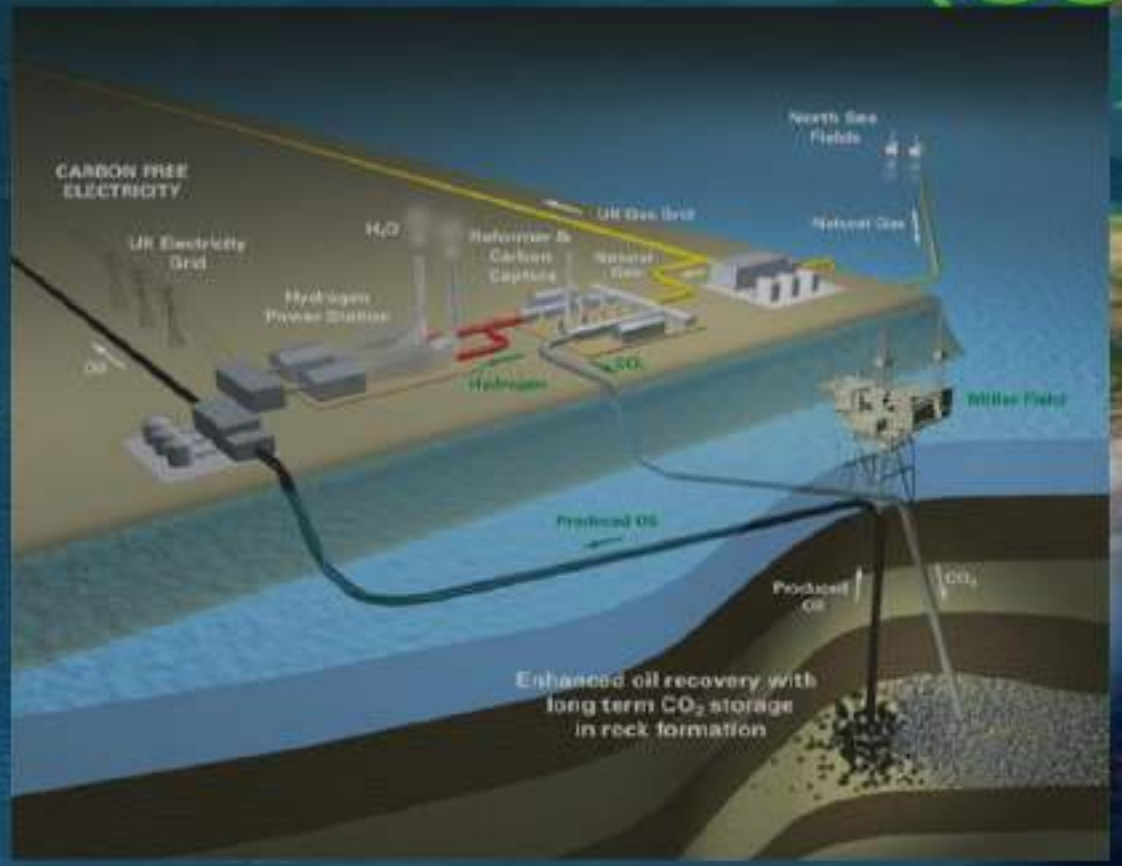

February 17, 1993
1993
The images show the effect of global warming on a ice covered mountain
February 21, 2000
2000

- Other fallouts include
  - Spread of disease
  - Warmer waters and more hurricanes
  - Increased probability and intensity of droughts and heat waves
  - Economic consequences
  - Loss of Biodiversity
  - Destruction of Ecosystems

Mitigation Of Global Warming

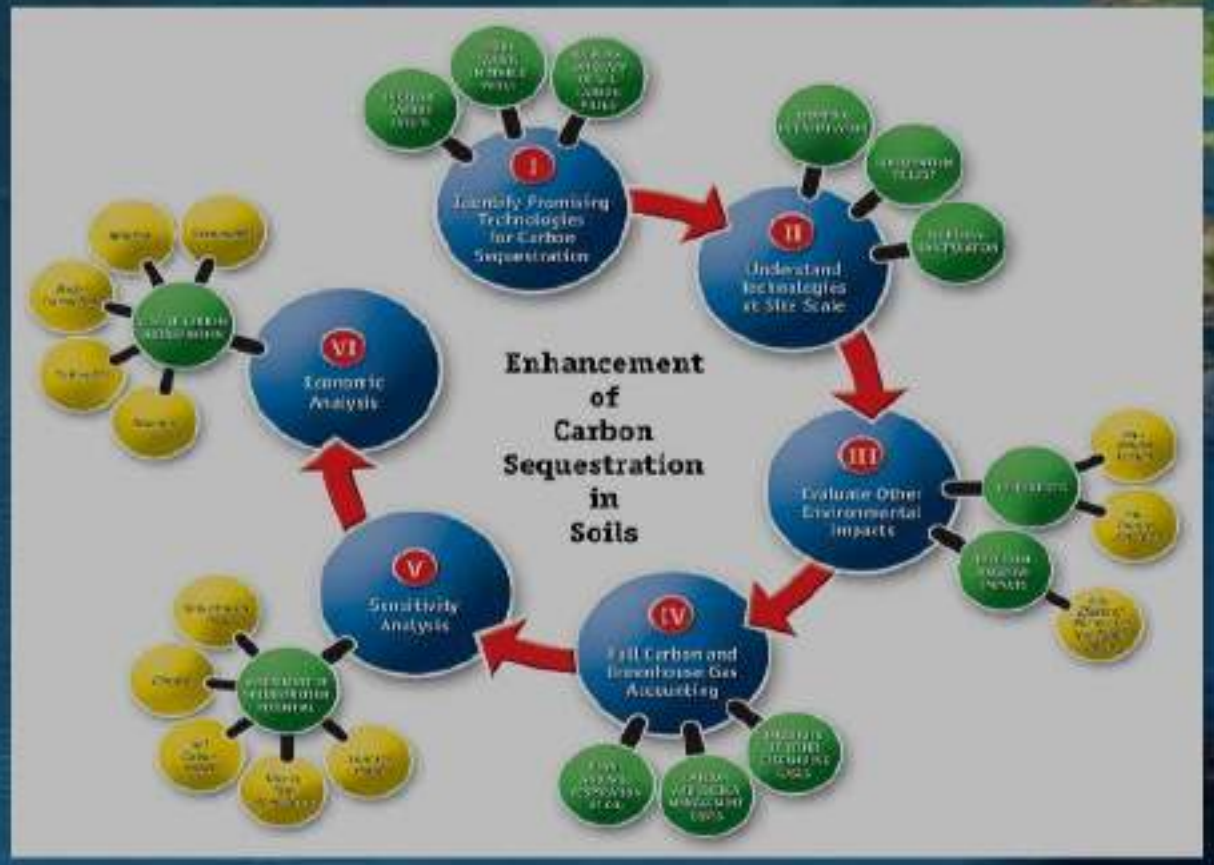
- Mitigation of global warming involves taking actions to reduce greenhouse gas emissions and to enhance sinks aimed at reducing the extent of global warming. This is in distinction to adaptation to global warming which involves taking action to minimize the effects of global warming.

Carbon Capture And Storage (CCS)



- **Carbon capture and storage** (CCS) is a plan to **mitigate** climate change by capturing carbon dioxide (CO_2) from large point sources such as power plants and subsequently storing it away safely instead of releasing it into the atmosphere.

Carbon Sequestration



- Carbon sequestration is a term that describes processes that remove carbon from the atmosphere.
  - Seeding oceans with iron
  - Solar shades
  - Geoengineering

Solar Shades

Governmental And Intergovernmental Action

- Policies like:
  - Kyoto Protocol
  - Carbon emissions trading
  - Carbon tax

Acknowledgement

I want to convey my heartfelt appreciation and gratitude to my professors as well as my supervisors for providing me with the chance to work on this project.which also aided me in conducting extensive study and learning about a bunch of new topics.
I am greatful to them.
I want to thank my f for their assistance in completing this p h a short period of time.
Thank you everyon have helped me.


THANK
YOU!

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NOISE AND LIGHT POLLUTION AND THEIR EFFECTS ON PUBLIC HEALTH

NOISE POLLUTION

WHAT IS NOISE ?

- Noise is unwanted sound judge to be unpleasant, loud or disruptive to hearing.
- The unbearable volume or voice or sound that is not suitable for human ear.

WHAT IS NOISE POLLUTION?

- Noise pollution or sound pollution refers to the presence of excessive and disturbing noise (from machines , transportation systems, aircraft, train etc) in the environment and mental health of the living beings on earth.


NOISE POLLUTION

SOURCES OF NOISE POLLUTION

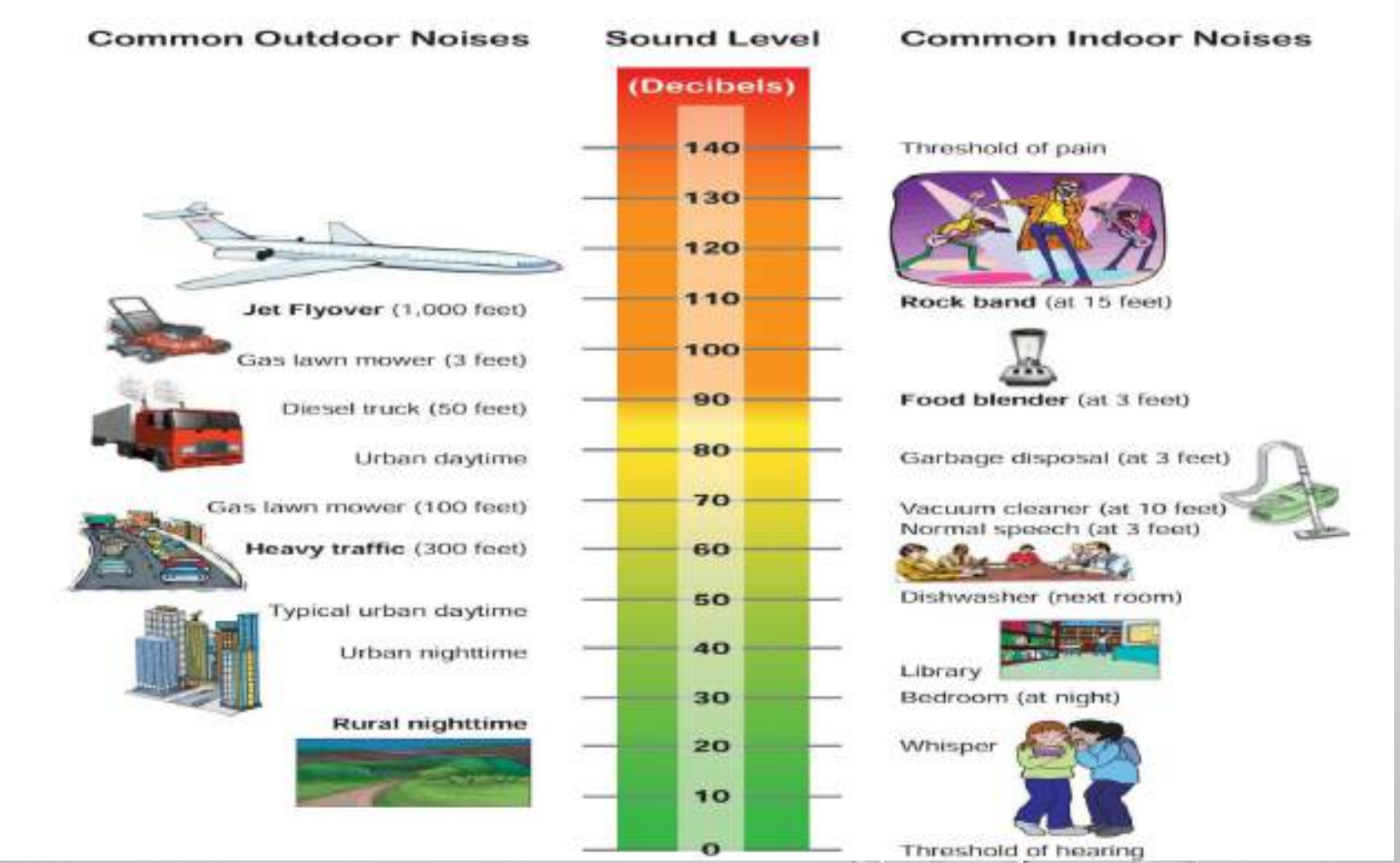
- Transportation systems
- Construction of building, highway and streets.
- Bulldozers, digging machines etc .
- Vehicle horn, noise from silencer of a bike etc.

SOURCES OF NOISE POLLUTION

HOUSEHOLD SOURCES:

- Food mixer , grinder
- Vacuum cleaner
- Washing machine and dryer
- Air conditioner, straighter and curler
- Cooler
- Loud speaker
- Neighbor's barking dog

NOISE MEASUREMENT



MEASUREMENT OF NOISE

"A decibel is the standard for the measurement of noise

- 20 db is whisper.
- 40 db the noise in a quiet office.
- 60 db is normal conversation.
- 80 db is the level at which sound become physically painful And can be termed as noise .

Diseases Caused by Noise Pollution

- High Blood Pressure
- Heart Attack
- Cancer
- Asthma
- Coughing, wheezing
- Deafness
- Annoyance
- Stress
- Anxiety
- Reduced lung development
- Bronchitis
- Insomnia
- Arterious Clerosis

EFFECTS OF NOISE POLLUTION ON PUBLIC HEALTH

1. Unwanted noise can damage physiological and psychological health.
2. Noise pollution can cause annoyance and aggression, hypertension, high streets levels , hearing loss, sleep disturbance, and other harmful effects.
3. High noise levels can contribute to cardiovascular effects and exposure to moderately high levels during a single eight hour period causes a statistical rise in blood pressure

THE DANGERS OF NOISE POLLUTION

IMPACTS SLEEP HABITS

Can disturb sleep patterns, making it difficult to fall or stay asleep.

HINDERS CHILD DEVELOPMENT

Can affect children's hearing and lead to trouble concentrating.

CAN CAUSE PSYCHOLOGICAL ISSUES

Found to increase stress and anxiety in both children and adults.

SOLUTION OF NOISE POLLUTION

- Planting bushes and trees in and around sound generating sources is an effective solution for noise Pollution.
- Regular servicing and tuning of automobile can effectively reduce the noise pollution.
- Building can be designed with suitable noise absorbing material for the walls, windows, and ceiling.
- Workers should be provided with equipments Such as ear plugs and


Light Pollution

WHAT IS LIGHT POLLUTION?

Light pollution is excessive and prolonged use of artificial lights, in away that results in brightening of night skies , disrupting natural cycles and activities of wildlife. There are different types of light pollution; skyglow, glare, and light trespass.

Skyglow is orange -pink glow that hangs over cities and towns at night. Glare is the effect produced when iyes are exposed to bright lights. Light trespass occurs when light goes over its intended range.

TYPES OF LIGHT POLLUTION

- Glare
- Sky glow
- Light trespas
- Up lighting
- Light clutter

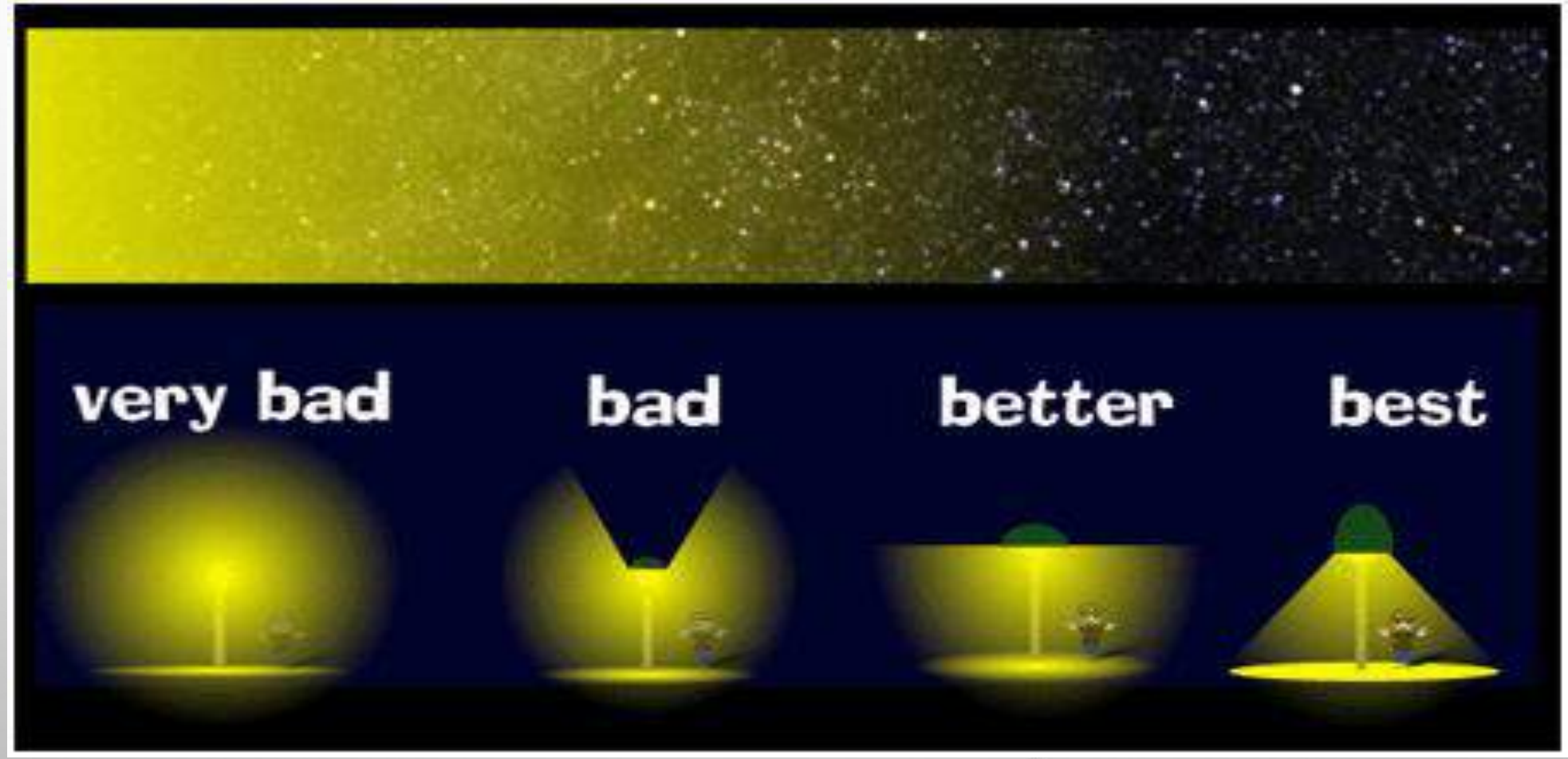
CAUSES OF LIGHT POLLUTION

- Light pollution is a side effect of industrialized Civilization it is cause due to excessive use of artificial lights by humans.
- The powerful artificial light, which are used to illuminates office, factories, sports stadium, street , Parks and something even houseing complex obscure the night sky.
- Unlike the sunlight, the artificial light which are thrust in to the sky have many

CONTROL OF LIGHT POLLUTION

- Lighting scheme changes
- Creating environmental zone
- Design aspects
- Full cut off lighting fixtures
- Usages of different types and colours of light
- Usage of automated light sensors
- Limit growth in installed

EFFECTS OF LIGHT POLLUTION



Effects of Light Pollution

- The brightness of the night sky prevents the view of the stars and other celestial bodies
- Disorders in the sight of children
- Insomnia

HUMAN HEALTH :

- Exposure to light at night suppresses the production of hormon , melatonin. The latter is synthesized in the brains pineal gland only when the eye sight it is dark .
- Production beings around nightfall , peaks between 1-2 AM , and shuts off during day. Hence melatonin is often referred to as the hormonal

REFERENCE

- Environmental noise and light pollution, Patrick F. Cunniff, John Wiley and sons.
- Narandra Singh at all , noise and light pollution, sources, Effect and control, J.Hum.Ecol
- Noise , light by JOAN FITCH RN/ B.S.N

ADSORPTION PROPERTY OF NANO PARTICLES

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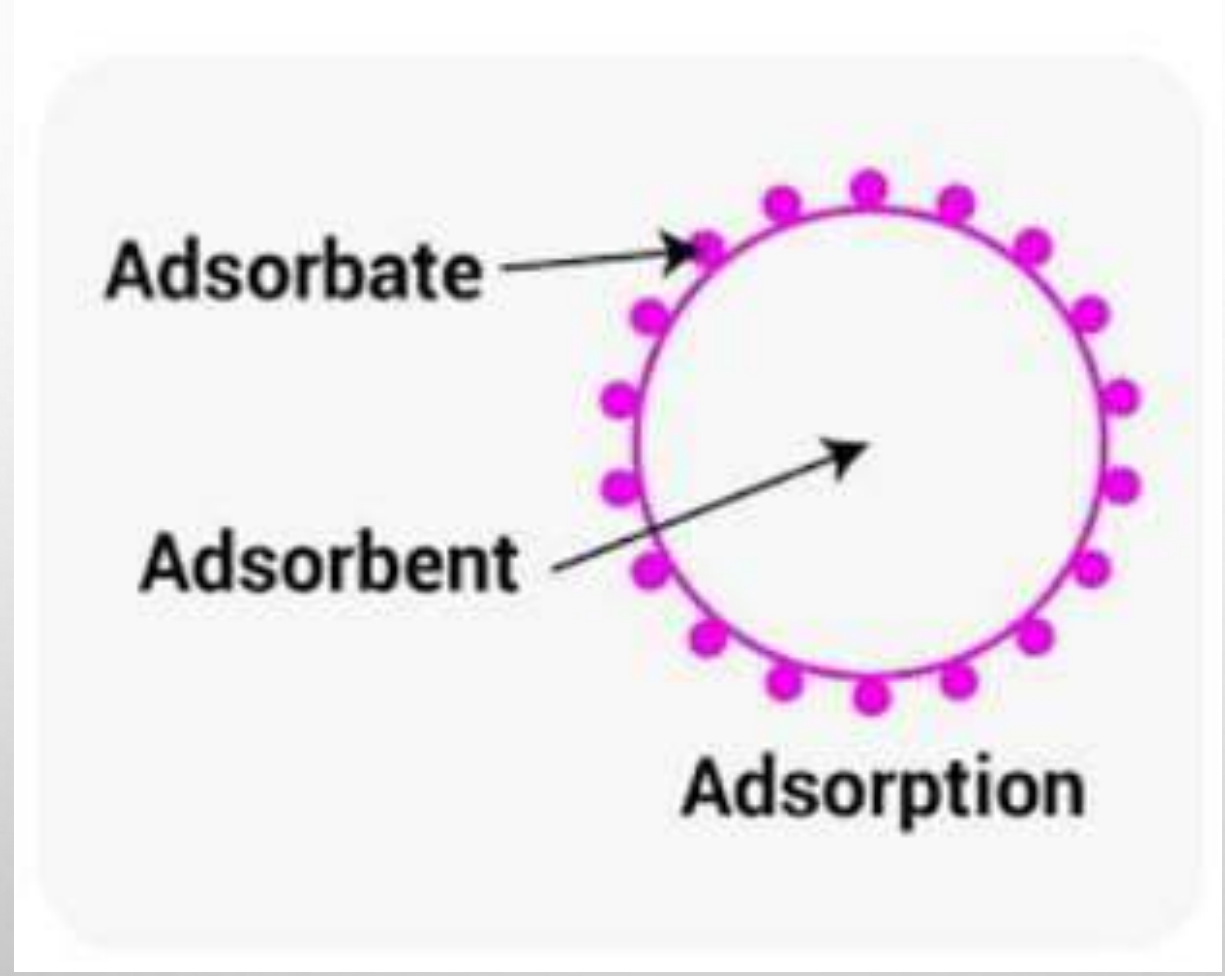
THE UNIVERSITY OF BURDWAN

WHAT IS ADSORPTION?

ACCUMULATION OF A SUBSTANCE OVER THE SURFACE OF ANOTHER SUBSTANCE

AS COMPARED TO IT'S BULK IS CALLED ADSORPTION.

- ADSORPTION PROCESS INVOLVES TWO COMPONENTS :
- ADSORBENT(THE SUBSTANCE ON THE SURFACE OF WHICH ADSORPTION TAKES PLACE IS CALLED ADSORBENT).
- ADSORBATE(THE SUBSTANCE WHICH GETS ACCUMULATED ON THE SURFACE OF ADSORBENT IS CALLED ADSORBATE).


Adsorbate
Adsorbent
Adsorption

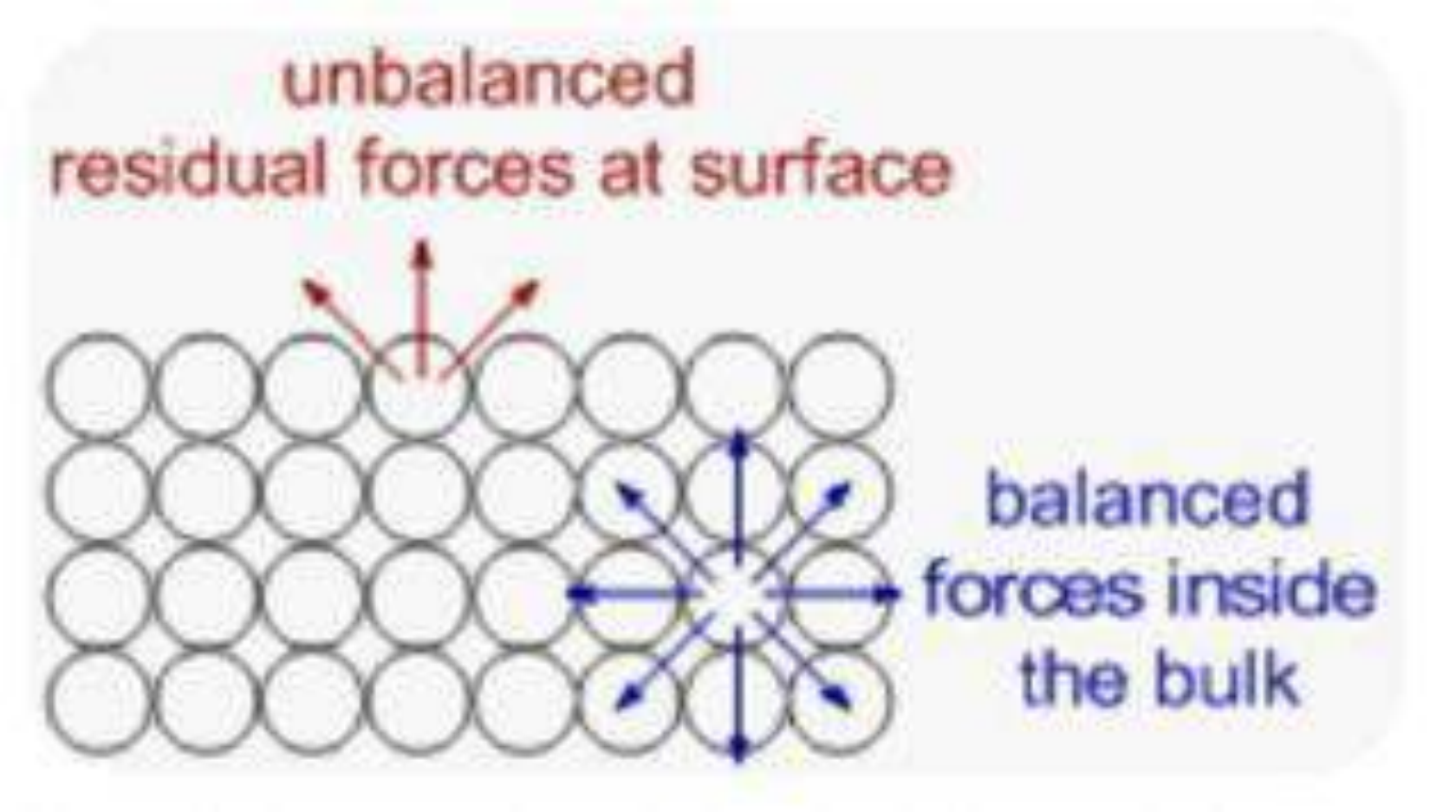
- ADSORPTION IS A SURFACE PHENOMENON – EXPLAIN.

ANSWER : ADSORPTION INCRESES WITH INCREASE IN SURFACE AREA PER UNIT MASS OF ADSORBENT AT A GIVEN TEMPERATURE AND PRESSURE. THIS PROVES THAT ADSORPTION PROCESS IS RESTRICTED ON THE SURFACE ONLY. HENCE IT IS SURFACE PHENOMENON.

WHEN A CERTAIN AMOUNT OF METHYLENE BLUE (AN ORGANIC DYE) IS POURED IN TWO CONTAINERS CONTAINING SAME MASS OF CHARCOAL BLOCK AND CHARCOAL DUST SEPERATELY, WE OBSERVE COLOUR OF METHYLENE BLUE GETS FADED AWAY MORE IN CASE OF CHARCOAL DUST, WHICH HAS HIGHER SURFACE AREA THAN CHARCOAL BLOCK OF SAME MASS.

THIS EXPERIMENT PROVES STATMENT ABOVE.

MECHANISM/REASON OF ADSORPTION



MOLECULES PRESENT IN THE BULK ARE BEING UNIFORMLY ATTRACTED FROM ALL SIDES BY NEIGHBOURING MOLECULES. SO NET FORCE ACTING ON A BULK MOLECULES IS ZERO.

BUT THE MOLECULES PRESENT AT SURFACE IS BEING ATTRACTED ONLY BY THE MOLECULES BELOW. THUS SURFACE MOLECULES EXPERIENCE A RESIDUAL OR RESULTANT DOWNWARD, UNBALANCED FORCE OF ATTRACTION.

TO BALANCE THIS RESIDUAL FORCE, SURFACE MOLECULES ATTRACT AND RETURN ADSORBATE PARTICLES WHEN BROUGHT NEAR THE SURFACE OF ADSORBENT.

THERMODYNAMICS OF ADSORPTION

Any process can be represented thermodynamically under constant T & P by

GIBBS EQUATION : $\Delta G = \Delta H - T\Delta S$

ΔG = Gibbs Free Energy, ΔH = Heat of enthalpy, ΔS = Entropy & T = Temperature

Adsorption is a SPONTANEOUS process, there is a decrease in the free energy of the system

For SPONTANEITY **$(\Delta G = \Delta H - T\Delta S) < o$** ..... *at const T & P*

As translational freedom of adsorbate is reduced when it is adsorbed, thus

$\Delta S < o$ or negative

$\Delta G = \Delta H - T(-\Delta S) \Longrightarrow \Delta G = \Delta H + T\Delta S$

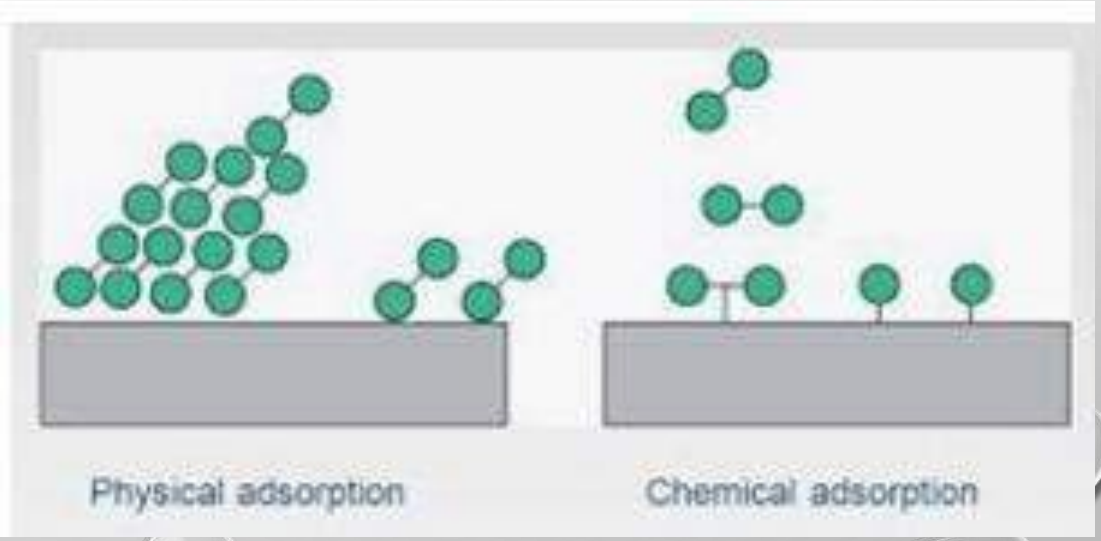
As for Spontaneity, $\Delta G < o$, hence ΔH should be negative i.e $\Delta H < o$

SPONTANEOUS i.e. ($\Delta G < o$) & EXOTHERMIC i.e. ($\Delta H < o$)

TYPES OF ADSORPTION

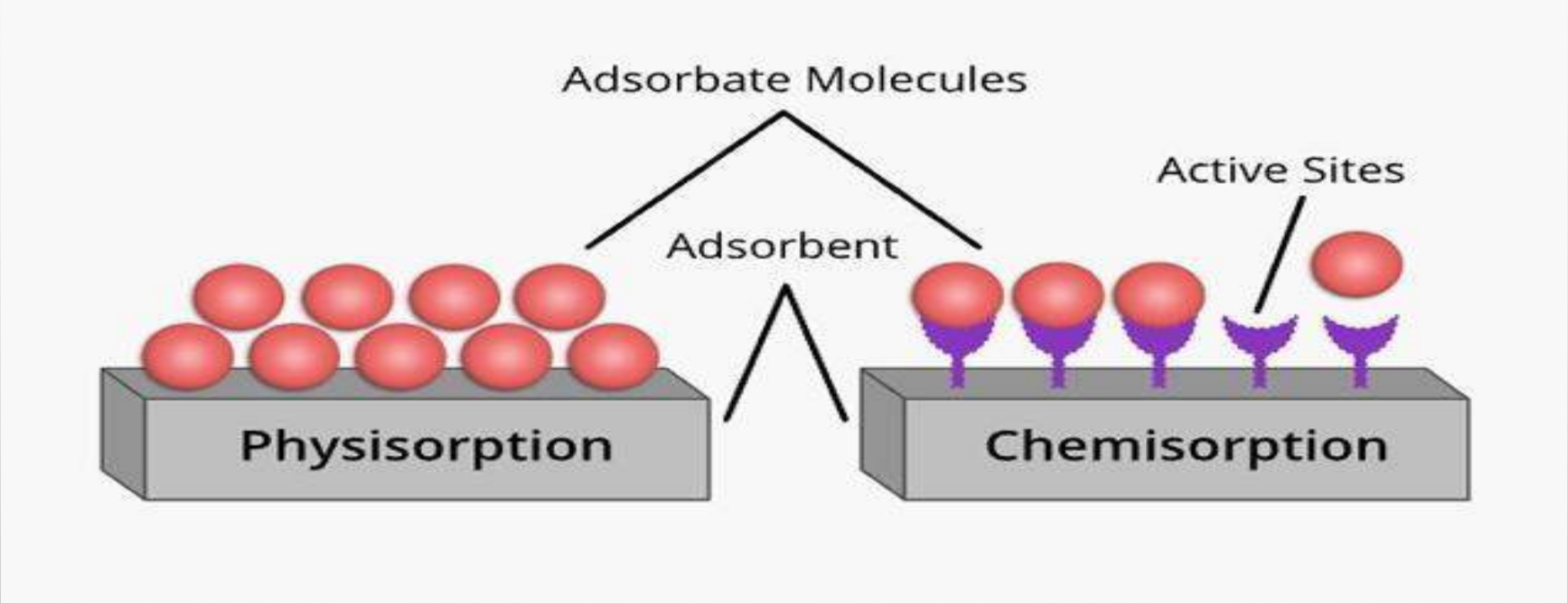
ON THE BASIS OF ATTRACTION BETWEEN ADSORBATE AND ADSORBENT, ADSORPTION IS OF TYPES :

1. PHYSICAL ADSORPTION OR PHYSISORPTION
2. CHEMICAL ADSORPTION OR CHEMISORPTION



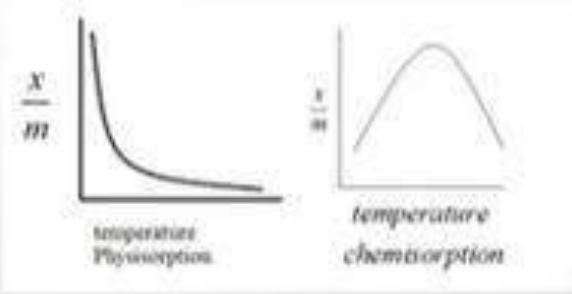
COMPARISON BETWEEN PHYSISORPTION AND CHEMISORPTION

Physisorption	Chemisorption
Bonded by weak Vander Waal's forces	Bonded by chemical bond
Enthalpy of adsorption is 20-40 KJ/mol	Enthalpy of adsorption is 80-240 KJ/mol
Increase in temperature decreases the rate of adsorption	Increase in temperature increase the adsorption and them it decreases on further rise
Forms multilayers	Forms unilayer
It is not specific which is usually adsorbed on solids	It is highly specific
Reversible	Irreversible


Adsorbate Molecules
Active Sites
Adsorbent
Physisorption
Chemisorption

FACTORS EFFECTING EXTENT OF ADSORPTION

1. **NATURE OF ADSORBATE/GAS :** Easily liquefiable gases NH_3, HCl, Cl_2, SO_2) are readily adsorbed than permanent gases (O_2, H_2, N_2)
2. **NATURE OF ADSORBENT & SURFACE AREA :**
   - Adsorbent is selective and specific in chemisorption
   - Surface area of adsorbent increases adsorption also increases
   - Presence of active groups on adsorbent (polar/activated) increases adsorption
3. **TEMPERATURE :**
   - Physisorption decreases when temperature increases
   - Chemisorption increases with increase of temperature upto certain limit and then adsorption decreases



4. **PRESSURE :**
   - Chemisorption is not affected by pressure
   - Physisorption is increases when pressure increases upto a limit and then the rate becomes constant
   - the effect pressure is explained by Freundlich and Langmuir adsorption isotherms

ACTIVATION OF SOLID ADSORBENT

THIS MEANS INCREASING ADSORBING PWER OF ADSORBENT, WHICH IS USUALLY DONE BY INCREASING SPECIFIC SURFACE AREA OF THE ADSORBENT BY THE FOLLOWING METHODS :

1. BY HEATING STRONGLY : CHARCOAL IS ACTIVATED BY HEATING IT IN SUPERHEATED STEAM OR IN VACUUM AT TEMPERATURE BETWEEN (350-1000)°C.
2. BY SUBDIVIDING ADSORBENT IN SMALLER PIECES OR GRAINS : THIS INCREASE SURFACE AREA AND ADSORPTION POWER.
3. BY MASKING SURFACE OF ADSORBENT ROUGH : THIS IS DONE BY MECHANICAL RUBBING OR BY CHEMICAL ACTION OR BY DEPOSITING FINELY DISPERSED METALS ON THE SURFACE OF ADSORBENT BY ELECTROPLATING.

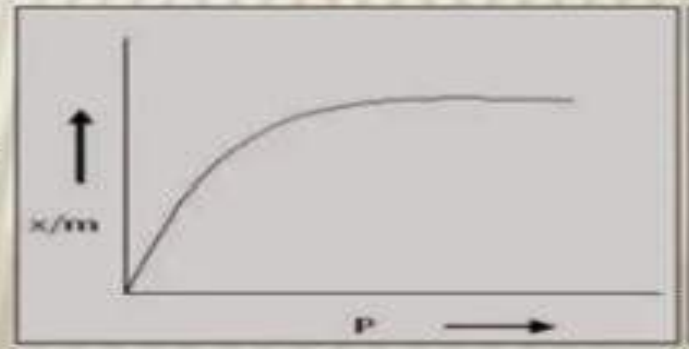
FREUNDLICH ADSORPTION ISOTHERM

- Empirical equation for representing the isothermal variation of adsorption of a quantity of gas adsorbed by unit mass of solid adsorbent with pressure is Freundlich Adsorption Isotherm

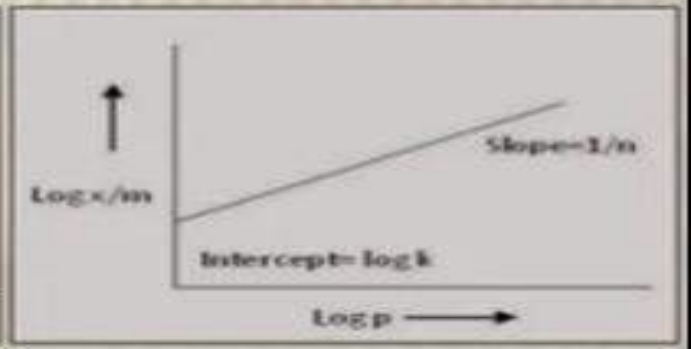
$x/m = kP^{1/n}$ OR $x/m = kC^{1/n}$ ..... FREUNDLICH ISOTHERM

- x/m = adsorption per gram of adsorbent which is obtained by dividing the amount of adsorbate (x) by the weight of the adsorbent (m).
- P is Pressure, k and n are constants whose values depend upon adsorbent and gas at particular temperature .
- Taking the logarithms of Freundlich Isotherm : $\log x/m = \log k + 1/n \log P$
- Freundlich Isotherm correctly established the relationship of adsorption with pressure at lower values.

Limitation : Failed to predict adsorption capacity at higher pressure



Freundlich Isotherm curve



Log x/m versus log P

LANGMUIR ADSORPTION ISOTHERM

In 1916, Langmuir proposed another Isotherm : ***Langmuir Adsorption isotherm***

- *Based on different assumptions one of which is that dynamic equilibrium exists between adsorbed gaseous molecules and the free gaseous molecule.*

$$A(g) + M(surface) \rightleftharpoons AM(surface) \quad \ldots\ldots\ldots\ldots\ldots\ldots$$

A(g) = unadsorbed gaseous molecules M(surface) = unoccupied adsorbent surface AM(surface) = Adsorbed gaseous molecules

- *The extent of surface coverage is normally expressed as the fractional coverage, θ*

$$\theta = \text{number of adsorption sites occupied / number of adsorption sites available}$$

- *The rate of change of surface coverage due to adsorption is proportional to the partial pressure p of gas & the number of vacant sites $N(1-\theta)$, where N is the total number of sites, k_a & k_d rate constants for adsorption & desorption*

$$d\theta/dt = k_a p N(1-\theta) \quad \ldots\ldots\ldots\ldots\ldots\ldots$$

Rate of Adsorption

- *The rate of change of θ due to desorption is proportional to the number of adsorbed species, $N\theta$*

$$d\theta/dt = -k_d N\theta \quad \ldots\ldots\ldots\ldots\ldots\ldots$$

Rate of Desorption

- At equilibrium there is no net change (that is, the sum of these two rates is zero), and solving for θ gives the **Langmuir Isotherm**, where **K = (ka / kd)**

$$\theta = Kp / (1 + Kp)$$ ..... **LANGMUIR ISOTHERM**

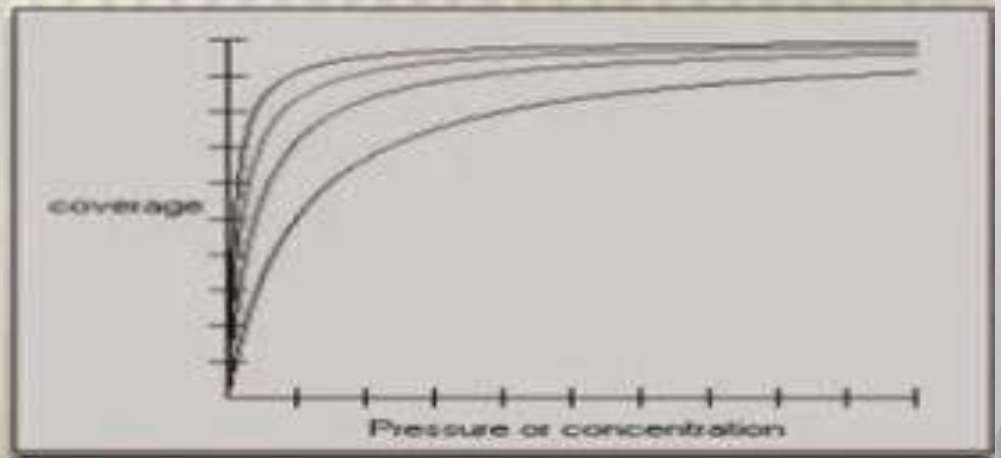
- At lower pressure, Kp is so small that factor (1 + Kp) in denominator can almost be ignored & Langmuir equation reduces to :

$$\theta = Kp$$

- At higher pressure , Kp is so large that factor (1 + Kp) in denominator is nearly equal to Kp & Langmuir equation reduces to :

$$\theta = Kp / Kp = 1$$

Limitation : Valid at low Pressures only



Langmuir isotherm for different values of K

APPLICATION OF ADSORPTION

1. HETEROGENEOUS CATALYSIS : IN A HETEROGENEOUS CATALYSIS, THE MOLECULES OF THE REACTANT ARE ADSORBED AT THE CATALYST SURFACE, WHERE THEY FORM AN " ADSORPTION COMPLEX " . THIS DECOMPOSES TO FORM THE PRODUCT MOLECULES WHICH THEN TAKE OFF FROM THE SURFACE.
2. REMOVAL OF COLOURING MATTER FROM SOLUTION : ANIMAL CHARCOAL REMOVES COLOURS OF SOLUTION BY ADSORBING COLORED IMPURITIES THUS IN THE MANUFACTURE OF CANE-SUGAR , THE COLOURED SOLUTION IS CLARIFIED BY TREATING WITH ANIMAL CHARCOAL OR ACTIVATED CHARCOAL.
3. CHROMATOGRAPHIC ANALYSIS : MIXTURES OF SMALL QUANTITIES OF ORGANIC SUBSTANCES CAN BE SEPARATED WITH THE HELP OF CHROMATOGRAPHY WHICH INVOLVES THE PRINCIPLES OF SELECTIVE ADSORPTION.

THANK YOU