



Bioaccumulation and Biomagnification of Pollutants

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Abstract

The movement of pollutants can be examined through various trophic levels in an ecosystem. To understand this material we have to understand the trophic levels, food chains and food webs as well as pyramid of biomass.

Bioaccumulation refers to how pollutants enter a food chain, biomagnification refers to the tendency of pollutants to concentrate as they move from one trophic level to the next. Here are some definitions of these terms.

Description

Bioaccumulation: Increase in concentration of a pollutant from the environment to the 1st organism in a food chain.

Biomagnification: Increase in concentration of a pollutant from one link in a food chain to another.

We are concerned about this phenomenon because, together they mean that even small concentrations of chemicals in the environment can find their way into organisms in high enough dosages to cause problems. In order for biomagnification to occur, the pollutant must be:

1. Long lived
2. Mobile
3. Soluble in fats
4. Biologically active

If a pollutant is short lived it'll be broken down before it can become dangerous. If it is immobile, it'll stay in one place and is unlikely to be taken up by organisms. If the pollutant is soluble in water it will be excreted by the organism. Pollutants that dissolve in fats, however may be retained for a long period of time. It is traditional to measure the amount of pollutants in fatty tissues of organism, such as fish. In mammals, we often test the milk produced by the females. Since the milk has a lot of fat in it and because the very young are often more susceptible to damage from toxins (Poisons) Ex.: DDT.

DDT stands for dichloro diphenyl trichloro Ethane. It is chlorinated hydrocarbon. DDT has a half life of 15 years, which means if you use 100 Kg of DDT it will breakdown as follows:

YEARS	REMAINING AMOUNT
0	100 KG
15	50 KG

30	25 KG
45	12.5 KG
60	6.25 KG
75	3.13 KG
90	1.56 KG
105	0.78 KG
120	0.39 KG

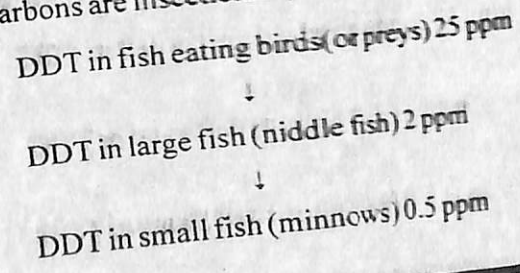
This means that after 100 years there will still be over a pound of DDT in environment. If it does bioaccumulate and biomagnify much of the DDT will be in the bodies of organisms. DDT actually has rather low toxicity to humans. (but high toxicity to insects, hence it is used as an insecticide). Heavy metal and other substances.

DDT is not the only toxin to biomagnify. All the other have the same potential.

SUBSTANCES	USES	PROBLEMS
—	Insulators in transformers plasticizer fire retardant	Biomagnifies impairs reproduction wide spread in aquatic system
PAH's polynuclear aromatic hydrocarbons	Components of petroleum products	carcinogenic(Cancer causing)
Heavy metals, Mercury, Copper, Cadmium, Chromium, Lead, Nickel, Zinc, Tin	Mercury from gold mining used for processing.	May affect the nervous system, may affect reproduction.
Cyanide	Used in leaching gold	Toxic in nature

Biomagnified chemicals are elements such as Selenium, Mercury, Nickel etc. others are in the class of chemicals called as chlorinated hydrocarbons (or organochlorines). They are extremely insoluble in water but are freely soluble in organic solvent.

Many of the chlorinated hydrocarbons are also very persistent in the environment because they are not easily broken down to simple chemicals. Common examples of bioaccumulating chlorinated hydrocarbons are insecticides, DDT, dieldrin and PCB's.





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DDT in water 0.000003 ppm or 3 ppm

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DDT in fish eating birds (or preys) 25 ppm

CONCLUSION

Pollutants are hazardous for life because bioaccumulation of pollutants enter the food chain. Its concentration increases in first organism in food chain. Increase in its percentage it link in a food chain to another. The organisms are going to susceptible for various health complications and diseases. The process of slow accumulation of pollutants in the body cells now causing, ageing effects, in the plant and animals, which may be harmful to the existence of ecosystems.

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