

APES- Chapter #10: Environmental Health, Pollution and Toxicology

Name: _____

Learning Objectives: Serious environmental health problems and diseases may arise from toxic elements in water, air, soil, and even the rocks on which we build our homes. After reading this chapter, you should understand:

- *How the terms **toxic, pollution, contamination, carcinogen, synergism, and biomagnifications** are used in environmental health*
- *What the classification and characteristics are of major groups of pollutants of environmental toxicology*
- *Why there is controversy and concern about synthetic organic compounds such as dioxin*
- *Whether we should be concerned about exposure to human-produced electromagnetic fields*
- *What the dose-response concept is and how it relates to **LD-50, TD-50 and ED-50, ecological gradients, and tolerance***
- *How the process of biomagnifications works and why it is important in toxicology*
- *Why the threshold effects of environmental toxins are important*
- *What the process of risk assessment in toxicology is and why such processes are often difficult and controversial*
- *What the precautionary principle is and why it is important*

Read: Toxic Air Pollution and Human Health: Story of a Southeast Houston Neighborhood

1: What are some of the chronic health effects of exposure to Benzene?

Headaches, Dizziness, Drowsiness.

2: What are some of the potential sources of Benzene in the environment?

The gas that's realized from gasoline.

3: Why is it so hard to link health problems to toxic air pollution?

Because toxins are the health problems.

4: Why it is said that between a state of health and a state of disease is a gray zone of suboptimal health, a state of imbalance?

That even though you may not know, or be aware you can have or already have the sickness.

5: Explain what happened at **Lake Nyos, Cameroon.**

Co2 was discharge into the atmosphere seeping into the lake.

6: What is the difference between a *pollutant* and a *contaminant*?

Pollutant is unwanted and harmful, while contaminant is usually cause for a purpose, unwanted material.

7: **Define** the following:

- Toxin: *Substance that are poisonous to living things.*
- Toxicology: *A scientist that studies toxic material.*
- Carcinogen: *Toxic that increases the risk of cancer.*
- Synergism: *Interaction of diff. substances resulting a greater and bigger effect.*
- Point sources: **Give example:**
Smokestacks. Introduce to the environment .
- Area sources (non-point): **Give example:**
Diffused into land.
Beach.
- Mobile sources: **Give example:**
Automobiles. Traveling.

8: *Define the following: (Identify when they are used)*

- ppm: *Parts per million -Volume, Mass, & Weight.*
- ppb: *Parts Per billion -Volume, Mass, & Weight.*
- mg/L: *Micrograms per liter -Water pollutants*
- $\mu\text{g}/\text{m}^3$: *Pollutant per cubic meter of air — Air pollutants*

9: What is an **Infectious Agent**? (Give examples):

Interaction b/t human and food, water, air soil, and animals.
Ex/ airplanes, terrorist. by inhaling,

A Closer Look 10.1

Sudbury Smelters: A Point Source

10: *Explain what happened to the area surrounding the Sudbury Smelter as a result of the release of heavy metal pollution into the air*

All the nickels, arsenic, and lead has been released to the atmosphere,most of them deposit to the soil.

11: What are some **common heavy metals** found in the environment? *What health hazards can they pose to humans*

Arsenic, chromium, nickel, gold, silver, Mercury, and lead. They incorporated into the skin tissue.

12: What is the concept of *Body Burden*?

It's toxic heavy elements.

What are the body burdens for the following?

- **Antimony:** 8mg
- **Mercury:** 13mg
- **Arsenic:** 18mg
- **Cadmium:** 30mg
- **Lead:** 150mg.

13: Define **biomagnification/bioaccumulation**:

Accumulation or increasing of concentration of a substance within a living organism, changing the food web.

14: Describe how *Cadmium* is a good example of biomagnification.

It increases the chances of getting cancer.

15: How does *Mercury* enter the environment?

With/by the volcanics eruptions.

16: Define **Methylation**:

Univalent radical CH₃- derived from methane.

17: Define **Volatilization**:

Volatile pass by vapor.

Read: A Closer Look 10.2- **Mercury and Minamata, Japan**

What are the 4 major factors that must be considered in evaluating and treating toxic environmental pollutants?

*The individual vary response to the toxic.
Pollutants have a threshold.
Effect and reversible.
They can cause health problems.*

18: Define: *Persistent Organic Pollutant (POP)* and describe the properties that define them

Chemicals that aren't easy break down by the environmental.

Read: A Closer Look 10.3- ***Dioxin: How Dangerous is it?***

How is Dioxin produced?

Organic pollutant, made of O₂, H, Carbon, and chlorine.

What happened in Times Beach, Missouri?

Oil sprayed on the towns roads because entire area contaminated.

19: Give some examples of **HAA's**:

Pesticides, herbicides, and phthalates.

20: Explain how PCB's are harmful (*found in plastics*):

They are toxic.

Read: A Closer Look 10.4- ***Demasculinization and Feminization of Frogs***

Explain how hormone disruptors (Endocrine disruptors) work

Transform the hormones of male frog to females.

21: How can *Thermal Pollution* affect a body of water and it's biodiversity? **Explain.**

Because it's creating, transforming the hormones of the organism to females. It affects it's body.

22: What are ***examples of particulates?***

Dust storms, and volcanic eruptions.

23: Why is **asbestos** harmful to humans?

Lung diseases by inhaling.

24: How can **EMF (Electromagnetic Fields)** be harmful to humans?

They produce magnetic fields

25: How is **noise pollution** measured?

Decibels (dB.)

26: What are some **voluntary exposures** to pollutants?

Tobacco, alcohol, and other drugs. Smoking or drinking.

27: What is meant by the quote, “*everything is poisonous, yet nothing is poisonous*”?
Explain.

Water can be poisonous if we take in a large amount. If we don't know how to use it and it's effects.

28: Describe the “*dose-response*”. **Draw and label** the generalized dose-response curve.
Explain each step.

When various concentration of chemicals are plotted against effects on the organism.

29: Define the following:

- **LD-50:** *Approximation of a chemical's toxicity.*
- **ED-50:** *Causes an effect in 50% of the observed objects.*
- **TD-50:** *Toxic to 50% of the observed subjects.*
- **LD-0:** *Does not cause any deaths.*

30: Explain the concept of a **threshold dose**:

No effect occurs and above which effects begin occur.

31: Define:

- **Behavioral tolerance:** *Changes in behavior.*

- **Physiological tolerance:** *Body adjusts to tolerate a higher level of pollution.*
- **Genetic tolerance:** *Organisms that are more naturally resistant to toxins than others.*

32: Explain the difference between an *acute* and *chronic* effect.

Acute occurs as soon after exposure, chronic after a long period of time.

33: Explain the steps of **risk assessment**:

Identification of the hazard: Whether it can cause any effect.

Dose-response: relationship b/t the chemical and the people.

Exposure assessment: Duration.

Risk characterization: Delineate health risk.

34: What is the *precautionary principle*?

Warning ahead of time.

Read: ***“Is Lead in the Urban Environment Contributing to Antisocial Behavior”***

35: What is the main point of the discussion about lead in the bones of children and behavior?

It can cause defects and deaths. It's bad for them, affects body.

36: Why is it difficult to establish standards for acceptable levels of pollution? *In giving your answer, consider physical, climatological, biological, social, and ethical reasons.*

Because it's in the air, and it can be caused by natural disaster. Somethings can't be controlled. People can't afford it and it can affect the economy.

