

Toxin or Toxic?

The *Textbook of Modern Toxicology* states, “A toxin is produced by a living organism... Toxins, whether produced by animals, plants, insects, or microbes are generally metabolic products that have evolved as defense mechanisms for the purpose of repelling or killing predators or pathogens.”

Toxins are natural products such as the ones found in poisonous mushrooms, or in a snake's venom. Toxicants (or “toxics”) are synthetic products, artificial products introduced into the environment due to human activity; examples are industrial waste products and pesticides.

Toxins: are from biological sources only. They are a poisonous substance produced by living cells or organisms.

- Peptides or proteins produced by living organisms.
- Venoms are toxins injected by a bite or sting (e.g. bees, snakes).

If the invading organisms excrete chemicals which are the basis for their toxicity, the excreted substances are known as biological toxins. In that case, the organisms are called toxic organisms. A specific example is tetanus. Tetanus is caused by a bacterium, *Clostridium tetani*. The bacteria *C. tetani* itself does not cause disease by invading and destroying cells. Rather, a toxin (neurotoxin) that the bacteria excrete travels to the nervous system and produces the disease.

A toxic chemical or toxic substance is simply a material that has toxic properties. It may be a discrete toxic chemical or a mixture of toxic chemicals. For example, lead chromate, asbestos, gasoline, PFAS, bisphenol A are all toxic substances. More specifically:

- Lead chromate is a discrete toxic chemical.
- Asbestos is a toxic material that does not have an exact chemical composition but comprises a variety of fibers and minerals.
- Gasoline is a toxic substance rather than a toxic chemical in that it contains a mixture of many chemicals. Toxic substances may not always have a constant composition. The composition of gasoline varies with octane level, manufacturer, time of season, and other factors.

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