

STEM *Sims*™

# Agent Impact



# Agent Impact

**Do you need an idea for a scientific study?  
Try out one of our ideas or make one of your own.**

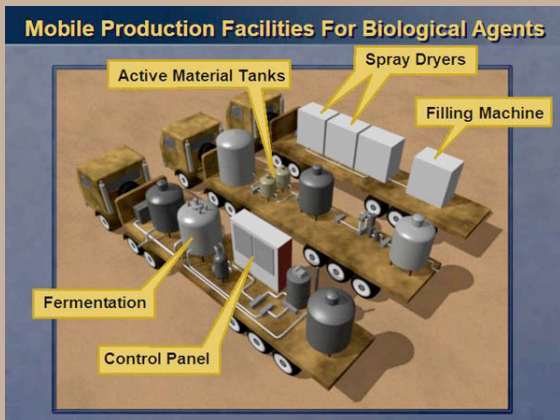
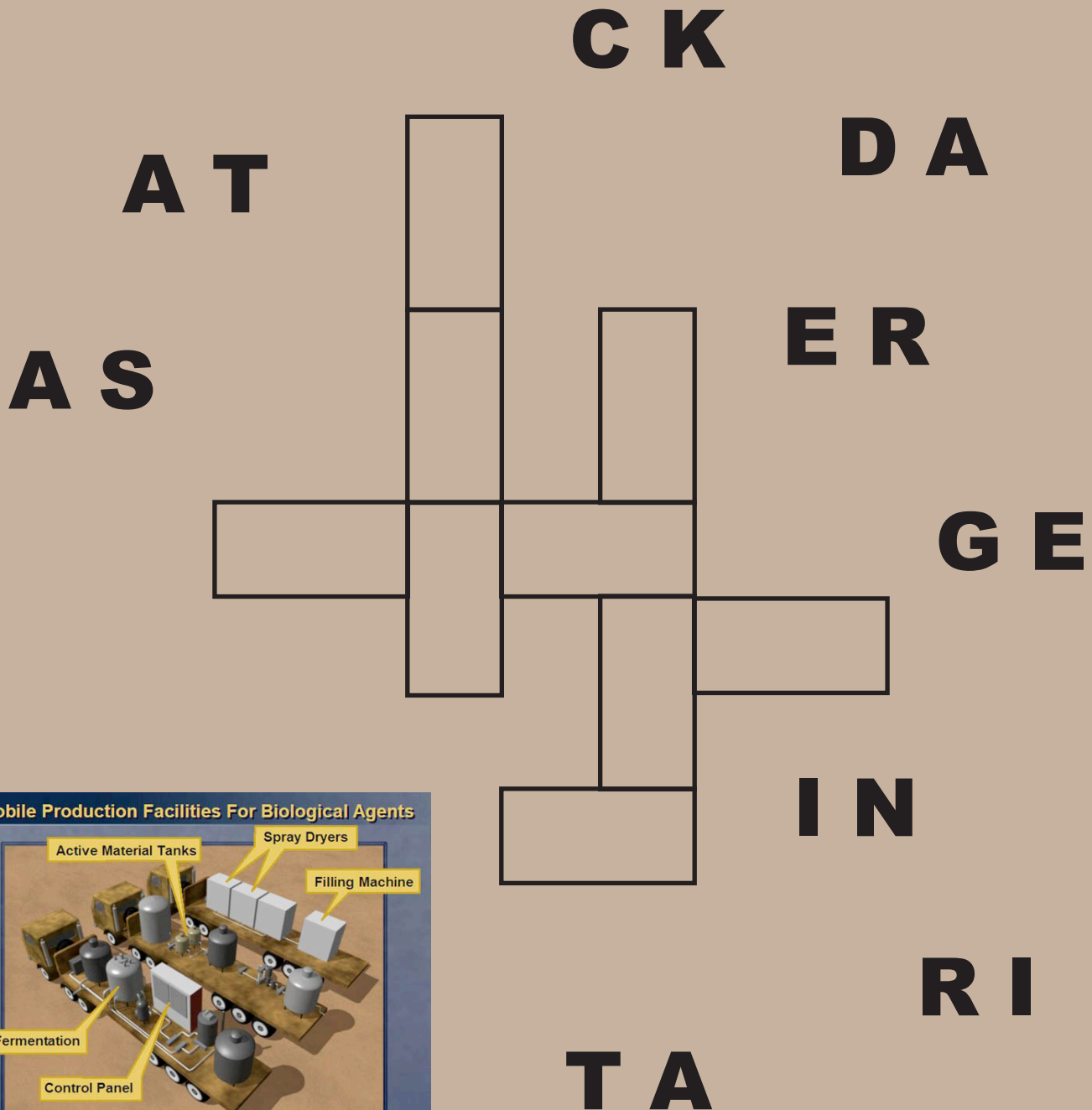
**Start learning right now about how the use of biological and chemical agents can impact human health. Take the following brief quiz to see how much you already know about biochemical attacks. See the bottom of page 4 to check your answers.**

1. Assuming equal amounts of each, which substance is the most deadly to humans?
  - a. cyanide
  - b. strychnine
  - c. arsenic
  - d. botulinum
2. Anthrax was first made into a weapon of war during the:
  - a. 1910's.
  - b. 1940's.
  - c. 1970's.
  - d. 1990's.
3. The United States Postal Services currently uses gamma irradiation to treat some mail as a precaution against anthrax attacks.
  - a. true
  - b. false
4. Anthrax spores from dead animals buried for over 70 years have been known to cause new infections in other animals.
  - a. true
  - b. false
5. A chemical extracted from castor beans was investigated by the U.S. Defense Department as a possible coating for bullets and shrapnel.
  - a. true
  - b. false



## Puzzling Problem

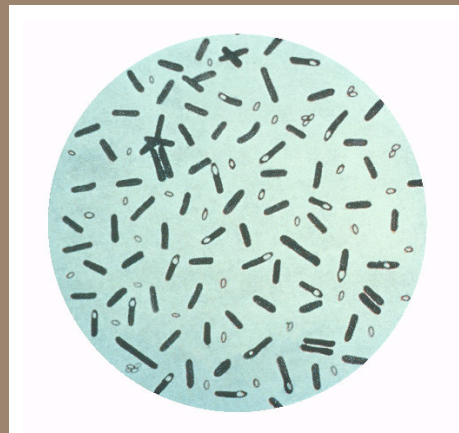
Arrange the tiles to complete the puzzle. Each tile is a pair of letters found around the puzzle. All of the words are related to biological and chemical agents used as weapons. See the bottom of page 4 to see the list of words used to complete the puzzle.



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## Putting It Out There

A number of biological and chemical agents are extremely deadly even in low dosages. The good news is that many of them are very hard to convert to a form that can easily be dispersed over large areas. So while botulinum toxin is the deadliest substance known, the substance is very hard to change into a vapor that could be widely spread through the air. The botulinum toxin is about 30,000 times more deadly than cyanide. In fact, 0.00007 grams, which is much smaller than a grain of sand, is the lethal dose for humans. Experts estimate that one teaspoon of botulinum toxin could kill over one billion people!



Anthrax, on the other hand, can be converted to a form that a person could spread over a wide area. If inhaled, anthrax can be a very deadly toxin. Terrorist attacks using anthrax have occurred resulting in a limited number of fatalities. However, the preparation of anthrax for inhalation takes high-tech equipment to which few people have access. One such attack in the United States in 2001 led to 22 infections and 5 deaths. For this reason, certain practices such as crop dusting and other broad-scale applications of chemicals have been closely monitored by the government and law enforcement agencies.

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**Answers:** Page 2 Answers: 1) d, 2) a, 3) a, 4) a, 5) a, the toxic substance is called ricin. Page 3 Puzzling Problems Answers: attack, ricin, danger, gas, ER.

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