



Every 20 seconds, a person in the developing world – usually a child – dies from diseases caused by polluted drinking water. But this heart-breaking issue extends even to rich countries like Canada, where water contaminated by animal waste has been a problem.

Through basic information and challenging activities, these junior high (grade 7-9) science resources are intended to teach students principles around water stewardship and water treatment, while adhering to government education guidelines. Learn about Samaritan's Purse's work helping families get safe water and involve your students in thinking about world water issues and how to solve them.

TREATMENT OPTIONS:

3. CHLORINATION

Chlorine acts as a powerful disinfectant when used on its own, as sodium hypochlorite (bleach) or as calcium hypochlorite. Added to water in tiny quantities – six drops in bleach form is enough to disinfect four liters of water – chlorine quickly kills bacteria and other microbes. In fact, putting chlorine in drinking water (in Canada, this began in the early 1900s) is a major reason for the end of typhoid fever epidemics, which killed thousands of people in the 1800s.

In addition to purifying water, chlorine helps remove unpleasant tastes and odors, controls the growth of slime and algae in pipes and storage tanks, and helps remove unwanted nitrogen compounds from water. In Europe, more than 90 per cent of drinking water is chlorinated. In white powder form (called calcium hypochlorite). It's also used as a disinfectant in swimming pools.

In the developing world, people who collect drinking water from lakes, rivers or wells are able to disinfect it using a water storage container and bottle of chlorine liquid or a packet of solid treatment chemicals. The chemicals are measured into the water container. Point-of-use treatment is certainly not as convenient as centralized treatment, but evidence shows this simple, low-cost method reduces the risk of disease and death.

Cancer controversy

There is controversy about chlorine's long-term health effects. During the 1970s, it was discovered chlorine and materials found naturally in water, such as decomposing plant and animal materials, can combine to create compounds which can increase the risk of rectal, colon and bladder cancer.

However, there are considerable differences of opinion on how great that risk is. And the consensus for developing nations, with their huge numbers of deaths and illnesses from water-related diseases, is chlorine remains among the best treatment options available.

Nonetheless, alternatives should be constantly considered to reduce the potential for adverse health effects related to chlorine.



Benefits, Drawbacks and Appropriateness

The benefits of chlorine are:

- Easy to use.
- Widely available.
- Works quickly, so appropriate in emergency relief situations.
- Effective in many ways.

The drawbacks of chlorine are:

- Potential cancer-causing agent.
- Muddy, silty water can reduce chlorine's effectiveness.
- Affordability, due to its ongoing cost.
- Must have reliable supply, so not always appropriate in remote areas.

Suggested activities

- Organize a TV-style debate over this question: when do potential long-term health problems overrule short-term benefits when it comes to safe water?
- Ask students to research the water they drink from their tap and any bottled water they or their families might buy. Is it chlorinated? If yes, what does the bottler and/or their municipality say about the safety of this water?

Sources: Samaritan's Purse Canada, www.turnonthetap.ca
The Toronto Star, Nov. 21, 1999
Euro Chlor, representing the chlor-alkali industry in Europe
Triangular Wave Technologies