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Water Quality Quiz

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Here is a quiz for anyone who drinks water, has indoor plumbing, pays water bills, or votes on water improvement bonds. True or False:

1. If it were not for manmade pollution, it would not be necessary to treat drinking water.

2. It is a state law in Texas that all water used in a residence must receive treatment.

3. Municipal water treatment is basically the same procedure as it was 50 years ago.

4. Only chlorine and fluoride may be added to municipal water supplies.

5. Municipal water users not only pay to have water treated before it is used, but also pay the cost of treating it as waste water.

6. Many cities spend more money to improve the aesthetic quality of the water than to guarantee its safety.

7. There are laws in Texas which prohibit municipal waste water from being reused.

8. The type of water treatment retquired of Texas cities is determined by their population.

9. The only way to meet future water demands is to increase the size of water treatment plants.

10. Texas water supplies are particularly susceptible to potentially harmful contamination.

1. False. Even though water that condenses and falls as rain is relatively pure, as soon as the rain strikes the ground, it begins to acquire properties that are not desirable in a water supply.

Obvious to any observer is the suspended matter--mud, silt, leaves--that give water an unattractive look. Usually invisible are the organic compounds leached from vegetable matter in the soil or on the surface of the ground over which the water flows. These organic compounds may be causes of undesirable tastes and odors.

Less readily detected by the customer are the dissolved chemicals and minerals in the water. These are occasionally detected by taste but most often are known by the "hardness" they give the water. The water also picks up millions of microscopic organisms--bacteria, molds, viruses, or algae. Many of these organisms are harmless and may actually be helpful to mankind, but others cause disease.

A great number of man-caused pollutants do flow into Texas lakes, rivers, and streams. Industrial plants discharge formidable amounts of improperly treated wastes each day. Other major sources of water pollution are sewage treatment plants, septic tanks which are improperly installed or operated, runoff from agricultural land, flooding from uncontrolled development in flood plains, urban storm runoff, and runoff from landfills and dumps.

2. False. Many rural homes in the state use groundwater from springs and wells. These private systems are not regulated and are, more often than not, untested and untreated. Water from deep wells is usually safe, but there is a wide range of quality. Water from shallow wells can become contaminated from septic tanks or polluted surface waters.

All water distributed by public water systems must meet standards set by the Texas Department of Health which defines a public system as a water distribution system with four or more service connections or at least 25 users daily for at least 60 days each year.

3. True. The basic steps of municipal water treatment--sedimentation, filtration, and disinfection--are the same as they were fifty years ago. In fact, the principals, methods, and materials for treating water have remained remarkably similar from the first recorded date of man treating water in 2000 B.C. to the present time.

The earliest treatment methods included filtration and disinfection (boiling). Removing impurities in water by filtering the water through sand has been practiced for thousands of years, and even today sand and gravel are the most widely used filters in water treatment.

4. False. Millions of tons of chemicals are used each year in the treatment of drinking water for Texans. Yet of all chemicals added to the water, only a small amount remains; the great majority settle out as sludge in the clarifying process.

Dallas adds activated carbon to control tastes and odors, chlorine to kill bacteria and prevent growth of algae, lime to soften, ferric sulfate to help settle suspended matter, fluoride to help protect children's teeth from decay, sodium hexametaphosphate to control corrosion, and ammonia to mask the taste of chlorine.

5. True. Just as the purpose of municipal water treatment is to remove potentially harmful or unappealing contaminants for human consumption, so the purpose of waste water treatment is to remove those contaminants which might be harmful to the environment.

Treatment of the waste water is not only necessary to protect the environment, it is required by law. The Federal Water Pollution Control Act was passed in 1972 to prevent municipal, industrial, and agricultural wastes from further desecrating "the chemical, physical, and biological integrity of the nation's waters."

The act places stringent regulations on the quality of water that municipal water treatment plants will be allowed to discharge by 1985.

If present laws, technology, and methods remain unchanged, many Texans in the future will pay more for waste water treatment than for the treatment of their drinking water.

6. True. Modern Texans are very particular about their drinking water. They expect it not only to be free from harmful bacteria, but also to be aesthetically pleasing. It should have little or no color, cloudiness, taste, or odor. It should be free from excessive organics and minerals and should not be extremely corrosive. Water temperature should be moderate to low; and the water should not contain gases such as methane and hydrogen sulfide.

7. False. Not only is waste water reused in Texas, but waste water is actually purchased from some cities by farmers for irrigation and by power companies for cooling purposes. Other cities use treated waste water for recreational water, and certainly a user downstream from any other user is reusing waste water.

8. False. Water treatment required by the state depends upon the quality of the water source--not on the population served by the water system.

A disinfectant such as chlorine is required no matter how pure the water source. This procedure protects the water as it moves through the distribution system.

The Edwards Underground Reservoir which supplies water for San Antonio is an example of a city water supply requiring no treatment other than disinfection.

9. False. There are alternatives to increasing water treatment facilities. The adoption of water conservation measures in homes and industries would cut the per capita water use and therefore ease the demand on water and waste water treatment facilities.

Other alternatives to increasing water treatment facilities take into consideration the fact that even though the average person uses 175 gallons of water per day, he drinks less than one-half gallon each day. The impractical aspects of treating 175 gallons to a high degree of purity when only a half gallon is needed has prompted the consideration of several alternatives to present day policy of treating all municipal water to drinking water quality.

Two of the most viable alternatives, according to Harold Wolf, Head of the Environmental Engineering Division, Civil Engineering Department, Texas A&M University, are dual distribution systems and household treatment devices. A dual system would deliver to each residence and business a high purity water for drinking and cooking. Another system would deliver a less pure--but still safe as far as acute health problems are concerned--water for uses such as toilet flushing and lawn watering. Although dual systems cannot now be economically installed in existing urban areas, they can be built into new developments.

Household treatment devices can be installed on household water lines to provide a high quality water for cooking and drinking. Household devices are subject to misuse, and effective control would be very difficult. The Environmental Protection Agency (EPA), however, is testing a variety of household treatment devices, and both dual systems and household devices remain serious alternatives to present practices of treating all municipal water.

Wolf cites priority uses of a total water system as another alternative to increasing water and waste water treatment. In this system water is used and reused in the order of quality needs. First, high quality water is used in households, then reused in applications in which lower quality water is suitable. Overall, treatment would be far less than that required to completely clean all water used to drinking water quality.

10. True. According to Bill Batchelor, a civil engineering professor at Texas A&M University, Texas water supplies are particularly vulnerable to synthetic organics contamination. He cites high concentrations of agricultural, petrochemical, and petroleum refining industries in the state as potential sources of the organics.

The Environmental Protection Agency has studied drinking water of cities around the country to determine if dangerous organic compounds are present in community drinking water and to evaluate the health significance of these compounds. An EPA report released in 1974 found drinking water in some American cities containing low levels of several dangerous organic compounds such as chloroform. In fact, small quantities of 66 different organic chemicals were found in one city's water supply.

In a project funded by the Texas Water Resources Institute, Batchelor is studying the degree to which Texas water supplies are contaminated with synthetic organics. The completed project will also provide a basis for designing treatment systems to control those organics.

Time To Tally

If you answered eight or more questions correctly, go reward yourself with a tall glass of high quality water.

A score of seven or under could mean that you have not fully appreciated the technology responsible for your safe and appealing drinking water. You might want to contact the Environmental Protection Agency, 1201 Elm Street, Dallas, TX 75202 for more information on water and waste water treatment.

As population and demands for water increase, Texans will be called upon to make many decisions regarding water treatment and water quality. Answers will not be simple and should not be made without an understanding of the issues involved.