The Water-Treatment Process

(Grades 5-12, Suggested Time: 20-30 minutes)

Before people can safely use water, it must be found, treated, and transported to households. The treatment piece of this process is called the **water-treatment process.** The water treatment process involves four steps, in this order: coagulation, sedimentation, filtration, and disinfection. This activity focuses on vocabulary and teaching students the basic principles of the water-treatment process. Students will learn what happens in each step of the water-treatment process and, based on this knowledge, figure out the order in which these steps occur.

Materials

- Marker and whiteboard/chalk and chalkboard
- Water process name cards (included in activity)

Instructions

Part One: Introduction

- Ask students where they get their water from at home. Answers will probably include faucets and hoses. Do any of the students get water straight from a lake or river? Why or why not? What are some issues with getting water straight from an open body of water? Answers should include health reasons, convenience, etc. If you need to prompt answers, ask about what sorts of things are found in lakes (runoff, animals, chemicals, bacteria, etc.).
- Explain that many things must happen to water before it reaches our homes. Water must go through a process to make water **potable**, or safe for drinking. That process is called the **water-treatment process.**

Part Two: Vocabulary

- Write each of the steps on the board as a *backwards* list (see below). Make sure to leave enough space in between each term to write the students' guesses and the actual definition under each.

Backwards	Correct Order
Disinfection	Coagulation
Filtration	Sedimentation
Sedimentation	Filtration
Coagulation	Disinfection

- Ask students what they think each term means and write down their definitions under the terms on the board. Encourage a lot of guesses and creativity. To prompt guesses, break the words down and ask what they think each part of the word means (i.e. coagulation, sedimentation, filtration, disinfection). When all the terms are covered, tell students the real definitions and write them on the board.
- The students' age level should determine the level of detail you go into with the definitions. With high school students there is more freedom to go into detail about chemical processes.

Backwards Chart

Term	Middle School	High School
Disinfection	After you remove all of the bigger, harmful stuff you can see, you need to remove harmful stuff you can't see, like germs. Using different methods, such as adding chemicals, water is disinfected.	The use of chemical and/or other means like UV radiation to kill potentially harmful microorganisms and pathogens in the water.
Filtration	Water flows through another material in order to catch the smallest pieces of dirt- the material removes the dirt from the water by allowing the water to pass through, but not the dirt. For example, when adults make coffee they use a filter to catch the grounds. The water can pass through the filter, but the grounds cannot.	The process of passing a liquid or gas through a porous article or mass (paper, membrane, sand, etc.) to separate out a solution (when some matter is dissolved in something else).
Sedimentation	As water travels through a tank, gravity causes the clumps of dirt to fall to the bottom. The dirt is removed from the water because the water continues to flow, while the dirt remains at the bottom of the tank.	As water travels through a tank, gravity causes the clumps of dirt to fall to the bottom. The dirt is removed from the water because the water continues to flow, while the dirt remains at the bottom of the tank.
Coagulation	Alum and other chemicals are added to the water, forming "floc," which are tiny particles that dirt in the water sticks to like glue. Coagulation is important because the dirt forms into big clumps, heavy enough to sink to the bottom.	The purpose of coagulation is to create dirt clumps that are heavy enough to sink, which is important for the next step in the process. Alum and other chemicals are added to the water, forming "floc"- tiny, sticky particles. Dirt in the water sticks to these particles, forming clumps.

Part Three: Applying Vocabulary

- Now that students know the definition of each step in the water-treatment process, select four volunteers from the class. Have them come to the front of the room and hand each of them a water process name card. Have them line up and introduce themselves to the rest of the class as their respective step in the water treatment process.
    - *NOTE:* The name cards should NOT be in the correct order when you hand them out to the volunteers at the front of the room.
- Have the class decide what the order of the steps should be by having them direct the volunteers to get into the proper order.
    - If they need help, refer to the definitions on the board. Make sure to ask WHY a student makes a particular suggestion—don't let students just shout out suggestions without support for their ideas.

Sedimentation

Coagulation

Filtration

Disinfection