Potable water: Worksheet 10.2.1

Sterilising water and potable water

1. Thames Water provides more than 1000 dm3 water to each of their 8.8 million customers every week. The diagram shows the stages of water treatment carried out by Thames Water.

The water is filtered through beds of coarse sand, and then fine sand.

The water is disinfected by adding less than 1 mg/dm3 chlorine.

Rainwater is collected and stored in aquifers and reservoirs.

The water is screened by passing it through a sieve to remove any debris.

Water is pumped to homes through pipes and pumping stations.

a. What type of debris is removed by screening?

b. Why is the water passed through a bed of coarse sand followed by a bed of fine sand?

c. Why is chlorine added?

d. What volume of water does Thames Water treat per day?

2. Chlorine, ozone and ultraviolet light can be used to sterilise water supplies. The table shows different types of microbes and the exposure time needed to kill 100% of them using ultraviolet light.

|  |  |  |
| --- | --- | --- |
| **Type of microbe** | **Microbe** | **Exposure time (s)** |
| Bacteria | Dysentery bacteria | 0.15 |
| Bacteria | *E.coli* | 0.36 |
| Bacteria | *Salmonella* bacteria | 0.53 |
| Virus | Influenza virus | 0.23 |
| Virus | Polio virus | 0.80 |
| Mould spore | Penicillium | 2.93 |

a. Why is it important to use the same frequency and wattage of ultraviolet light for each test?

b. Which microbes will be killed by an exposure time of:

(i) 0.50 seconds?

(ii) 0.75 seconds?

c. *E.coli* is commonly found in the intestines of animals. Why are water supplies tested for the presence of *E.coli* bacteria regularly?

d. The wavelength of ultraviolet light used for these results was 254 nm (1 nm = 1 × 10−9 m). What is the wavelength of the ultraviolet light in:

(i) metres?

(ii) centimetres?