



Untreated human waste contains all the known human pathogens and is also referred to as raw sewage, which is considered to be hazardous. Raw sewage contains the following pathogens³:

Organism	Type of pathogen	Concentration (millions per litre)
Total coliform	Bacterium	$10^5 - 10^6$
Faecal coliform	Bacterium	$10^4 - 10^5$
Faecal streptococci	Bacterium	$10^3 - 10^4$
Enterococci	Bacterium	$10^2 - 10^3$
Salmonella ²	Bacterium	$10^0 - 10^2$
Pseudomonas aeruginosa	Parasite	$10^1 - 10^2$
Clostridium perfringens	Bacterium	$10^2 - 10^3$
Mycobacterium tuberculosis	Bacterium	Present
Protozoan cysts	Parasite	$10^1 - 10^3$
Giardia cysts	Parasite	$10^{-1} - 10^2$
Cryptosporidium cysts	Parasite	$10^{-1} - 10^1$
Helminth ova	Parasite	$10^{-2} - 10^1$
Enteric virus	Virus	$10^1 - 10^2$

Every waste water treatment process reduces the number of micro-organisms³. However, even after the best possible biological treatment, there still remain high numbers of pathogenic micro-organisms in the treated wastewater. To render the waste water effluent safe for discharge into a public stream or river, some additional treatment, such as disinfection, is required.

Why Disinfection?

The disinfection treatment process will **remove or inactivate pathogenic micro-organisms**. Not all organisms are killed during disinfection, as is the case with water sterilization. The purpose of disinfection is to kill or inactivate all the primary micro-organisms, such as bacteria, viruses and protozoan cysts.

There are many methods for disinfecting waste water effluents, such as:

- 💧 Natural processes (predation and normal death)
- 💧 Environmental factors (salinity and solar radiation)
- 💧 Methods with certain industrial applications (ultrasound and heat)

The general methods best used for waste water disinfections includes:

- 💧 Chlorine disinfection
- 💧 Bromine, bromine chloride and iodine
- 💧 Ozone
- 💧 Ultraviolet radiation

References: Water Institute of Southern Africa (2002): Handbook for the operation of wastewater treatment plants Metcalf and Eddy Inc. (1991). Wastewater Engineering: Treatment, disposal and reuse. Third Edition