

1. What does the term combined sewers cover?
 - a) Sewers combine the dwellings in a settlement
 - b) Both black water and grey water runs in the sewers
 - c) **Rainwater runs together with domestic wastewater in the sewers**

2. Which environmental effects may domestic wastewater have if let out untreated to surface water?
 - a) **Eutrophication**
 - b) **Ecosystem disturbance**
 - c) **Spreading of antibiotic resistance genes**
 - d) Acidification
 - e) Algae death
 - f) **Dead sea bottom**
 - g) None, only industrial activities have environmental effects

3. Which microorganism may be found in domestic wastewater?
 - a) Coliforms only
 - b) Coliforms and Enterococci
 - c) **Any kind of enteric microorganism**

4. What is a major concern regarding the microbial content in wastewater?
 - a) They may cause algae bloom
 - b) They take up the oxygen in the recipient and cause oxygen depletion
 - c) **They include pathogenic organisms**
 - d) **They include antibiotic resistant organisms that may transfer antibiotic resistance genes to natural organisms in the recipient**

5. Which constituents may cause eutrophication and dead sea bottom?
 - a) **Nitrogen, phosphorous and organic matter**
 - b) Anthropogenic compounds
 - c) **Only nitrogen**
 - d) **Only phosphorous**
 - e) **Only organic matter**
 - f) Medical residues and PPCP's

6. Which wastewater constituents have conventional wastewater treatment plans been optimized to remove?
 - a) Pharmaceuticals and personal care products (PPCP's)
 - b) **Nutrients (P and N)**
 - c) **Organic matter (COD/BOD)**
 - d) Medical residues
 - e) **Particles**
 - f) Heavy metals
 - g) **Microorganisms**

7. Primary treatment refers to:

- a) Treatment of prime quality with effluent of drinking water quality
 - b) The first and most simple treatment step in a conventional treatment plant in which larger particles are removed**
 - c) Treatment which should be prioritized above other treatments
8. Removal of medical residues is obtained most efficiently by:
- a) Primary treatment
 - b) Secondary treatment
 - c) Tertiary treatment
 - d) None of the above, conventional treatment plants are inefficient in removal of medical residues**
9. Significant reduction of microbial content is obtained most efficiently by:
- a) Flocculation and removal of sludge
 - b) Primary treatment
 - c) Secondary biological treatment**
 - d) Disinfection**
10. Cold temperatures affect treatment the following ways:
- a) Particles sediment faster
 - b) Bacteria die off faster
 - c) Particles sediment more slow**
 - d) Pathogens survive longer**
 - e) Filtration happens more slowly**
 - f) Biological treatment slows down**
11. Freezing and freeze thaw cycles may be useful for treatment of blackwater and sludge due to:
- a) Dewatering effects
 - b) Efficient reduction of gram negative bacteria**
 - c) Efficient removal of viruses
 - d) Energy production
12. The main reasons for not having wastewater treatment in Greenland and Svalbard are:
- a) It is impossible
 - b) No technology has been developed yet to cope with the conditions
 - c) Conventional technologies are very expensive to implement and run in small remote communities**
 - d) No environmental effects have been observed
- 13. What are the favorable chemical properties of contaminants in solved sewage?**
- a. Lipophilic
 - b. Hydrophilic**
 - c. Neutral
- 14. What is the origin of the majority of the contaminants identified in Arctic sewage?**
- a. Human consumption**

- b. Long-range transport
- c. Industry**
- d. Veterinary applications
- e. Agriculture

15. How are Sewage related contaminants behaving in the Arctic aqueous environments compared middle latitude regions?

- a. Prolonged life time**
- b. Spread wider quicker in the surface water
- c. Slow microbial transformation**
- d. More effective photochemical transformation
- e. Seasonal transformation pattern**

16. What are the major challenges of sewage related pollutant release in the Arctic?

- a. Local water pollution**
- b. up-take in fish caught for local consumption**
- c. Change in the local biosphere composition
- d. Temperature increase in the recipient water

17. Identify the major water pollutants in Arctic water

- a. Organic pollutants**
- b. Metals**
- c. Pathogens**
- d. Nutrients**

18. Identify the sources for water pollutants in the Arctic

- a. Domestic activities**
- b. Municipal activities**
- c. Industrial activities**
- d. Tourism**

19. How are pollutants detected?

- a. Visual inspection**
- b. Laboratory based analysis**
- c. Field sample analysis**
- d. Remote sensing**

20. What is heat pollution?

- a. Continuous high temperature release into the aqueous environment**
- b. Heated wastes destroy the cleaning process in the treatment plant
- c. Chemical reactions producing heat which in turn reduces the effectivity of the biofouling in sewage treatment plants
- d. High ambient temperatures reduce the effectivity of drinking water / sewage treatment

21. Why is unretained pollution release into Arctic environments of special concern for environmental risk assessment?

- a. Low biotransformation in cold aqueous environments**
- b. No photochemical transformation in winter (polar night)**
- c. Extended life time of otherwise readily degradable substances**
- d. Higher emission rates in untreated Arctic waste waters

- 22. What factors determine the amount of released pollution into Arctic aqueous environments?**
- Human population density**
 - Treatment technology**
 - Ambient temperatures**
 - The pollutants environmental stability**
- 23. How are pollutants from water treatment effecting the local environment?**
- Toxic effects on local organisms**
 - Adaptation of the local micro fauna (resistance to chemical pollution)**
 - Influencing the oxygen demand in the micro fauna and flora**
 - Increasing the water temperature
 - Contributing to increased algae growth
- 24. What consequences can local pollution from sewage have on local people?**
- Pollution of local food resources**
 - Transfer of diseases**
 - Abundance of fish for local food supply
 - Introduction of new fish species as local food source
- 25. What cofounding factors are influencing the pollution release and effects in the Arctic environment**
- Climate change**
 - Technology and processing strategies**
 - Population density**
 - Water quality
- 26. How can sewage and sewage sludge be utilized in a sustainable way?**
- Soil amendment**
 - Fertilizer**
 - Biogas production**
 - Electric power production