

NATURAL POLLUTION BY SOME HEAVY METALS IN THE TIGRIS RIVER

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How polluted is the Tigris River? A study published this April in the journal *Water* found that the Tigris in Baghdad contained unhealthy levels of fecal coliform bacteria — about three times what the Environmental Protection Agency considers safe for domestic water supplies in the United States.

What are the natural sources of heavy metals pollution? Heavy metals are well-known environmental pollutants due to their toxicity, persistence in the environment, and bioaccumulative nature. Their natural sources include weathering of metal-bearing rocks and volcanic eruptions, while anthropogenic sources include mining and various industrial and agricultural activities.

What are the heavy metals in river pollution? Heavy metal ions can be introduced into the water through several point and non-point sources including leather industry, coal mining, agriculture activity and domestic waste. Regrettably, these toxic heavy metals may pose a threat to both humans and animals, particularly when they infiltrate water and soil.

What is a source of heavy metal pollution in water? There are several natural and anthropogenic activities responsible for the heavy metal contamination of water. Industrial sources, including coal washery, steel industry, food processing industry, plastic processing, metallic work, leather tanning, etc., are responsible for heavy metal contamination in water.

Is the Tigris River drying up? In recent years, a significant and unprecedented decline in water flow has been clear in both the Euphrates and the Tigris, and tributary rivers and lakes have dried up in several governorates.

Where is the most polluted river in the world? Ganges River But the further the river gets into India, the dirtier it gets. Overall, the Ganges absorbs more than a billion gallons of waste each day — making large stretches unrecognizable. Seventy-five percent of this is raw sewage and domestic waste.

Why is heavy metal pollution a problem? Effects. The effects on human health and the environment from exposure to the three most common heavy metal pollutants (mercury, lead and cadmium) include: Mercury exposure can harm the brain, heart, kidneys, lungs, and immune system of people of all ages.

What do heavy metals do to the body? Several acute and chronic toxic effects of heavy metals affect different body organs. Gastrointestinal and kidney dysfunction, nervous system disorders, skin lesions, vascular damage, immune system dysfunction, birth defects, and cancer are examples of the complications of heavy metals toxic effects.

How can we stop heavy metal pollution? Microbial remediation The utilization of specific microorganisms for adsorption, sedimentation, oxidation, reduction and other treatment of soil can effectively remove heavy metals in soil. On this basis, appropriate microbial remediation technology is studied and applied to various environmental pollution problems.

Which metal is the most polluting water? Toxic organic substances like arsenic and mercury cause water pollution. Arsenic contamination of groundwater is now a major problem. Arsenic poisoning first produces skin disease, leading to gangrene and cancer. It also causes many other complications such as blindness, liver and heart problems, diabetes and goitre.

What are the sources of heavy metals in rivers? The presence of these heavy metals on the surface of the water can be due to natural or anthropogenic activities. In natural activities, weathering of rocks that contain metals, an eruption from volcanos, fires in the forest, and naturally occurring processes of weathering can be

included.

What are the most common heavy metals in drinking water? Drinking water contaminated with heavy metals namely; arsenic, cadmium, nickel, mercury, chromium, zinc, and lead is becoming a major health concern for public and health care professionals.

Does boiling water remove heavy metals? However, boiling or disinfection will not destroy other contaminants, such as heavy metals, salts, and most other chemicals.

How to remove heavy metals from water? Reverse osmosis (RO) can be used to reduce many heavy metals in water, such as chromium, copper, lead, and arsenic. RO technology uses added pressure to push water through a semipermeable membrane, which blocks contaminants larger than 0.0001 micrometers from passing through while allowing water molecules free passage.

What are the natural sources of heavy metals? Rocks and soils are the principal natural sources of heavy metals in the environment. The primary rocks, which are called magmatic or igneous rocks, crystallize from magma upon cooling down.

What are the problems with the Tigris and Euphrates River? Climate Change Impacts. Over the past decades, the flow in the Euphrates-Tigris River system has decreased to almost half of the average annual flow during dry years. The water levels in the Euphrates are currently at one of their lowest points in recorded history.

Are there sharks in the Tigris River? Bull sharks have been recorded in the Tigris River since at least 1924 as far upriver as Baghdad, and has been rumored to also inhabit the Cahora Bassa lake upstream of the Zambezi. The species has a distinct preference for warm currents.

How polluted is the Euphrates? The classification of the river for drinking use was reduced from good to polluted for 1998 and 2010 respectively. For industrial use, the quality degraded from acceptable to severely polluted for 1998 and 2010 respectively.

What is special about the Tigris River? The Tigris River is one of the most important waterways in the Fertile Crescent, and has supported cities like Hasankeyf, Turkey, for centuries. Surrounded by four countries (Iran, Iraq, Turkey,

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and Syria), the Tigris River is the second largest river in western Asia.

Unit 22: Research Methodology for Health and Social Care

Question 1: What is the purpose of research methodology in health and social care?

Answer: Research methodology provides a systematic and structured approach to conducting research in the health and social care field. It helps researchers design, implement, and evaluate research studies to ensure the validity, reliability, and accuracy of the findings.

Question 2: What are the key principles of research methodology?

Answer: The key principles include: objectivity (avoiding bias), ethics (ensuring ethical treatment of participants), validity (measuring what it is intended to measure), reliability (ensuring consistent results), and generalizability (applying findings to a wider population).

Question 3: What are the different types of research methodologies in health and social care?

Answer: Research methodologies include quantitative (using numerical data), qualitative (using non-numerical data), mixed methods (combining quantitative and qualitative methods), and participatory action research (involving participants actively in the research process).

Question 4: What are the challenges of conducting research in health and social care?

Answer: Challenges include gaining access to sensitive data, ensuring participant confidentiality, addressing ethical and vulnerable population concerns, obtaining funding, and interpreting findings in a meaningful way.

Question 5: How is research methodology applied in health and social care practice?

Answer: Research methodology is used to inform evidence-based practice, improve service delivery, evaluate interventions, and develop policies. It enables practitioners

to make data-driven decisions, enhance patient and service-user outcomes, and contribute to the advancement of knowledge in the field.

Statistics Quiz Answers: Stats Portal NRCGAS

Paragraph 1: Questions 1-3

Q1: What is the mean of the following dataset: 5, 10, 15, 20, 25? Q2: What is the standard deviation of the dataset in Q1? Q3: What is the probability of rolling a 6 on a six-sided die?

Paragraph 2: Answers 1-3

A1: Mean = $(5 + 10 + 15 + 20 + 25) / 5 = 15$ A2: Standard deviation = 7.91 (approximately) A3: Probability = $1 / 6$

Paragraph 3: Questions 4-6

Q4: What is the null hypothesis in a hypothesis test? Q5: What is a Type I error? Q6: What is the p-value in hypothesis testing?

Paragraph 4: Answers 4-6

A4: The null hypothesis is the statement that there is no significant difference between the groups being tested. A5: A Type I error occurs when the null hypothesis is rejected, even though it is actually true. A6: The p-value is the probability of observing a test statistic as extreme as, or more extreme than, what was obtained, assuming the null hypothesis is true.

Paragraph 5: Question 7

Q7: What is the central limit theorem?

Answer 7

A7: The central limit theorem states that the distribution of sample means will be approximately normal, regardless of the distribution of the original population. This is true for large sample sizes.

Thermodynamics by Yunus Cengel: 3rd Edition Solution

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Question 1: A closed system undergoes an isothermal process during which its entropy increases by 2 kJ/K. If the temperature of the system is 300 K, determine the heat transfer during the process.

Answer: According to the Second Law of Thermodynamics, for a closed isothermal system, heat transfer (Q) is given by:

$$Q = T * \Delta S$$

Where T is the temperature and ΔS is the change in entropy.

Substituting the given values, we get:

$$Q = 300 \text{ K} * 2 \text{ kJ/K}$$

$$Q = 600 \text{ kJ}$$

Question 2: A heat engine operates between a heat source at 800°C and a heat sink at 200°C. Determine the maximum possible thermal efficiency of the engine.

Answer: The maximum possible thermal efficiency (η) of a heat engine is given by:

$$\eta = 1 - (T_{\text{sink}} / T_{\text{source}})$$

Where T_{sink} is the temperature of the heat sink and T_{source} is the temperature of the heat source.

Substituting the given values, we get:

$$\eta = 1 - (573 \text{ K} / 1073 \text{ K})$$

$$\eta = 0.469 \text{ or } 46.9\%$$

Question 3: A gas undergoes a polytropic process with $n = 1.2$. If the initial volume is 0.5 m³ and the final volume is 2 m³, determine the work done during the process.

Answer: For a polytropic process, the work done (W) is given by:

$$W = (P_1 * V_1 - P_2 * V_2) / (1 - n)$$

Where P_1 and V_1 are the initial pressure and volume, and P_2 and V_2 are the final pressure and volume.

Assuming an ideal gas, we can relate the pressures and volumes using $PV^n = \text{constant}$. Solving for P_2 , we get:

$$P_2 = P_1 * (V_1 / V_2)^n$$

Substituting the given values, we get:

$$P_2 = P_1 * (0.5 \text{ m}^3 / 2 \text{ m}^3)^{1.2}$$

$$P_2 = 0.354 * P_1$$

Now, we can calculate the work done:

$$W = (P_1 * 0.5 \text{ m}^3 - 0.354 * P_1 * 2 \text{ m}^3) / (1 - 1.2)$$

$$W = 0.177 * P_1 * V_1$$

Question 4: A mixture of two gases has a mass fraction of 40% for oxygen and 60% for nitrogen. Determine the molar mass of the mixture.

Answer: The molar mass (M_{mix}) of a mixture is given by:

$$M_{\text{mix}} = (x_1 * M_1 + x_2 * M_2) / (x_1 + x_2)$$

Where x_1 and M_1 are the mass fraction and molar mass of gas 1, and x_2 and M_2 are the mass fraction and molar mass of gas 2.

For oxygen (O_2), $M_1 = 32 \text{ g/mol}$ and $x_1 = 0.4$. For nitrogen (N_2), $M_2 = 28 \text{ g/mol}$ and $x_2 = 0.6$.

Substituting the values, we get:

$$M_{\text{mix}} = ((0.4 * 32 \text{ g/mol}) + (0.6 * 28 \text{ g/mol})) / (0.4 + 0.6)$$

$$M_{\text{mix}} = 29.6 \text{ g/mol}$$

Question 5: A steam turbine receives steam at a temperature of 500°C and pressure of 10 MPa. The steam expands isentropically to a pressure of 100 kPa. Determine the exit temperature and specific work output of the turbine.

Answer: For an isentropic process, the entropy of the steam remains constant. Using steam tables, we can find the specific enthalpy (h) of the steam at the inlet and outlet conditions:

$$h_1 = 3381.9 \text{ kJ/kg} \quad (T = 500^\circ\text{C}, P = 10 \text{ MPa})$$

$$h_2 = 2581.9 \text{ kJ/kg} \quad (T = ?, P = 100 \text{ kPa})$$

The specific work output (w) of the turbine is given by:

$$w = h_1 - h_2$$

Substituting the values, we get:

$$w = 3381.9 \text{ kJ/kg} - 2581.9 \text{ kJ/kg}$$

$$w = 800 \text{ kJ/kg}$$

To find the exit temperature, we can use the specific enthalpy and entropy at the outlet:

$$s_2 = 6.5876 \text{ kJ/kg-K} \quad (h_2 = 2581.9 \text{ kJ/kg}, P = 100 \text{ kPa})$$

Using steam tables, we find that the exit temperature (T_2) corresponding to this specific entropy and pressure is:

$$T_2 = 133.1^\circ\text{C}$$

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