

“Science is the art of asking precise questions of nature and using quantitative measurements to answer them — numbers matter.”

You report benzene at 3,240  $\mu\text{g/L}$ . Here's what that means and how serious it is.

#### Basic conversions and perspective

- 3,240  $\mu\text{g/L}$  = 3.24  $\text{mg/L}$  = 3.24 parts per million (ppm) = 3,240 parts per billion (ppb).
- Regulatory/comparison benchmarks for benzene in drinking water:
- US EPA Maximum Contaminant Level (MCL): 5  $\mu\text{g/L}$  (5 ppb). Your value is  $3,240/5 = 648$  times this limit.
- World Health Organization guideline: 10  $\mu\text{g/L}$ . Your value is 324 times that.
- European parametric value: 1  $\mu\text{g/L}$ . Your value is 3,240 times that.
- Benzene is a Group 1 carcinogen (IARC): there is sufficient evidence for its carcinogenicity in humans (notably leukemia with chronic exposure).

#### Toxicological implications (qualitative)

- Chronic risk is the principal concern: even relatively low concentrations of benzene in drinking water are associated with increased lifetime cancer risk; at thousands of  $\mu\text{g/L}$  the lifetime cancer risk is far above typical regulatory “acceptable” risk ranges.
- Acute toxicity from a single small-volume ingestion at this concentration is unlikely to be immediately life-threatening (for example, 2 L of water at 3.24  $\text{mg/L}$  contains  $\approx 6.5$  mg benzene), but symptoms like dizziness, nausea, or CNS depression can occur with higher acute doses and with inhalation of vapors.
- Volatilization is important: benzene is volatile and can transfer from water into indoor air (showering, cooking), producing potentially significant inhalation exposure even if ingestion is the only intended route. That can raise acute and chronic risks.

#### Practical advice (if this concentration is found in a water supply)

1. Immediately stop using the water for drinking and food preparation (do not boil — boiling will transfer benzene to air). Use bottled or alternative safe water.
2. Avoid prolonged showering or other activities that produce aerosols or vapors from the water in poorly ventilated spaces. Ventilate indoor spaces.
3. Notify local public health authorities/water utility and have the sample verified by a certified laboratory. This concentration is high enough to require regulatory action and site investigation.
4. For homeowners: consider point-of-entry remediation or whole-house measures only after expert assessment. Do not attempt remediation yourself without guidance.
5. For site cleanup: typical technologies for removing benzene from water include granular activated carbon (GAC), air stripping, advanced oxidation, pump-and-treat and bioremediation; choice depends on site specifics and regulations.

#### Bottom line (professor's summation)

3,240  $\mu\text{g/L}$  benzene in water is very high — hundreds to thousands of times above common drinking-water standards — and represents a serious public-health and environmental concern. Do not use the water for drinking or cooking, minimize inhalation exposure, and contact public-health/water authorities immediately for confirmation, investigation, and remediation.

If you want, I can (a) estimate a rough lifetime cancer risk using standard slope factors (with caveats), (b) outline specific remediation options and their pros/cons, or (c) draft wording for an advisory to inform occupants. Which would you like?