Arsenic by the Numbers

Compare drinking water measurements with state and federal limits

CHE.8.8 "Enrichment: Investigate parts per million and/or parts per billion as it applies to environmental concerns in your geographic region, and reference laws that govern these factors."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline both legal limits in the passage. Circle each tap sample above New Jersey's limit, then number the circled samples from lowest to highest concentration.

What Does 5 ppb Mean?

1. In central New Jersey, groundwater can carry arsenic released from natural rock. Public water systems that pump this water treat it and test the water people receive. Arsenic is measured in parts per billion (ppb): about one microgram per liter of water equals one ppb. Small numbers matter because long-term exposure can harm health.

2. Under the federal Safe Drinking Water Act, the arsenic limit for public drinking water is 10 ppb. New Jersey sets a stricter state limit of 5 ppb for its public systems. Since 1 ppm equals 1,000 ppb, the state limit is 0.005 ppm. Compare the fictional tap samples below with both limits.

FICTIONAL CENTRAL NEW JERSEY PUBLIC SYSTEMS

System	Arsenic in treated tap water (ppb)
A	3
B	6
C	9
D	12

3. A result above a limit calls for closer attention, but one sample alone does not establish a legal violation. Compliance depends on monitoring and how results are evaluated under drinking water rules. These public-system limits do not apply to a homeowner's private well. If a result is high, request follow-up testing and ask the water provider about treatment.

2 ANSWER WITH EVIDENCE

Use the passage

1. System B has 6 ppb of arsenic. How does its result compare with New Jersey's limit and the federal limit?

2. Convert System D's result to ppm. Is it above either numerical limit?

3. How many ppb below each limit is System A's result? Name the law behind the federal limit.

4. A classmate says System C's result is above the federal limit but below New Jersey's limit. Correct the comparison. Why can't this one sample prove a legal violation?

3 YOUR TURN

Your own words

Imagine a fifth public system has a tap sample of 7 ppb arsenic. In 3 to 4 sentences, convert the result to ppm, compare it with both limits, name a governing law, and suggest a next step without declaring a legal violation.

Arsenic by the Numbers

PART 1 · READ AND MARK

Underline both legal limits in the passage. Circle each tap sample above New Jersey's limit, then number the circled samples from lowest to highest concentration. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	System B has 6 ppb of arsenic. How does its result compare with New Jersey's limit and the federal limit?	**Its result is 1 ppb above New Jersey's 5 ppb limit and 4 ppb below the federal 10 ppb limit.**
2	Convert System D's result to ppm. Is it above either numerical limit?	**12 ppb is 0.012 ppm. It is above both the New Jersey and federal numerical limits.**
3	How many ppb below each limit is System A's result? Name the law behind the federal limit.	**System A is 2 ppb below New Jersey's limit and 7 ppb below the federal limit. The federal limit is set under the Safe Drinking Water Act.**
4	A classmate says System C's result is above the federal limit but below New Jersey's limit. Correct the comparison. Why can't this one sample prove a legal violation?	**System C's 9 ppb result is below the federal 10 ppb limit but above New Jersey's 5 ppb limit. A legal violation depends on required monitoring and how results are evaluated, not one sample alone.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

A 7 ppb arsenic result equals 0.007 ppm. It is above New Jersey's 5 ppb limit but below the 10 ppb federal limit set under the Safe Drinking Water Act. One sample cannot establish a legal violation, so I would request follow-up testing and ask the water provider about treatment.

For the marking job, accept circles around 6, 9, and 12 ppb, numbered in that order. Distinguish a result above a numerical limit from a confirmed legal violation.