# Concentrations Lab Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Period\_\_\_\_\_\_\_\_\_**

**1.**  1:10 **2.** 1:100 **3.** 1:1,000 **4.** 1:10,000

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\_\_\_\_pp\_\_

Color\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Density\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**5. \_\_\_\_\_\_\_\_\_\_\_\_\_ 6. \_\_\_\_\_\_\_\_\_\_\_\_\_ 7.\_\_\_\_\_\_\_\_\_\_\_ 8. \_**\_\_\_\_\_\_\_\_

Color\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Density\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**9. \_\_\_\_\_\_\_\_\_\_\_\_\_\_ 10. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 11.\_\_\_\_\_\_\_\_\_\_\_ 12. \_\_\_\_\_\_\_\_\_**

Color\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Density\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Parts Per Million Lab**

**Objective:**

To develop an understanding of the concept of parts per million (ppm) as a unit of measurement.

**Background:**

People are often concerned with materials in very small amounts or concentrations. Sometimes when discussing water or air, a scientist will have to discuss what is in the fluid in terms of parts per million (ppm) or parts per billion (ppb) because the amounts are so small. A concentration of 1 ppm corresponds to one part pollutant per one million parts of the gas, liquid, or solid medium it is found in. But just because these amounts are so small does not mean that they are unimportant. For example, fish like bass require a dissolved oxygen level of at least 4 ppm. The ambient air quality standard for pollutant sulfur dioxide (SO2) is 30 ppb.

Living things can be affected by very small amounts of materials in water. It is important to know the human tolerance level of a substance. As technology develops, people are able to use more sensitive equipment and testing techniques to detect tiny concentrations of contaminants in water. The smallest amount which can be detected is the detection limit. The smaller the detection limit, the more we know about what is in our water, and more can be done to keep our water safe. Today scientists are able to detect some materials at a parts per billion or even parts per trillion concentration.

**Analysis:**

1. At what concentration did you notice that the color of the drink mix was no longer visible?

2. At what concentration did the evidence of the milk disappear? (Consider both the color and Tyndall effect.)

3. How do you think a solution of one part per million salt water would taste? Explain.

4. If one cannot see a diluted chemical in drinking water, does that mean the water is safe to drink? Explain.

5. How many parts per million of salt are found in a 3.5% salt solution?

6. Express the ambient air standard for ozone and nitrogen oxides in % and ppm.

7. If you were the toxic waste manager of a factory, you might be responsible for diluting dangerous chemicals to safe levels in order to dispose of them legally. If a one liter sample of a chemical waste had a concentration of 5000 ppm, how much water would have to be added to dilute the sample to an acceptable concentration of 5 ppm? Show work.

8. Write another problem similar to the previous question, but include a "ppb" concentration. Show the solution to the problem as well. Include all calculations.