Student Sheet 3.1 Parts Per Million

Name: _____ **Date:** _____ **Period:** _____

INTRODUCTION

Many substances dispersed in water are measured in parts per million. Some of these substances are colorless, odorless, and tasteless, yet even in small amounts they can be toxic. You will perform a **serial dilution** of food coloring to understand concentration levels of part per million (ppm) and parts per billion (ppb).

MATERIALS

For each pair of students

- Chemplate
- Medicine dropper
- Paper towel
- 15-20 ml tap water
- Small cup for rinse water

QUESTIONS

Answer questions 1-4 using information from the class discussion.

1. If 100 grams of 3% salt solution were evaporated completely, how many grams of salt would be left? _____

2. How would you produce 50 grams of a 10% salt solution by weight?

_____

3. What is the ratio of powdered dye and water to produce a 10% solution of food coloring by weight?

_____

3. Which do you think is larger: Parts per million (ppm) or Parts per billion (ppb)?_____

LAB

A. Place a small piece of white paper under your Chemplate. Half fill the large oval cup in your Chemplate with tap water. Put some extra tap water in a small container for rinsing your medicine dropper.
B. Place 6 drops of food coloring in cup 1.
C. Using your eyedropper, remove one drop of food coloring from cup 1 and add it to cup 2. Rinse your dropper thoroughly and add 9 drops of clean water from the oval cup in your Chemplate. Mix thoroughly.
D. Using you dropper, remove one drop of solution from cup 2 and add it to cup 3. Rinse your dropper thoroughly, and add 9 drops of clean water from the oval cup in your Chemplate. Mix thoroughly.
E. Repeat the procedure for cups 4-9.
F. Record the colors of the solutions in the data table. Determine the dilution and concentrations of the various cups and record them in the data table.
G. Answer questions 4-7.

RESULTS

Cup	Color	Dilution	Concentration
1	Dark red	1/10	100,000 ppm
2			
3			
4			
5			
6			
7			
8			
9			

CONCLUSIONS

5. What is the number of the cup in which the solution first appeared colorless?_____

6. What is the concentration of the solution in this cup?_____

7. Do you think there is any food coloring present in this cup even though it is colorless? Explain.

_____

8. Suppose the food coloring was a harmful substance, how would you "purify" the water?

_____

9. How could you remove the water from the solution to see how much dye is still present?

_____

10. What do you think is an allowable limit of pesticide in drinking water in terms of ppm or ppb?

_____