

MB 402 Immunology Fall 2009
Lab 2 Problem Set
(45 pts)

Name _____

Show your calculations for partial credit

- 4 pts** 1). You have a stock solution of NaCl that contains 45g of NaCl/L in distilled water. Convert this to the following concentrations:
- a. mg/ml _____
 - b. mg/L _____
 - c. g/ml _____

d. What is the molarity of a 9 g/L = _____ ?
(molecular weight of NaCl = 58.44 g/mole)

- 6 pts** 2). Given an unlimited amount of a **3.0 M** solution of NaCl, calculate how much diluent (H₂O) and how much of the NaCl solution you must use to obtain the following:

| | <u>#ml 3.0 M NaCl</u> | <u>#ml H₂O</u> |
|------------------------|-----------------------|---------------------------|
| a). 150 ml of 2 M NaCl | _____ | _____ |
| b). 1 L of .5 M NaCl | _____ | _____ |
| c). 200 ml of 1 M NaCl | _____ | _____ |

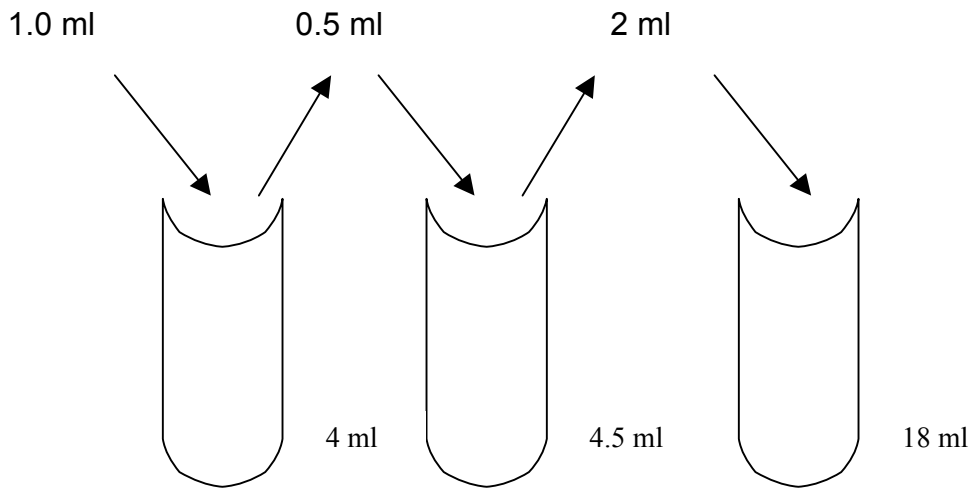
10 pts. 3). Imagine you are in a lab and you need to do set up a serial 2-fold dilution series so that you reach a final dilution factor of 512 and you need to have 2.0 ml of diluted solution in each tube.

a. In the space provided below, diagram a dilution sequence for this 2-fold serial dilution. For each tube, indicate the amount of diluent you would initially add to each tube and how much is transferred to each tube. Below each tube, indicate the cumulative dilution for each tube.

b. What is the **cumulative** dilution factor of the last tube? _____

c. What is the **cumulative** dilution factor of the 3rd tube in your dilution series? _____

4 pts 4). Determine the dilution and the final dilution of the following **nonserial** dilution sequence:



Dilution: _____

Cumulative (=Final) Dilution: _____

NOTE: dilutions can be expressed as a fraction or by convention, sometimes are expressed as a ratio. For example: 1ml + 9 ml = 1/10 or 1:10.

6 pts 5). You are given 10.0 ml of a suspension of bacteria containing 5×10^8 organisms/ml. Diagram the scheme to dilute your bacterial solution to 5×10^2 bacteria/ml in serial 1/100 fold dilutions. You need a final volume of 5 ml in the last tube. Give the cumulative (final) dilution and cumulative dilution factor in the blanks provided below.

a. Dilution Scheme:

b. Cumulative (Final) Dilution: _____

c. Cumulative Dilution Factor: _____

5 pts. 6). Determine how much glycerol or sucrose should be added to distilled water to reach the following final concentrations (calculate them as w/v or v/v).

NOTE: glycerol is a solution; sucrose is a solid

Amount of glycerol

a. 50 ml of 25% glycerol (v/v) _____

b. 100 ml of 25% glycerol (v/v) _____

Amount of sucrose

c. 100 ml of 5% sucrose (w/v) _____

d. 50 ml of 10% sucrose (w/v) _____

e. What does quantity sufficient (Q.S.) mean? What is the "lab phrase" that is usually used to indicate a Q.S. solution?

5 pts. 7). Antibodies are soluble proteins found in serum. Antiserum must often be diluted for use in immunological tests. Complete the following table indicating the amount of antiserum and diluent required.

| <u>Dilution</u> | <u>Final Volume</u> | <u>Antiserum</u> | <u>Diluent</u> |
|-----------------|---------------------|------------------|----------------|
| 1/2 | 10 ml | _____ | _____ |
| 1/4 | 100 ml | _____ | _____ |
| 1/10 | 50 ml | _____ | _____ |
| 1/20 | 10 ml | _____ | _____ |
| 1/100 | 50 ml | _____ | _____ |

NOTE: dilutions are expressed as fractions

- 4 pts 8). For the diagram below determine:
- a. the number of bacteria per ml in the original sample _____ CFU/ml
 - b. total number of bacteria in the original sample _____ CFU

NOTE: plate counts should be 30-300 colonies/ plate in order to get accurate counts

SHOW YOUR WORK BELOW

