

Calculating Concentrations with Answers

First write down what is provided (with units) and what is unknown. Be methodical about this to avoid mistakes. What is the dilution factor? What total volume of solution is desired? What is the stock solution concentration? What volume of stock is needed? What volume of solvent (or water) is needed? It is good practice to record such calculations in your lab notebook.

Exercise 1

Prepare 250 ml of 200 mM NaCl and 150 mM Tris-HCl pH 7.2. You have a stock solution of 5 M NaCl and 1 M Tris-HCl.

Use the dilution formula: $C_1V_1 = C_2V_2$

10 ml of 5 M NaCl

37.5 ml of 1 M Tris-HCl

202.5 ml H₂O

Exercise 2

You need to prepare 1 L of Tris-EDTA buffer from a 20X stock. What volumes of stock and distilled water should be mixed?

Use the dilution formula: $C_1V_1 = C_2V_2$

50 ml of 20X Tris-EDTA

950 ml H₂O

Exercise 3

You are preparing a 1.2 % agarose gel in a total volume of 50 ml TAE. How much agarose do you need?

0.6 g of agarose

Exercise 4

You make 0.8 % agarose gels for 8 groups in a total volume of 400 ml TAE. How much agarose do you need?

3.2 g of agarose

Exercise 5

You need to prepare 5 ml of a 2% sucrose solution. You already have a stock solution of 10% sucrose. How many μ l of the 10% sucrose solution do you need?

1000 μ l of 10% sucrose (+4000 μ l H₂O)

Exercise 6

For PCR you need to prepare 25 mM dNTPs (deoxynucleotide triphosphates) from 100 mM each of dATP, dTTP, dCTP and dGTP stocks. What volume of each stock and water is mixed to obtain 1 ml dNTP working solution?

250 μ l dATP

250 μ l dTTP

250 μ l dCTP

250 μ l dGTP

0 μ l H₂O

Exercise 7

You prepare 250 ml of sterile filtered 1 M NaCl stock solution (Figure 1). Using the image below, write down materials and procedures, as well as the amounts of solute and solvent needed.

Molecular Weight NaCl: 58.44 g/mol; dissolve 14.61 g NaCl in 250 ml water.

Material

- Weighing paper or boat
- Spatula
- Clean graduated cylinder, beaker or Erlenmeyer
- Magnetic stir plate and bar
- Water
- Electronic balance

Procedure

- Weigh 14.61 g NaCl (using weighing paper and balance)
- Place the solute in an appropriate volumetric measuring device (beaker or cylinder).
- Add about 80% of the solvent (here: water) and mix by stirring with the magnetic stirrer until the solute has dissolved.
- Carefully add solvent to cylinder until the bottom of the meniscus reaches the level of the final volume.
- Put the solution into the glass bottle with label (Name of solution, date and your initials).

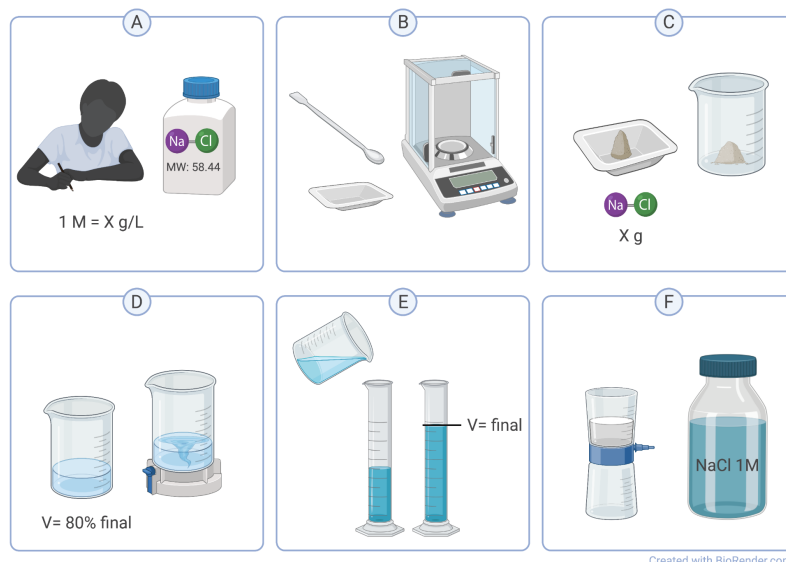


Figure 1: Preparation of 1M NaCl solution.