

CH1020 Exercises (Worksheet 6)

1. Calculate the molarity of each of the following solutions:

a. 0.25 mol NaCl in 175 mL of solution	1.4M
b. 0.070 mmol AgNO ₃ in 50 μ L of solution	1.4M
c. 1.2 mmol Na ₂ SO ₄ in 0.10 L solution	0.012M
d. 7.8 g NaOH in 150 mL solution	1.3M

2. Phosphate-buffered saline (abbreviated PBS) is a buffer solution commonly used in biological and biochemical research. A typical composition of a PBS is as follows:

137 mM NaCl	4.00g
2.70 mM KCl	0.100g
10.0 mM Na ₂ HPO ₄	0.71g
1.80 mM KH ₂ PO ₄	0.122g

You want to prepare 500 mL of PBS buffer. How many grams do you need of each component of the buffer?

3. The solubility of AgCl in water is 0.002 g/L. Is it possible to make a 0.010 mM AgCl aqueous solution?

0.01 mM Solution: 0.0014 g/L => yes it is possible because the concentration is below the solubility threshold

4. How many moles of Na are in each of the following solutions:

a. 0.7 L of 0.5 M NaCl	0.35 mol Na
b. 400 mL of 0.10 M Na ₃ PO ₄	0.12 mol Na

5. What is the molarity of Cl⁻ in each of these solutions:

a. 0.200 M AlCl ₃	0.600 M Cl ⁻
b. 0.450 M FeCl ₂	0.900 M Cl ⁻

6. What volume of 0.200 M ethanol solution contains 0.450 mol ethanol?

2.25 L

7. What volume of 1.5 M SrCl₂ is needed to prepare 400.0 mL of a 10 mM solution? 0.0027 L = 2.7 mL

8. Classify each compound as a strong electrolyte, weak electrolyte or non-electrolyte

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|---|-----------------|
| a. CsCl | strong |
| b. CH ₃ CH ₂ OH (ethanol) | non-electrolyte |
| c. NH ₃ (weak base) | weak |
| d. FeCl ₃ | strong |
| e. Na ₂ SO ₄ | strong |
| f. PbCl ₂ (very low solubility) | weak |

9. You are mixing 30.0 mL of 0.700 M K₃PO₄ with 0.050 L of 0.400 M KCl solution. What is the final concentration of the common ion?

Common Ion K⁺ = 1.04 M

10. You are mixing 200 cm³ of 0.600 M FeCl₂ and 300 cm³ of 200 mM FeCl₃. Identify the common ion and determine its concentration in the resulting solution.

Common Ion Cl⁻ (please note you have a mixture of Fe²⁺ and Fe³⁺, i.e., iron is not a common ion).

0.840 M Cl⁻