# Appendix B

## Answers to Chapter Questions

**Section 1 Multiple Choice Answers:**

- Ch. 1: Introduction to Physiology: **1. D, 2. C, 3. B, 4. A, 5. B, 6. E, 7. C, 8. D, 9. D, 10. C.**
- Ch. 2: Chemistry of Physiology: **1. E, 2. D, 3. B, 4. E, 5. C, 6. A, 7. B, 8. C, 9. A, 10. D.**
- Ch. 3: Enzymes: **1. C, 2. E 3. C, 4. A, 5. D, 6. B, 7. C, 8. D, 9. C, 10. D.**
- Ch. 4: Organelles: **1. D, 2. B 3. A, 4. C, 5. D, 6. C, 7. E, 8. B, 9. C, 10. D.**
- Ch. 5: Plasma Membrane: **1. C, 2. E, 3. D, 4. 1, 5, 6,8 5. B, 6. A, 7. C, 8. A, 9. B, 10. E.**
- Ch. 6: Physiological Solutions: **1. C, 2. A, 3. 180g, 4. D, 5. C, 6. 85%, 7. D, 8. B, 9. E, 10. E.**
- Ch. 7: Neurophysiology: **1. C, 2. A, 3. C, 4. E, 5. B, 6. C, 7. D, 8. A, 9. E, 10. D.**

**a)** depolarization, +10mV
**b)** hyperpolarization, -15mV
**c)** depolarization, +4mV
**d)** depolarization, +10mV
**e)** depolarization, +5mV
**f)** depolarization, +15mV (= action potential)

Solutions for calculations converting to molarity and osmolarity from Chapter **6** page 99:

See the detailed calculations for the 3 solutions below starting on page 2 below.

**1)** D5W Solution (5% Dextrose, dextrose = glucose).
**2)** Saline Solution (1.3% NaCl).
**3)** Normal Saline (NS) Solution (0.9% NaCl).

**Section 2 Multiple Choice Answers:**

- Ch. 8: Neurotransmitters: **1. C, 2. E, 3. B, 4. D, 5. A, 6. B, 7. D, 8. C, 9. B, 10. A.**
- Ch. 9: Central Nervous System: **1. B, 2. E, 3. D, 4. C, 5. A, 6. C, 7. C, 8. B, 9. A, 10. E.**
- Ch. 10: Peripheral Nervous System: **1. C, 2. D, 3. A, 4. A, 5. C, 6. B, 7. D, 8. A, 9. E, 10. B.**
- Ch. 11: General and Special Sense: **1. B, 2. A, 3. C, 4. B, 5. E, 6. C, 7. A, 8. D, 9. C, 10. E. 11. D.**
- Ch. 12: Endocrine System: **1. D, 2. C, 3. D, 4. B, 5. A, 6. C, 7. E, 8. B, 9. E, 10. A.**
- Ch. 13: Muscle Systems: **1. B, 2. B, 3. A, 4. C, 5. A, 6. C, 7. D, 8. A, 9. D, 10. E.**

**Section 3 Multiple Choice Answers:**

- Ch. 14: Blood: **1. C, 2. E, 3. C, 4. B, 5. D, 6. A, 7. D, 8. B, 9. A, 10. C.**
- Ch. 15: Heart: **1. A, 2. C, 3. D, 4. D, 5. B, 6. A, 7. D, 8. C, 9. E, 10. B.**
- Ch. 16: Blood Vessels: **1. D, 2. 1, 4, 5, 3. A, 4. B, 5. E, 6. C, 7. E, 8. 1, 3, 4, 9. B, 10. A.**
- Ch. 17: Lymphatics and Immunity: **1. C, 2. D, 3. A, 4. C, 5. D, 6. C, 7. C, 8. A, 9. B, 10. D.**
- Ch. 18: Respiratory System: **1. A, 2. C, 3. B, 4. D, 5. A, 6. B, 7. C, 8. E, 9. D, 10. 2, 4.**
- Ch. 19: Respiratory Control: **1. D, 2. B, 3. C, 4. 1, 2, 3, 6, 5. B, 6. 1, 5, 6, 7. E, 8. D, 9.C, 10. A.**

**Section 4 Multiple Choice Answers:**

- Ch. 20: Digestion and Nutrition: **1. A, 2. C, 3. E, 4. C, 5. D, 6. E, 7. A, 8. B, 9. B, 10. D.**
- Ch. 21: Urinary System: **1. C, 2. B, 3. B, 4. D, 5. B, 6. A, 7. E, 8. C, 9. A, 10. E. 11. D.**
- Ch. 22: Male Reproductive System: **1. D, 2. B, 3. E, 4. A, 5. C, 6. D, 7. C, 8. A, 9. E, 10. C.**
- Ch. 23: Female Reproductive System: **1. B, 2. C, 3. D, 4. E, 5. C, 6. B, 7. A, 8. D, 9. B, 10. E.**

# Solutions to the Solutions Calculation

## 1) D5W Solution (5% Dextrose, dextrose = glucose)

Molecular weight of glucose = 180. (This information will always be provided in any calculation question).

### ① Convert % to Molarity:

5% glucose solution.

$$\frac{5\text{g glucose}}{100\text{ ml}} \times \frac{1000\text{ ml}}{1.0\text{ L}} \times \frac{1\text{ mole glucose}}{180\text{g glucose}} = 0.278 \text{ moles/L, or } \mathbf{0.278\ M} \text{ glucose solution.}$$

### ② Convert Molarity to Osmolarity:

Ask yourself, how many particles are created when this substance dissolved in water.

For glucose, although it is soluble in water, that it is dissolved in it, it does not ionize in water, therefore the molarity of a glucose solution equals the osmolarity of the solution.

0.278 M glucose = 0.278 OsM glucose solution.

### ③ Convert to OsM to mOsM and comment on the Tonicity of the Solution:

Convert to mOsM (mili-osmoles), by multiplying OsM x 1,000.

Therefore, 0.278 OsM glucose x 1000 = **278 mOsM** glucose solution.

This solution falls below the 295 to 310 mOsM range that is isotonic in body fluids, and therefore this solution is **hypotonic**, and cells in this type of solution would swell and could lyse.

## 2) Saline Solution (1.3% NaCl)

Molecular weight of NaCl = 58.5.

### ① Convert % to Molarity:

1.3% NaCl solution.

$$\frac{1.3\text{g glucose}}{100\text{ ml}} \times \frac{1000\text{ ml}}{1.0\text{ L}} \times \frac{1\text{ mole NaCl}}{58.5\text{g NaCl}} = 0.222 \text{ moles/L, or } \mathbf{0.222\ M} \text{ NaCl solution.}$$

### ② Convert Molarity to Osmolarity:

Ask yourself, how many particles are created when this substance dissolved in water.

Sodium chloride, NaCl, is a salt that has ionic bonds and therefore ionizes in solution to form the two particles $Na^+$ and $Cl^-$. This means that the osmolarity NaCl is 2 x the molarity of a NaCl solution.

0.222 M NaCl x 2 = 0.444 OsM NaCl solution.

**③ Convert to OsM to mOsM and comment on the Tonicity of the Solution**:

Convert to mOsM (mili-osmoles), by multiplying OsM x 1,000.

Therefore, 0.444 OsM NaCl x 1000 = **444 mOsM** NaCl solution.

This solution is above the 295 to 310 mOsM range that is isotonic in body fluids, and therefore this solution is **hypertonic**, and cells in this type of solution would shrink or crenate.

**3) Normal Saline (NS) Solution (0.9% NaCl)**

Molecular weight of NaCl = 58.5.

**① Convert % to Molarity**:

0.9% NaCl solution.

$$\frac{0.9\text{g glucose}}{100\text{ ml}} \times \frac{1000\text{ ml}}{1.0\text{ L}} \times \frac{1\text{ mole NaCl}}{58.5\text{g NaCl}} = 0.154 \text{ moles/L, or } \mathbf{0.154} \text{ M NaCl solution.}$$

**② Convert Molarity to Osmolarity**:

Ask yourself, how many particles are created when this substance dissolved in water.

Sodium chloride, NaCl, is a salt that has ionic bonds and therefore ionizes in solution to form the two particles $Na^+$ and $Cl^-$. This means that the osmolarity NaCl is 2 x the molarity of a NaCl solution.

0.154 M NaCl x 2 = 0.444 OsM NaCl solution.

**③ Convert to OsM to mOsM and comment on the Tonicity of the Solution**:

Convert to mOsM (mili-osmoles), by multiplying OsM x 1,000.

Therefore, 0.308 OsM NaCl x 1000 = **308 mOsM** NaCl solution.

This solution falls within the 295 to 310 mOsM range that is isotonic in body fluids, and therefore this solution is **isotonic**, and cells loves in this type of solution and are very happy and balanced.