

# SI A&P - Full Discipline Demo - Fetal Pig

## Diffusion and Osmosis

### Final Report - Answer Guide

|                    |                                           |
|--------------------|-------------------------------------------|
| <b>Institution</b> | Science Interactive University            |
| <b>Session</b>     | SI A&P - Full Discipline Demo - Fetal Pig |
| <b>Course</b>      | SI A&P - Full Discipline Demo - Fetal Pig |
| <b>Instructor</b>  | Sales SI Demo                             |

### Test Your Knowledge

Match each term with the best description.

Terms to match:

- Solute
- Osmosis
- Solvent
- Diffusion

Descriptions:

- The net movement of molecules from areas of high concentration to areas of low concentration
- A substance into which a particle can be dissolved to create a solution
- The movement of water across a selectively permeable membrane
- A substance that can be dissolved into a liquid to create a solution

Matched answers:

- 1 Diffusion
- 2 Solvent
- 3 Osmosis
- 4 Solute

Correct answers:

1 Diffusion 2 Solvent 3 Osmosis 4 Solute

**Categorize each statement as true or false.**

|                                                                                                                                   |              |
|-----------------------------------------------------------------------------------------------------------------------------------|--------------|
| ⚡ The plasma membrane is composed of a bilayer of phospholipids.                                                                  |              |
| ⚡<br>The polarity of phospholipids results in a plasma membrane that has selective permeability.                                  |              |
| ⚡ Cells swell and eventually hemolyze when placed in isotonic solutions.                                                          |              |
| ⚡<br>In a hypertonic solution, the concentration of solutes inside the cell equals the concentration of solutes outside the cell. |              |
| <b>True</b>                                                                                                                       | <b>False</b> |
| 1                                                                                                                                 | 2            |

Correct answers:

1 The plasma membrane is composed of a bilayer of phospholipids.

The polarity of phospholipids results in a plasma membrane that has selective permeability.

2 Cells swell and eventually hemolyze when placed in isotonic solutions.

In a hypertonic solution, the concentration of solutes inside the cell equals the concentration of solutes outside the cell.

## Exploration

**In general, molecules move from areas with a higher concentration to areas with a lower concentration.**

- ☒ True
- ☐ False



The \_\_\_\_ are arranged on the inside of the plasma membrane.

- ☐ hydrophobic heads
- ☒ hydrophobic tails ✓
- ☐ hydrophilic heads
- ☐ hydrophilic tails

Cells \_\_\_\_ when placed in hypertonic solutions.

- ☒ crenate ✓
- ☐ hemolyze
- ☐ swell
- ☐ rupture

## Exercise 1

What occurred when the blood was mixed with each solution? Why did this occur?

|  |
|--|
|  |
|  |

Why do intravenous (IV) solutions need to have the same tonicity as blood?

|  |
|--|
|  |
|  |

Is the movement of substances in this exercise active or passive? Include the definition of osmosis in your explanation.

|  |
|--|
|  |
|  |

Photo 1: Stained Smears  
(SAMPLE ANSWER BELOW)

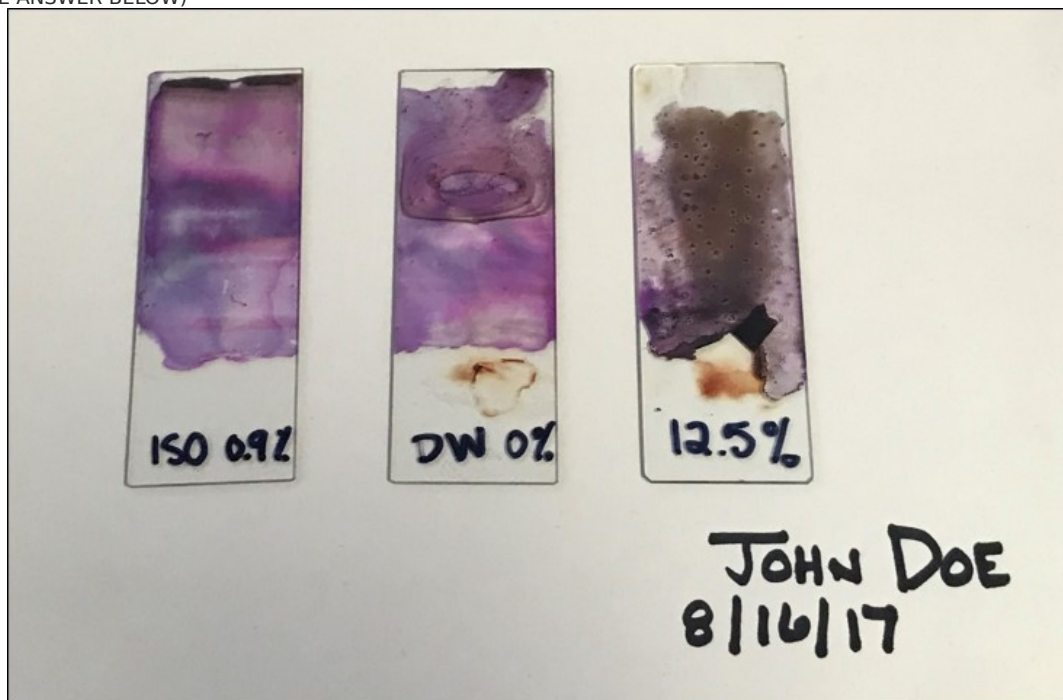
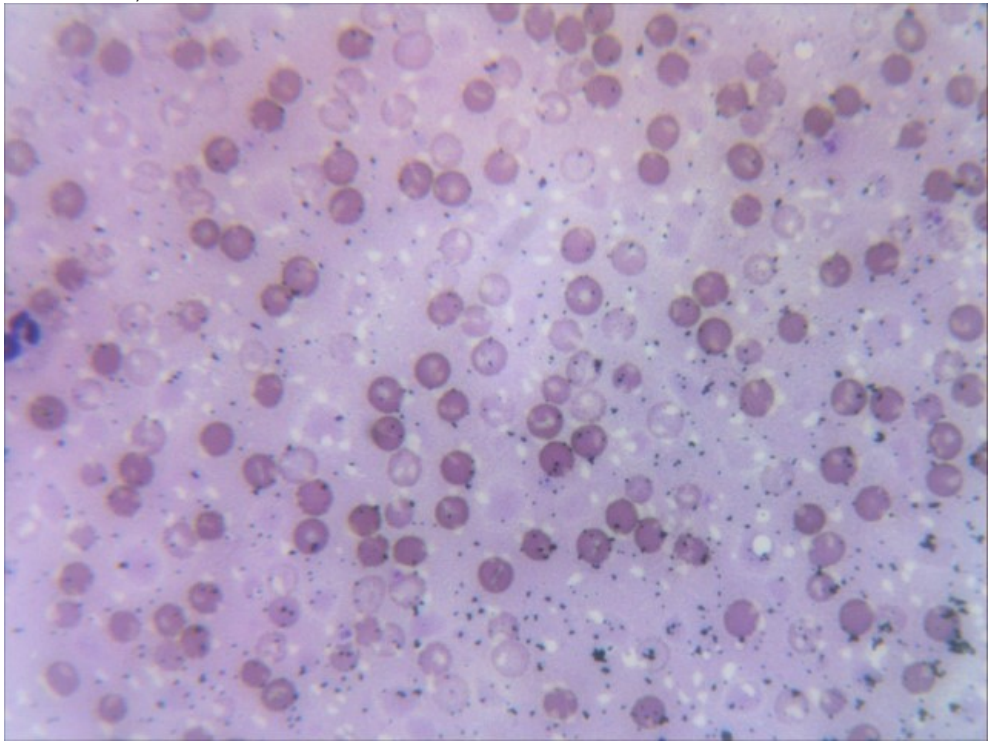


Photo 2: 0% Salt Solution  
(SAMPLE ANSWER BELOW)

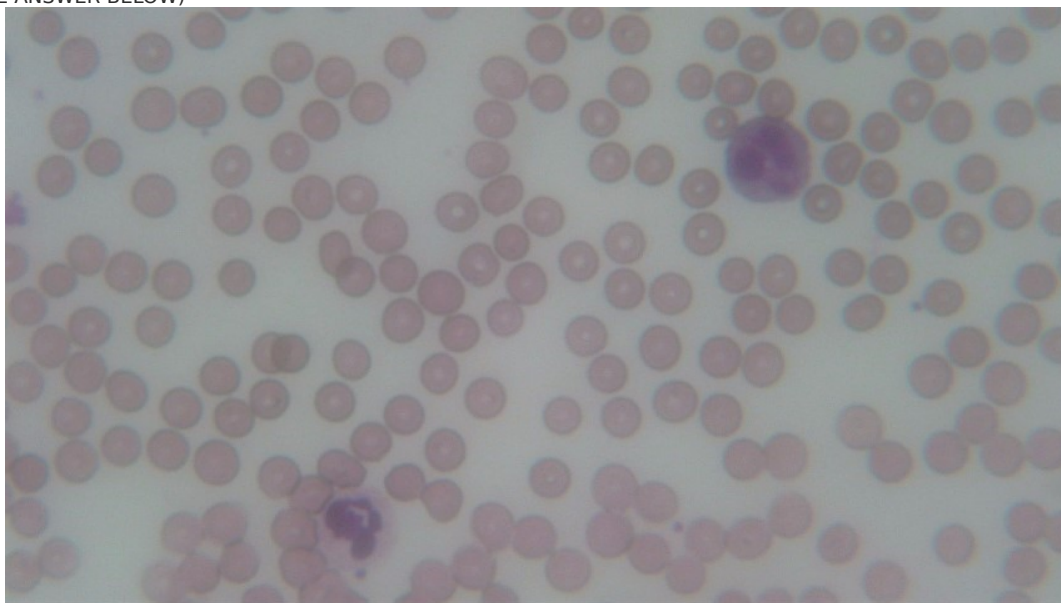


Data Table 1: Blood Smears  
(SAMPLE ANSWER BELOW)

| Treatment | Magnification | Characteristics | Tonicity |
|-----------|---------------|-----------------|----------|
|-----------|---------------|-----------------|----------|

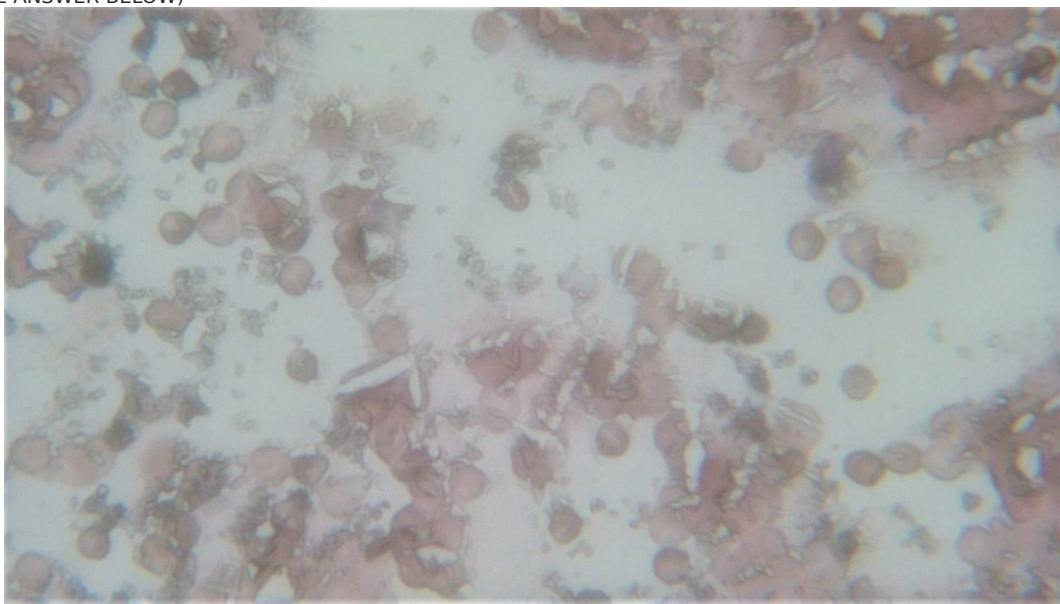
|                    |      |                                                     |            |
|--------------------|------|-----------------------------------------------------|------------|
| 0% Salt Solution   | 600X | Red blood cells are swollen and some have ruptured. | Hypotonic  |
| 0.9% Salt Solution | 600X | Red blood cells have a normal, concave shape.       | Isotonic   |
| 14% Salt Solution  | 600X | Red blood cells have crenated.                      | Hypertonic |

Photo 3: 0.9% Salt Solution  
(SAMPLE ANSWER BELOW)



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Photo 4: 14% Salt Solution  
(SAMPLE ANSWER BELOW)



## Competency Review

\_\_\_\_\_ is the net movement of molecules from areas of high concentration to areas of low concentration.

- ☒ Diffusion ✓
  - ☐ Equilibrium
  - ☐ Hydrolysis
  - ☐ Crenation
- 

If uninhibited, diffusion will continue until equilibrium is reached.

- ☒ True ✓
  - ☐ False
- 

\_\_\_\_\_ is the diffusion of water across a selectively permeable membrane.

- ☐ Solvent
  - ☐ Solute
  - ☒ Osmosis ✓
  - ☐ Hypotonic
- 

The plasma membrane is a semi-permeable membrane that acts as a selective barrier.

- ☒ True ✓
  - ☐ False
- 

Molecules that are large and charged are able to move freely through the plasma membrane in a process called simple diffusion.

- ☐ True
  - ☒ False ✓
-

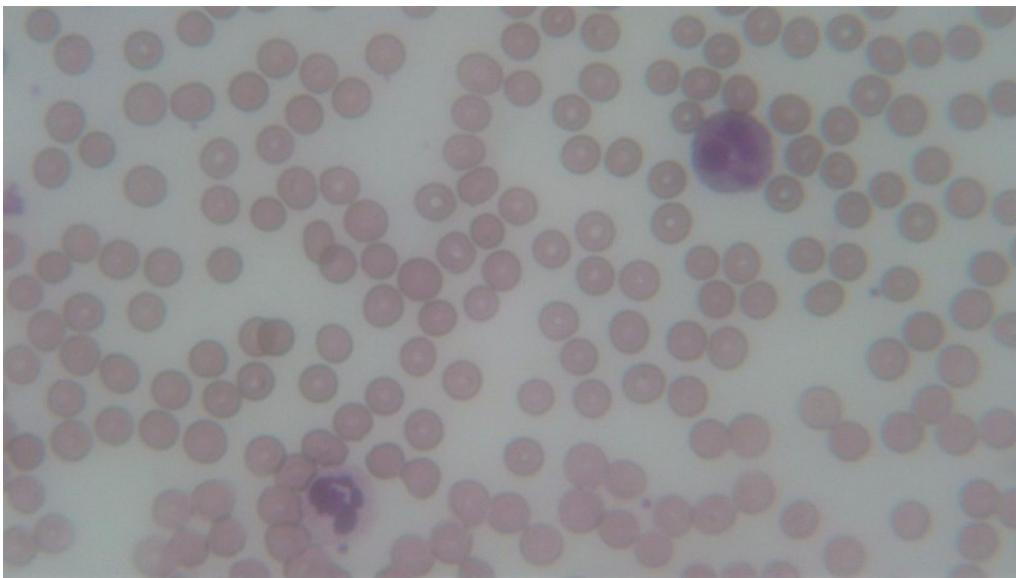
In a(n) \_\_\_\_ solution, the concentration of solutes outside the cell is greater than the concentration of solutes inside the cell.

- ☒ hypertonic ✓
- ☐ hypotonic
- ☐ isotonic
- ☐ equilibrium

Cells eventually hemolyze when placed in hypotonic solutions.

- ☒ True ✓
- ☐ False

The red blood cells in the micrograph below appear \_\_\_\_.



- ☐ crenated
- ☐ swollen
- ☐ hemolyzed
- ☒ normal ✓

**A 0% salt solution is considered isotonic to red blood cells.**

☐ True

☒ False



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## Extension Questions

**Apply your knowledge of diffusion and osmosis to explain why drinking seawater, which has 3.5% salt concentration, is often fatal to those stranded at sea.** (SAMPLE ANSWER BELOW)

Seawater is hypertonic compared to cells of the human body. As a result of drinking seawater, osmosis will move water out of the human cells into the seawater ingested, resulting in cell dehydration, shrinkage, and eventual crenation.