Cellular Transport Worksheet

Answer the following questions using your notes and your textbook.

OSMOSIS - Write the correct type of solution underneath (isotonic, hypertonic, or hypotonic)

1. _hypotonic_  
   there is a GREATER concentration of solute molecules OUTSIDE the cell than inside.

2. _hypertonic_  
   there is a LOWER concentration of solute molecules OUTSIDE the cell than inside.

3. _isotonic_  
   there is the SAME concentration of solute molecules outside the cell as inside.

4. _hypertonic_ tonic  
   there is a GREATER concentration of solute molecules OUTSIDE the cell than inside.

5. _hypotonic_ tonic  
   there is a LOWER concentration of solute molecules OUTSIDE the cell than inside.

6. _isotonic_ tonic  
   there is the SAME concentration of solute molecules outside the cell as inside.

7. The SWELLING AND BURSTING of animal cells when water enters happens when a cell is placed in a _hypotonic_ tonic solution.

8. What organelle [that plants have that animals don’t] keeps plant cells from bursting in this condition? _cell wall_

9. The SHRINKING of plant cells when water leaves so the cell membrane pulls away from the cell wall or shrinking of animal cells happens when a plant cell is placed into a _hyper_ tonic solution.

10. Cells stay the same size when placed in an _iso_ tonic solution because the amount of water leaving the cell is the same and the amount of water entering.

MULTIPLE CHOICE: Circle and/or fill-in the answer(s) that best completes the sentence.

1. The substance that dissolves to make a solution is called the ________________.  
   A. diffuser  
   B. solvent  
   C. solute  
   D. concentrate

2. During diffusion molecules tend to move ________________.  
   A. up / against the concentration gradient  
   B. from an area of lower concentration to an area of higher concentration  
   C. down / with the concentration gradient  
   D. in a direction that doesn’t depend on concentration

3. When the concentration of solute inside & outside a cell is the same, the cell has reached ________________.  
   A. maximum concentration  
   B. homeostasis  
   C. osmotic pressure  
   D. dynamic equilibrium

4. The diffusion of water across a selectively permeable membrane is called _________________.  
   A. active transport  
   B. facilitated diffusion  
   C. osmosis  
   D. phagocytosis

5. Energy for active transport comes from a cell’s _________________.  
   A. Golgi complex  
   B. nucleus  
   C. mitochrondria  
   D. lysosomes

6. ______________ transport requires energy from ATP to move substances across membranes.  
   A. Passive  
   B. Active

7. All of the following are kinds of passive transport EXCEPT _________________.  
   A. Diffusion  
   B. facilitated diffusion  
   C. osmosis  
   D. ion channels

8. When molecules move DOWN the concentration gradient it means they’re moving from _________________.  
   A. an area of low concentration to an area of higher concentration  
   B. an area of high concentration to an area of lower concentration

Fill-Ins – Complete the transport terms. Some of the letters have been filled in!

1. Active transport requires _E_ NERGY to move molecules across membranes.

2. _A T P_ is the molecule that provides the energy for active transport.

3. _DIFFUSION_ moves oxygen and carbon dioxide molecules from a high concentration to a low concentration across membranes.

4. The cell organelles that burns glucose and provides ATP for active transport are the _MITOCHONDRIA_.

5. Water moves across membranes by _OSMOSIS_.

6. A small membrane sac used to transport substances during exocytosis & endocytosis = _VACUOLE_ (vesicle would also work – but didn’t fit in the spaces)

7. _PAS S I V E_ transport does NOT REQUIRE energy.

8. A cell placed in an _ISOTONIC_ solution neither swells or shrinks because the concentration of molecules outside the cell is the same as inside.

9. A solution in which there is a HIGHER concentration of molecules OUTSIDE the cell than inside = _HYPERTONIC_.

10. A CONCENTRATION _G RADIENT_ forms whenever there is a difference in concentration between one place and another.

11. A solution in which the concentration of molecules outside the cell is LOWER than inside = _HY POTONIC_.

12. When molecules move from high to low along a concentration gradient we say they are moving “_D O W N_” the gradient.
13. OSMOTIC pressure is caused by water inside a plant cell pushing against the cell wall. 

**LOOK AT THE DIAGRAMS** – The black dots represent solute molecules dissolved in water.

1. In which beaker is the concentration of solute the greatest?  
   - A  
   - B

2. If the solute (dots) in this diagram is unable to pass through the dividing membrane, what will happen?  
   - A. the water level will rise on the right side of the tube  
   - B. the water level will rise on the left side of the tube  
   - C. the water level will stay equal on the two sides

**Match the description with the solution type:**

- **A. Isotonic**  
  1. _C_ solution with a lower solute concentration (more water)  
  2. _A_ solution in which the solute concentration is the same  
  3. _C_ condition plant cells require (otherwise the cell shrinks away from the membrane and the plant wilts)  
  4. _A_ condition that animal cells require  
  5. _C_ red blood cell bursts (cytolysis)  
  6. _B_ plant cells shrink (plasmolysis)  
  7. _B_ solution with a higher solute concentration (less water)  
  8. _C_ solution with a high water concentration [which means ↓solute conc.]

- **B. Hypertonic**  
- **C. Hypotonic**

**Label the tonicity for each solution** (isotonic, hypotonic, or hypertonic):  
Pay close attention to the arrows!!!

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**Examine the pictures on the bottom of the left side of this page.**

What if anything is different about the plant and animal cells in each of these states?

<table>
<thead>
<tr>
<th>State</th>
<th>Animal Cell</th>
<th>Plant Cell</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertonic</td>
<td>cell shrinks</td>
<td>cell shrinks away from the cell wall</td>
</tr>
<tr>
<td>Isotonic</td>
<td>cell remains the same size</td>
<td>cell remains the same size</td>
</tr>
<tr>
<td>Hypotonic</td>
<td>cell swells &amp; bursts</td>
<td>cell swells against the cell wall</td>
</tr>
</tbody>
</table>

**Matching** – Match each term to its definition:

- **a. energy**  
  - _H_ 1. Transport protein that provides a tubelike opening in the plasma membrane through which particles can diffuse

- **b. facilitated diffusion**  
  - _A_ 2. Is used during active transport but not passive transport

- **c. endocytosis**  
  - _C_ 3. Process by which a cell takes in material by forming a vacuole around it

- **d. passive transport**  
  - _D_ 4. Particle movement from an area of higher concentration to an area of lower concentration

- **e. active transport**  
  - _F_ 5. Process by which a cell expels wastes from a vacuole

- **f. exocytosis**  
  - _B_ 6. A form of passive transport that uses transport proteins

- **g. protein ion pump**  
  - _E_ 7. Particle movement from an area of lower concentration to an area of higher concentration

- **h. channel protein**  
  - _G_ 8. Transport protein that changes shape when a particle binds with it

**Short Answer** –

1. Name two factors that affect the rate of diffusion.
   - temperature [increase temp, increase diffusion bc particles speed up]
   - shape [some particles can move by simple diffusion, some can move through protein channels, and some have to move by ion carriers or by endo/exo-cytosis]
   - concentration [increase concentration, increase diffusion]
   - charge [no charge diffuses easily, charged particles do not]
   - solubility [if a substance not soluble…it often won’t diffuse in certain solvent]