Biological Industries Israel
Beit Haemek Ltd.

Product Profile

Product Name:	*Alsever's Solution*
Catalog Number	*02-045-1*
Unit Size Availability:	(A) 500ml ; (B)100ml
Formulation:	Liquid Solution
Defined Storage Conditions:	15-30°C(Room Temperature)
Stability: (Under Defined Handling & Storage Conditions)	Please Refer To Product Label

Important Note! Please read the *MSDS* and *Product Profile* carefully in their entirety *before* using this material for possible safety precautions and potential hazards.

Product Description:
Alsever's solution is an isotonic, balanced salt solution which is routinely utilized as an anticoagulant or blood preservative. The advantage of Alsever's is its ability to support erythrocytes or Red Blood Cells (RBC's) which will ensure the antigenic life of the cells and may be used not only for panel RBC's but also RBC's drawn for serological investigation. It permits the storage of whole blood at specified storage conditions under refrigeration for up to ten (10) weeks.

Isotonic/ Hypotonic/Hypertonic Solutions
In its normal environment and in most vertebrates, a cell is bathed in a fluid similar to its contents. So if the flow within and without the cell are about equal, this is known as an isotonic or isoosmotic solution where, in this case, no net flow movement may occur. However, if the cell is placed within a new environment such as in culture media, far-reaching changes may occur if the *in vitro* environment does not mimic the *in vivo* environment to the nth degree. However in cell culture, we artfully create situations to meet our requirements.

In some appropriate hypotonic solutions, cultured mammalian cells may rapidly increase in volume and then shrink gradually over a relatively short-period of time within 20-30 minutes at 37.5°C. However, for example, an animal cell placed in a hypertonic solution (i.e. which has a higher osmotic pressure) than the cell cytoplasm will lose intracellular fluids to the surrounding environment and shrink or contract.

In we take another example in contrast to the aforementioned, an animal cell such as a lymphocyte placed in a *hypotonic* or perhaps a hypoosmotic environment, would be unable to maintain its equilibrium and thus lose its shape because it will gain water (i.e. more water will flow into the cell than out of it). In this case, the pressure or concentration inside the cell is greater and the solvent would continue to diffuse across the cell membrane causing the cell to eventually burst. The rupture of any cell by a hypotonic solution is known as plasmolysis, if however it occurs within an erythrocyte or RBC it is known as hemolysis, whereas the shrinking or shriveling of the inside of the RBC is known as crenation.

Generally in hypotonic solutions, there is a lower concentration of solute outside a cell, creating an environment with a lower osmotic pressure than that contained within the cell itself. The body would then attempt to achieve equilibrium across the cell membrane in an effort to compensate for or to equalize the concentration or the osmotic pressure which is a measure of the tendency of a solution to take in water by osmosis.

The solute to solvent concentration determines the solution tonicity which is important with respect to membrane permeability and diffusion. We see that most vertebrates are either hypotonic or hypertonic relative to their environment and therefore tend to gain or lose fluids according to physiological mechanisms. These mechanisms assist most vertebrates in maintaining not only a constant blood osmolality but also relatively fixed concentrations of individual ions across concentration gradients.

Water in an animal's body is distributed between the Intracellular (ICF) and Extracellular (ECF) compartments. In order to maintain osmotic balance, the ECF (including the blood plasma) must be able to adsorb water and excrete any excess into its environment. Inorganic ions must also be exchanged between the ECF and the external environment in order to maintain homeostasis. Such exchanges of water and electrolytes between the body and the external environment occur across specialized epithelial cells and in most Vertebrates, through a filtration process via the excretory system or kidneys. Homeostasis must be maintained in regard to both the total solute concentration of the ECF and the concentration of the specific inorganic ions.

Osmosis occurs when a semi-permeable membrane, one permeable to water but not to salts or organic molecules in solution, separates water or a dilute solution from a more concentrated solution. Simply described, Osmosis is the diffusion of water across a membrane. Water molecules have a stronger tendency to escape from water than from a solution. Water flows through the membrane from the dilute to the concentrated side in an effort to equalize the osmotic pressures of the two solutions. Semi-permeable membranes have extremely small pores through which tiny water molecules can pass but larger molecules cannot. These membranes like cell membranes, the digestive tract lining and the walls of blood vessels all are semi-permeable; they allow certain substances to go through while holding back others. Membranes are not just passive sieves; they actively participate in the passage of molecules through the pores. For example, electronic charges on the surface of the pores undoubtedly interact with ions attempting to pass through.

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In essence, diffusion through a semi-permeable membrane is called *osmosis*. During the process of osmosis, there is always a net flow from the more dilute area to the compartment in which the solution is more concentrated. Osmosis will cease (i.e. the net flow) when the pressure of the water builds up in one compartment becomes sufficiently high. Osmosis may also be stopped by application of external pressure to the side with the more concentrated solution. And this precise amount of pressure needed to prevent the net flow of solvent from the dilute to the more concentrated compartment is known as *osmotic pressure.* The magnitude of the osmotic pressure depends only on the concentration of solute particles; the larger the number of particles (e.g. ions, molecules) in solution, the greater the osmotic pressure. The total solute concentration of a solution determines its osmotic behavior, and therefore, the total moles of a solute per kilogram of water are expressed as the osmolality of the solution.

Cell membranes too, allow small molecules and ions, as well as solvent to pass in both directions while holding back only the larger particles. Nevertheless, living cells can be regarded as selectively permeable. They are filled with ions, small and large molecules and still other larger cell components. In its normal milieu (*in vivo*), the cell is bathed in a fluid similar to its contents. Flow in and flow out are about equal. However, if the cell is placed in a new environment (in vitro), far-reaching manifestations and untoward effects may ensue. In general, if cells are placed in a solution with a lower osmotic pressure (hypotonic), more water will flow into the cell than out causing the cell to rupture. If the cell is an Erythrocyte (Red Blood Cell), the more specific term is known as Hemolysis. But if placed in a solution with a higher osmotic pressure (hypertonic), water then flows out of the cell causing the cell to shrivel, crenate and die. Placed in an isotonic solution in which the osmotic pressure is the same inside and outside of the cell where no net water movement occurs (e.g. 0.9% Saline) the cell neither swell nor shrinks but maintains its shape.

Balanced Salt Solutions

Balanced Salt Solutions, for all intents and purposes, are inorganic salt solutions that form the basis of many complex media formulations. They may contain varying amounts NaCl, KCl, $MgCl_2$, $NaHCO_3$, $MgSO_4$, $CaCl_2$ and other salts.

Predominant Characteristics of Alsever's Solution include:

- § Ready-To-Use Liquid Formulation
- § Isotonic or Isoosmotic
- § Suitable for Cell-Culture and Hematology Applications
- § Sterile-Filtered

Storage & Stability:
This product should be stored under specified conditions of 15-30° (Room Temperature) and used within the time specified on the product label. Do *not* use after the expiration date as specified on the label. Deterioration of liquid media may be recognized by any of the following characteristics, among others including: (a). color change, (b). granulation/ clumping, (c). insolubility,(d). And/or decrease in expected performance parameters. Any material described above should not be used and therefore discarded. Do not expose to light for prolonged periods as it is light-sensitive. For prolonged storage, store in the dark.

Instructions/Procedure:

1) Take a bottle of *Alsever's Solution* from specified storage conditions at 15-30°C and read the label.
2) Ensure that the cap of the bottle is tight.
3) Gently swirl the solution in the bottle to ensure homogeneity.
4) Wipe the outside of the bottle with a disinfectant solution such as 70% ethanol.
5) Using aseptic/sterile technique under a laminar-flow culture hood and work according to established protocols.
6) Using an equal volume of blood collected into a container of this product, the mixture is then gently but thoroughly blended to near uniformity.
7) The well-mixed solution is then placed in refrigeration temperatures (2-8°C) for two (2) weeks. The container may then be removed and the plasma layer procured for use.

Quality Control*(Please Note That Each Batch/Lot Will Differ as to the Final Specifications)

Test	Specifications*
Appearance:	Clear Solution
Osmolality:	310-345 mOsm/kg
pH:	6.0-7.0
Sterility:	Test & Record

Auxiliary Products

Product Name	Catalog Number	Storage Temperature
Dulbecco's Phosphate Buffered Saline(DPBS) without Calcium and Magnesium	02-023-1	Room Temperature (15-30°)
Amphotericin B 250 micrograms/ml	03-028-1	-20°C
Amphotericin B 2500 micrograms/ml	03-029-1	-20°C
Penicillin-Streptomycin 10X Solution	03-031-5	-20°C
Penicillin-Streptomycin-Neomycin Solution	03-034-1	-20°C
Note: For a list of Serum, Antibiotics, or other Biological Industries' Products, please refer to our Product Catalog/Product Profiles/ Product Guides and Internet Site.		

References:

1) Current Edition Merck Index
2) Biological Industries (BI)Specifications
3) Current Edition USP/E Ph
4) Martindale The Extra Pharmacopeia,28th Edition, Royal Pharmaceutical Society: London, England
5) Darling, D. C. and Morgan, S. J. Animal Cells: Culture and Media ,John Wiley & Sons: New York,1994

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