Product Name

Name: Sodium Bicarbonate Solution (7.5%)

Cat. No.: C3555-0100, C3555-0500

Size: 100 mL, 500 mL

Product Description

To maximize success in cell culture, the *in vitro* culture conditions are created to mimic the *in vivo* conditions in osmolality, pH, temperature, and nutrition. Ions, such as HCO_3^- and Na^+ among others, are the major contributors to the osmolality of cell culture media. The HCO_3^- level is determined by the concentration of CO_2 in the incubator (i.e., in contact with the growth medium). The sodium bicarbonate ($NaHCO_3$) and CO_2 buffer system are probably the most popular one and it also requires a CO_2 level of 5-10% (i.e., dependent on the media utilized) and 100% humidity. This is known as an open system and the $NaHCO_3$ interacts with the medium as follows:

(1) $H_2O + CO_2 \leftrightarrow H_2CO_3 \leftrightarrow H^+ + HCO_3^-$

(2) $NaHCO_3 \leftrightarrow Na^+ + HCO_3^-$

One of the products of cellular metabolism (i.e., CO_2), and the CO_2 present in the incubator interact with the water in the medium (Equation #1). Therefore, the H^+ concentration is proportional to the CO_2 concentration in the atmosphere. The $NaHCO_3$ in the bicarbonate-buffered medium dissociates as indicated in Equation #2. These reactions are in a reversible equilibrium, and the system *in toto* will have a tendency to resist any change in the ratio between the component parts. When the atmospheric concentration of CO_2 is increased, an increase in CO_2 and acidity (H^+) is prevented by a high HCO_3^- level achieved by the presence of $NaHCO_3$ (Equation #2). Interestingly enough is another advantage in using the Sodium Bicarbonate is that the absence of either HCO_3^- or CO_2 appears to be limiting in cell growth.

Culture media are often buffered to compensate for the cellular production of CO_2 and lactic acid as the by-products of metabolism. Traditionally, basal cell culture media have been buffered by HCO_3^- (bicarbonate). As cells grow, CO_2 evolves, the dissolved CO_2 forms a buffering system with the bicarbonate ions. However, if cell density is low or the cell growth is still in the so-called "lag phase," they may not produce sufficient CO_2 to maintain an optimal pH. To counter these potential problems, bicarbonate-buffered media require the use of an incubator with a 5 - 10% CO_2 atmosphere. Media with low levels of bicarbonate (1.5 - 2.2 g/L of HCO_3^-), such as MEM, require ~5% CO_2, and DMEM with a higher level of bicarbonate (3.7 g/L) requires 10% CO_2 in order to maintain the correct pH level. The most important factor in utilizing the correct percent CO_2 is based upon the medium's bicarbonate level to maintain the physiological pH, which is irrespective of cell type.

In the human body, the buffer systems are the major mechanism for controlling blood pH which guard against sudden changes in body acidity and alkalinity. pH, as a measure of hydrogen ion activity, is intimately interrelated with the bicarbonate and carbon dioxide concentrations. The pH buffer systems work to minimize changes in the pH of a solution by re-adjusting the proportion of acid to base. The most important blood buffer involves carbonic acid and bicarbonate ions. pH is vital in maintaining homeostasis,

and when the environmental pH is beyond the optimal range, proteins may not only be denatured but also enzymes may lose their function thereby causing untoward physiological manifestations (e.g., acidosis/alkalosis). The catalytic activity of enzymes is acutely sensitive in that they have an optimum pH and that their activity declines sharply on either side of the optimum. This is precisely why the biological control of the pH in cells is of central importance in all aspects of intermediary metabolism and cellular functions.

Predominant Characteristics

- Ready-to-use
- Effective with serum-free or with serum-containing medium
- Meets USP and EP testing specifications
- Suitable for cell culture applications
- Long shelf-life when handled and stored properly under defined conditions

Storage & Stability

The product should be kept at **15 - 30°C**.
The product is **light-sensitive** and therefore should not be left in the light.
Shelf life: 36 months from date of manufacture

Procedure

1) Take a bottle and read the label.
2) Ensure that the cap of the bottle is tight.
3) Gently swirl the solution in the bottle.
4) Wipe the outside of the bottle with a disinfectant solution such as 70% ethanol.
5) Take out appropriate volume using aseptic/sterile technique under a laminar flow culture hood.

Quality Control

Sodium Bicarbonate Solution (7.5%) is tested for sterility, pH, osmolality.

Precaution and Disclaimer

For research use only, not for clinical diagnosis, and treatment.