Product Profile

Product Name:	*TAE Electrophoresis Buffer Concentrate 50X*
Product Catalog Number	*01-870-1*
Unit Size Availability:	500ml
Concentration:	50X
Formulation:	Clear, Colorless Liquid Solution
Specified Storage Conditions:	Room Temperature(15°-30°C)
Stability: (Under Ideal Handling Storage)	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.

Caution: These materials are potentially hazardous to your health if not handled by qualified personnel trained in laboratory procedures and stored properly!

Product Description:

TAE Electrophoresis Buffer (50X) is a solution used in Agarose Gel Electrophoresis (AGE) typically for the separation of nucleic acids (i.e. DNA and RNA)and as a running buffer for preparative work. Tris-Acetate-EDTA (TAE) is not only used in nucleic acid agarose and polyacrylamide gel electrophoresis but also in agarose and polyacrylamide gel preparation. Also described in the literature is TAE's role in denaturing gradient gel electrophoresis methods for broad-range analysis and at various concentrations and to study the mobility of DNA in solution with and without NaCl[1]. DNA mobility on AGE is known to depend on the composition and strength of electrode buffer as well as the agarose concentrations. The resolution of supercoiled DNA is better in TAE than TBE but TAE's buffering capacity is rather low as it tends to become exhausted during successive electrophoresis. TAE buffer is more useful for larger DNA fragments (<2.0kb) but TBE is more effective to obtain higher resolution of smaller DNA fragments (i.e. 300bp). Either buffer is adequate is applicable for middle-sized DNA fragments.[2]

Agarose Gel Electrophoresis (AGE)

AGE is one of the easiest and well-known methods used in the fields of Molecular Biology and Biochemistry to separate DNA or RNA fragments by size. Commonly, a DNA molecule is digested with restriction enzymes and the AGE is utilized as a diagnostic tool to visualize the fragments. This is achieved by moving negatively charged nucleic acid molecules through an agarose (i.e., polysaccharide) matrix within an electric field. The goal of the gel might be to observe DNA, to isolate and quantify a particular band. The DNA is visualized in the gel by the addition of Ethidium Bromide (EB). This EB binds strongly to the DNA by intercalating between the bases and fluoresces by absorbing invisible UV light and thus transmitting the energy as visible orange light. This technique has a wide array of applications. Aside from not only being able to visualize smaller DNA fragments resulting from the enzymatic digestion of a larger piece of DNA and other multi-faceted research applications, AGE is also a common forensic technique used in DNA fingerprinting.

Buffers are aqueous systems that act to resist or minimize the change or changes in pH concentration when small amounts of acid (H^+) or base (OH^-) are added. They consist of a conjugate acid-base pair in which the ratio of proton donor to proton acceptor is near equal. The weak acid of the buffer solution is the proton-donor and its conjugate base is the proton-acceptor. Buffering results from two reversible reaction equilibria in a solution when the concentrations of both the proton-donor and proton-receptor are in harmony. When this occurs in a particular buffering system, the additions of minute amounts of acid or base have no detectable influence on the final solution pH. This point is commonly known as the isoelectric point where there is no net charge and the pH *per se* is said to be equal to pK_a. A buffer solution has a large reservoir of both acid molecules and the conjugate base of the acid (i.e., anions from the salt). If a strong acid is added, the hydronium ions from the added acid will donate protons to the anions of the buffer to form a weak acid and water. Although the reaction is slightly reversible, most of the protons are removed from the solution as they are added, and the pH barely changes. Most simple buffers work effectively in the pH scale of $pK_a \pm 1$, hence the working range is often given as $pK_a \pm 1$. Intracellular and extracellular fluids of living organisms contain conjugate acid-base pairs which act as buffers. Simply elucidated, pH buffers are essentially weak acids and one of its salts (or a weak base and one of its salts) usually in approximate equal concentrations in aqueous solution.

Chemically, if we take for example, 1 liter of a solution containing 0.1 mole of acetic acid(CH_3COOH) and 0.1 mole of sodium acetate (CH_3COONa) the solution acts as a buffer at pH 4.74, although somewhat of an acidic value. This value may be explained by the fact that although a solution of sodium acetate is slightly basic with a pH >7, however, it is a solution containing only a salt which is basic. This buffer solution consists not only of an acetic acid salt but also acetic acid itself, so the presence of this acid is what makes this buffer solution acidic.

Buffers have both intensive and extensive properties. Whereas the intensive property is a function of the pK_a value of the buffer acid or base, the extensive property (a.k.a. buffer capacity) is a measure of the protection a buffer offers against changes in pH. It should be remembered that pH is not dependent on the absolute concentrations of buffer components but rather on their ratio. It can be said that higher concentration buffers offer higher buffering capacity, and thus buffering capacity is the term used to delineate the ability of that given buffer to resist changes in pH when supplemented with an acid or base. For example, a buffering capacity (BC) of 1 occurs when 1 mole of acid or alkali is added to one liter of buffer and thus the pH changes by one (1) unit of measure. We see that the BC of a mixed weak acid-base buffer is much greater when the individual pK_a values are in close propinquity to each other. The BC of a buffer mixture is additive. Additive Interaction occurs when two or more chemicals are combines and whose combined effects are equal to the sum of their individual effects.

Predominant Characteristics o f TAE Electrophoresis Buffer 50X includes:

- § Liquid 50X Concentrate
- § Tris-Acetate-EDTA Buffer
- § Commonly Used In Agarose Gel Electrophoresis(AGE)
- § Free of Impurities
- § Relatively Long-Storage When Handled and Stored Properly Under Defined Conditions

Storage & Stability:

This product should be stored under specified conditions @ 15-30°C and used within the expiration date indicated on the product label. Do*es 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.

TAE Electrophoresis Buffer 50X is relatively stable when handled and stored under specified conditions as stipulated on the label. 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 *TAE Electrophoresis Buffer (50X)* 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) The TAE Electrophoresis Buffer Concentrate should be diluted to a working concentration of 1X before use.
7) For each Electrophoresis, use fresh TAE Buffer at the working concentration of 1X.

Quality Control (Each Batch/Lot Will Differ Somewhat as to Final Specifications)

Test	Specifications:
Appearance:	Clear, Colorless Solution
pH:	8.2-8.4
Sterility:	Sterile

Auxiliary Products

Product Name	Catalog Number	Storage Temperature
TBE Electrophoresis Buffer Concentrate(5X)	01-871-1	Room Temperature(15-30°)
Acrylamide/bis-Acrylamide (19:1) (T=40%,C=3.3%)Solution	01-872-1	2-8°C
Acrylamide/bis-Acrylamide (29:1) (T=40%,C=3.3%)Solution	01-874-1	2-8°C
Acrylamide/bis-Acrylamide (37.5) (T=40%, C=2.6%) Solution	01-876-1	2-8°C
SDS Solution	01-890-1	Room Temperature(15-30°)
Dulbecco's Phosphate Buffered Saline(DPBS) without Calcium and Magnesium	02-023-1	Room Temperature(15-30°)
L-Glutamine Solution 29.2mg/ml in Saline	03-020-1	-20°C
L-Alanyl-L-Glutamine Solution(A Dipeptide Substitute)	03-022-1	-20°C
Penicillin-Streptomycin Solution,10,000 units/ml Penicillin G Sodium Salt,10mg/ml Streptomycin	03-031-1	-20°C
Sterile Culture-Grade Water	03-055-1	Room Temperature(15-30°)
Serum-Free Cell Freezing Medium	05-065-1	2-8°C
Insulin, Bovine Biochemical Formulation	41-934-1	-20°C
Insulin, Recombinant Human EP,USP	41-975-1	-20°C
Note: For a list of other Antibiotics, Serum, other Reagents and Supplements, please refer to our Product Catalog/Product Guides, Product Profiles and Internet Site.		

References:

1) Hayes, V.M. *et. al*. "Improvements in Gel Composition and Electrophoretic Conditions..." *Nucleic Acid Res*., 27(20), 1999
2) Yutaka, Miura,Hirokai Wake, and Taiji, Kato."TBE or Not TBE; That Is The Question." *Nagoya Medical Journal*, 43(1) 1-6, 1999.
3) Sullivan Jr. John B. Krieger, Gary R. Hazardous Materials Toxicology: Clinical Principles of Environmental Health. Williams & Wilkins: Baltimore, Maryland, pps.157, 940-945.
4) Barile, Frank A. Clinical Toxicology: Principles and Mechanisms. CRC Press: Boca Raton, Florida, 2004.
5) Lackie, J. M. The Dictionary of Cell & Molecular Biology, Academic Press: London, 2007
6) O'Neil, Maryadele *et. al*., The Merck Index, 14th Edition, Whitehouse Station, New Jersey, 2006
7) Biological Industries (BI) Specifications
8) Current Edition USP/E Ph
9) Martindale The Extra Pharmacopeia, 28th Edition, Royal Pharmaceutical Society: London, England
10) Freshney, R.I. Animal Cell Culture: A Practical Approach, IRL Press, Oxford, p.25.