3M™ Molecular Detection System

A Better Technology

3M innovatively combines unique technologies—Isothermal DNA Amplification and Bioluminescence Detection—to offer the specificity and sensitivity you want in a pathogen test solution that is also fast, simple and cost-effective.

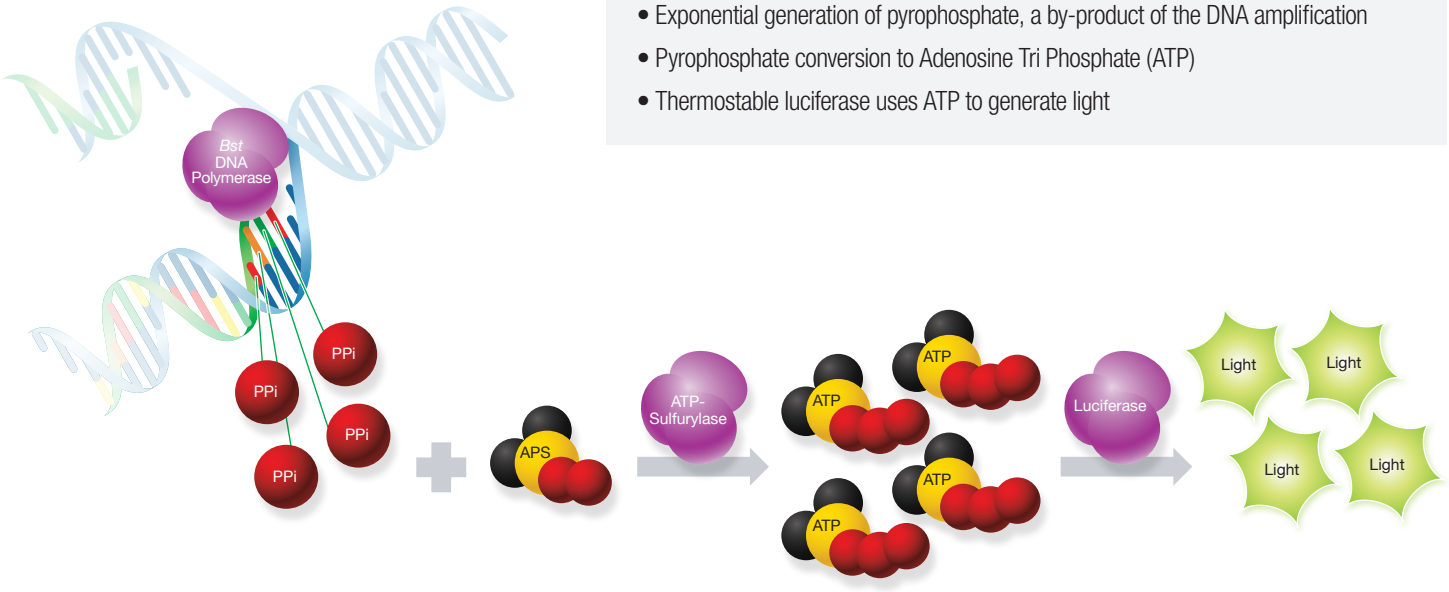
Chemistry Overview

Isothermal DNA Amplification

- Multiple primers recognize distinct regions of the genome
- A DNA polymerase with strand displacement activity
- Efficient, rapid and continuous amplification of target DNA

Bioluminescence Detection

- Exponential generation of pyrophosphate, a by-product of the DNA amplification
- Pyrophosphate conversion to Adenosine Tri Phosphate (ATP)
- Thermostable luciferase uses ATP to generate light



How does it work?

The 3M™ Molecular Detection System uses multiple primers to recognize distinct regions of the genome and *Bst* DNA polymerase to provide continuous and rapid amplification of genetic material. Pyrophosphate ions (PPi), a by-product of the targeted DNA amplification reaction, and APS, are enzymatically converted into ATP by ATP-Sulfurylase. ATP reacts with luciferase to produce light which is detected indicating the presence of target organism DNA. Both amplification and detection occur simultaneously and continuously during the exponential phase providing real time results and a short run time.

Technology Comparisons

	3M Isothermal DNA Amplification	PCR (Polymerase Chain Reaction)
Enzyme	*Bst* DNA Polymerase	*Taq* DNA Polymerase
DNA Denaturation	Strand Displacement	Heat
Reaction Temperature	Isothermal (60°C)	Thermal cycling consisting of cycles of repeated heating and cooling of the reaction for DNA denaturation (94°C) and enzymatic DNA replication (55°C then 72°C)
Amplification	Continuous	Cycling
Detection	Bioluminescent Light	Fluorescent Light

	3M Isothermal DNA Amplification	Immunoassay
Target	Nucleic acid (DNA)	Protein
Reaction	Exponential amplification of target genetic material	Series of antibody/antigen binding steps
Detection	Bioluminescence	Colorimetric or fluorescence
Instrumentation	Automated	Manual, semi-automated and automated
Results Interpretation	Automated	Human interpretation (visual) or automated

A Streamlined Solution

Accurate

- Multiple, specific primers target distinct regions of the genome resulting in more efficient amplification of target DNA and accurate results
- *Bst* DNA polymerase is less susceptible to inhibiting substances found in food samples than other polymerases
- DNA is amplified continuously under isothermal conditions limiting the possible interference of the template or DNA polymerase by inhibitors found in food samples
- Detection occurs during the exponential phase of amplification enhancing specificity
- Bioluminescence detection has a better signal-to-noise ratio than fluorescence and is not affected by interference from fluorophores that can be present in some foods (ex. food dyes, acriflavin in enrichment media, etc.)

Fast and Simple

- The continuous DNA strand displacement process enables efficient and rapid amplification of DNA
- Bioluminescence provides real-time detection of the DNA amplification AND simultaneous amplification and detection allows for detection of positive results before the end of the run
- The DNA polymerase is robust and tolerant to low-quality DNA allowing a simple sample preparation and an assay set up with fewer steps
- Bioluminescence has a better signal-to-noise ratio than fluorescence and is not affected by interference from other fluorophores making the process more robust and allowing the same procedure to be followed for all assays
- Because the DNA amplification is detected via bioluminescence, the 3M Molecular Detection System offers the unique use of color-coded assay tubes to differentiate pathogen assays

Cost Effective

- Isothermal DNA amplification proceeds at a constant temperature, removing the need for complicated instrumentation
- Bioluminescence detection eliminates the need for high-cost excitation sources, fluorophores, fluorescent filters and detectors resulting in a robust instrument with minimal maintenance requirements

3M

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