

TBDMS RNA Amidites and Supports, Standard Protection

**Application Notes**

**RNA Synthesis:**

The importance of RNA has long been recognized in cellular processes. A major area of focus is on antisense RNA<sup>1</sup> and the role of catalytic RNA in splicing and ligation.<sup>2</sup> Chemical synthesis of defined sequence RNA is fundamental to develop and understand the role and application of RNA. The enzymatic approach using RNA polymerase is template dependant and is therefore not a controlled sequence synthesis.<sup>3</sup> Chemical synthesis of RNA has been perfected to the extent that long sequences, such as biologically active 76-mer tRNA and multi-milligram quantities can be produced efficiently.<sup>4</sup>

**Small Interference RNA:**

Since the first description of this process in the nematode *C. elegans*<sup>5</sup> RNAi has become a powerful and widely used tool for gene down regulation and Andrew Fire and Craig Mello were awarded the Nobel Prize in medicine for the year 2006 in an honor of developments in RNAi mechanism. RNAi pathway is initiated by an endogenous ribonuclease enzyme called Dicer, which process long dsRNA molecules into short fragments of 21–23-nucleotide long siRNA molecules with the two nucleotide 3'overhanging ends. The siRNA molecules incorporated into RNA-induced silencing complex (RISC), where one of the two siRNA strands get unwinds. The single-stranded antisense molecule that is associated in RISC, sequence selectively binds to the specific mRNA transcript and an endonuclease from this complex cleaves the target mRNA. From the last few years, siRNA approach has become the preferred method for gene down regulation in many academic and industrial laboratories and it holds great therapeutic application for gene silencing.<sup>6</sup>

The RNAi offers astronomical potentials for understanding and manipulating human diseases at the cellular level. Among the vast and rapidly exploding field of siRNA, some key developments in this area are prediction of natural regulatory mechanism in the field of cell biology and functional genomics. This is expected to result in gene based drug discovery. Gene control, gene knock down, and target validation are currently being pursued with great vigor by a vast number of researchers worldwide. Short dsRNA's can be best obtained by Chemical synthesis. ChemGenes specializes in producing the highest purity RNA monomers for studies and further developments in this field.

**Use of Ethylthio Tetrazole (ETT) and Benzylthio Tetrazole (BMT):**

The use of ETT or BTT as an activator in RNA synthesis has been shown to enhance coupling efficiency in each step.<sup>7</sup>