This work deals with implementation of differential scanning kalorimetry (DSC) into research of potential oligonucleotide therapeutics. Capabilities and limits of the DSC device have been determined and optimal conditions for measurement of nucleic acids complexes specified. Four types of modified oligonucleotides with isopolar, non-isosteric internucleotide linkage, consisting in insertion of a methylene group into the phosphodiester linkage between the phosphorus and one of the two ester oxygens (the methylene group inserted or at 3‘ or at 5‘ side of the linkage, the modified linkages alternate with the natural ones or all linkages are modified) were investigated. We determined thermodynamics characteristics of hybrid duplexes composed of modified deoxythymidine pentadecamers and complementary RNA polymer chain, polyadenylic acid. The oligonucleotide with the methylene group at the 3’ side, the all linkages of which are modified, does not form complexes with polyadenylic acid. Other oligonucleotides form complexes and their stability increase in succession (3’ end, alternating) ~ (5’ end, all) < natural (dT)15 < (5’ end, alternating). High cooperativity of the oligonucleotide to the polymer binding has been found out for all complexes. RNA hairpin of HIV-1 TAR element and its R06 aptamer have been also characterized thermodynamically. Besides the thermodynamic parameters of the hairpin opening transition, a second low-temperature transition with remarkable hysteresis was analyzed in the case of the R06 hairpin. The “kissing” complex formed in an equimolar mixture of TAR and R06 hairpins was characterized quantitatively.