

Info Sheet (17.03.2010)

ZNA™-T_m Effect

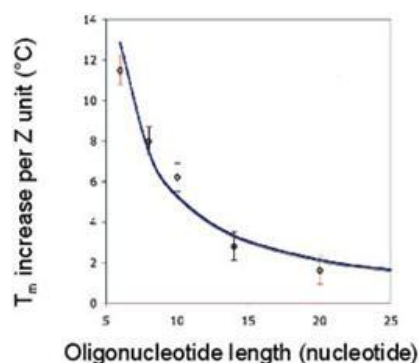
Guideline

T_m calculation of the ZNA™

The T_m of a ZNA™ oligo increases significantly and quite linearly with the number of grafted Z units. This is in general independent of the base sequence of the oligonucleotide and of the conjugation site of the cationic Z units (3' or 5'). The T_m increase per Z unit is mainly dependent on the length of the oligonucleotide.

The approximate T_m of the ZNA™ is then easily predictable, using a simple mathematical relation depending on the intrinsic DNA oligonucleotide T_m, on the length N of the oligonucleotide and on the number z of cationic units. (melting temperatures were measured in physiological ionic strength, 150 mM sodium chloride and pH 7.4; Noir et al., JACS 2008).

$$T_m(\text{ZNA}) = T_m(\text{DNA}) + \frac{36z}{(N - 3.2)}$$



Example:

Sequence: TGG CTA ACT AGA GAA CC
T_m(DNA) = 50.4 °C
ZNA-4 building block

$$T_m(\text{ZNA}) = 50.4 + \frac{36 * 4}{(17 - 3.2)} = 60.8 \text{ °C}$$

The following table provides a short guideline for the T_m increase by 4 or 5 Z-units in °C.

Oligo length in N		15	16	17	18	19	20	21	22	23	24	25	26	27
ZNA™ building block	ZNA-4	12,2	11,3	10,4	9,7	9,1	8,6	8,1	7,7	7,3	6,9	6,6	6,3	6,1
	ZNA-5	15,3	14,1	13,0	12,2	11,4	10,7	10,1	9,6	9,1	8,7	8,3	7,9	7,6

Oligo length in N		28	29	30	31	32	33	34	35	36	37	38	39	40
ZNA™ building block	ZNA-4	5,8	5,6	5,4	5,2	5,0	4,8	4,7	4,5	4,4	4,3	4,1	4,0	3,9
	ZNA-5	7,3	7,0	6,7	6,5	6,3	6,0	5,8	5,7	5,5	5,3	5,2	5,0	4,9

Please Note:

The T_m effect of Z-units can be higher or lower as indicated. There are many different algorithms to calculate the T_m of an oligo. All are just approximations for the actual T_m of a specific oligo under specific conditions (salt concentrations, pH, temperature, sequence composition, oligo length and other biophysical/biochemical parameters and reaction conditions). Optimization is always recommended.