

MW and TM calculation

ID	Base	BaseAbbrevia	MW	EC	Notes
1	DeoxyAdenosine	A	313.21	15.4	
2	DeoxyCytosine	C	289.19	7.4	
3	DeoxyGuanosine	G	329.21	11.5	
4	Thymidine	T	304.2	8.7	
5	Inosine	I	314.2	7.2	
6	A+G+T+C	N	308.95	10.7	
7	A+G	R	321.21	13.45	
8	C+T	Y	296.69	8.05	
9	A+C	M	301.2	11.4	
10	G+T	K	316.7	10.1	
11	G+C	S	309.2	9.45	
12	A+T	W	308.71	12.05	
13	A+T+C	H	302.2	10.5	
14	G+T+C	B	307.53	9.2	
15	G+A+T	D	315.54	11.86	
16	G+A+C	V	310.53	11.43	
18	phosphate	p	79.98	0	
19	Other	X	0	0	add mw of the
20	deoxy uridine	U	290.17	9.9	

Formulas

Size= Total number of bases.

%GC= (G+C)/Size

mw = (A x 313.2) + (C x 289.19) + (G x 329.21) + (T x 304.2) + (I x 314.2) + (N x 308.95) + (R x 321.21) + (Y x 296.69) + (M x 301.2) + (K x 316.7) + (S x 309.2) + (W x 308.71) + (H x 302.2) + (B x 307.53) + (D x 315.54) + (V x 310.53) + (P x 79.98) + (U x 290.17) -62

Tm For Oligos shorter than 25 bp = 2(A+T) + 4 (C+G)

For longer oligos: Reference Bolton, Et and McCarthy, B.J. (1962) PNAS 48: 139-1397

Tm=81.5 – 16.6 + (0.41 x %GC)) – 600 / size

EC =

Formula for Tm Calculation

Tm = 81.5 + 16.6 x Log10[Na+] + 0.41 (%GC) – 600/size

[Na+] is set to 100 mM

Example: 5'-ATGCATGCATGCATGCATG3' 20mer; GC=50%; AT= 50%

Tm = 81.5 + 16.6 x Log10[0.100] + 0.41 x 50 – 600/20

$$T_m = 81.5 - 16.6 + 0.41 \times 50 - 600/20$$

$$T_m = 81.5 - 16.6 + 20.5 - 30$$

$$T_m = 64.9 + 20.5 - 30$$

$$T_m = 85.40 - 30$$

$$T_m = 55.4^\circ \text{C}$$

T_m for same oligo using $2(A+T) + 4(C+G)$

$$= 2(5+5) + 4(5+5)$$

$$= 2(10) + 4(10)$$

$$= 20 + 40$$

$$= 60^\circ \text{C}$$