STANDARD NOMENCLATURE, DATA, AND ABBREVIATIONS

APPENDIX 1

Selected Abbreviations Used in This Manual

APPENDIX 1A

A adenine; adenosine
Ac acetyl
ACE acetoxyethoxy; acetoxyethyl
ADA adenosine deaminase
ADP adenosine 5′-diphosphate
ADTT 3-amino-1,2,4-dithiazoline-5-thione
AEEA 2-aminoethoxy-2-ethoxy acetic acid
AFM atomic force microscopy
AMP adenosine 5′-monophosphate
AMV-RT avian myoblastosis virus reverse transcriptase
ANA arabinonucleic acid
AP alkaline phosphatase
3-APA 3-aminopicolinic acid
APS ammonium persulfate
Ar aryl
ASY average stepwise yield
ATP adenosine 5′-triphosphate
ATPase adenosine triphosphatase
ATT 6-aza-2-thiothymine
AU absorbance units
AUFS absorbance units full scale
B base (nucleobase)
BAP bacterial alkaline phosphatase
BCIP 5-bromo-4-chloro-3-indolyl phosphate
BDT 3*H*-1,2-benzodithiol-3-one-1,1-dioxide
BHOC benzhydryloxycarbonyl
BIT benzimidazolium triflate
BMPM 1,1-bis(4-methoxyphenyl)-1-pyrenylmethyl
Bn benzyl
bNA branched nucleic acid
BOC *tert*-butyloxycarbonyl
BOMP 2-(benzotriazol-1-yloxy)-1,1-dimethyl-2-(pyrrolidin-1-yl)-1,3,2-diazaphospholidinium hexafluorophosphate
BSA bovine serum albumin; bis(trimethylsilyl)acetamide
Bu butyl
Bz benzoyl
C cytidine; cytosine
cAMP adenosine 3′,5′-cyclic-monophosphate
CD circular dichroism
CDI 1,1′-carbonyldiimidazole
cDNA complementary deoxyribonucleic acid
CDP cytidine 5′-diphosphate
CE capillary electrophoresis; cyanoethyl
C^{ex}_p excess heat capacity
CHA α-cyano-4-hydroxycinnamic acid
Ci curie
CID collision-induced dissociation
CMCT 1-cyclohexyl-3-(2-morpholinoethyl)carbodiimide metho-*p*-toluene sulfonate
CMP cytidine 5′-monophosphate
COSY correlation spectroscopy
CPG controlled-pore glass
CPI cyclopropapyrroloindole
CPK Corey-Pauling-Koltun (molecular models)
cpm counts per minute
CPMB *Current Protocols in Molecular Biology*
CSA D-10-camphorsulfonic acid
CSO (1*S*)-(+)(10-camphorsulfonyl)-oxaziridine
CSP calf spleen phosphodiesterase
CTAB cetyltrimethylammonium
Ctmp 1-(2-chloro-4-methylphenyl)-4-methoxypiperidin-4-yl
CTP cytidine 5′-triphosphate
dA deoxyadenosine
Dabcyl 4-[4-(dimethylamino)phenyl]-azobenzoic acid
dADP deoxyadenosine diphosphate
dAMP deoxyadenosine monophosphate
DAP diaminopurine
DAST (diethylamino)sulfur trifluoride
dATP deoxyadenosine triphosphate
DBMB 2-(dibromomethyl)benzoyl
DBPNC 2,6-dibromo-4-benzoquinone-*N*-chloroimine
DBU 1,8-diazabicyclo[3.4.0]undecene-7-ene
dC deoxycytosine

Current Protocols in Nucleic Acid Chemistry (2004) A.1A.1-A.1A.5

DCA dichloroacetic acid
DCC 1,3-dicyclohexylcarbodiimide
dCDP deoxycytosine diphosphate
DCHA dicyclohexylamine
DCI 4,5-dicyanoimidazole
DCM dichloromethane
dCMP deoxycytosine monophosphate
dCTP deoxycytosine triphosphate
DDQ 2,3-dichloro-5,6-dicyano-1,4-benzoquinone
DEAD diethyl azodicarboxylate
DEC 1-(3-dimethylaminopropyl)-3-ethylcarbodiimide
DEMA diethoxymethyl acetate
DEPC diethylpyrocarbonate
dG deoxyguanosine
DG distance geometry
dGDP deoxyguanosine diphosphate
dGMP deoxyguanosine monophosphate
dGTP deoxyguanosine triphosphate
DHB dihydroxybenzoic acid
DHPC dihexanoylphosphatidylcholine
dI deoxyinosine
DIAD diisopropyl azodicarboxylate
DIP 4,7-diphenyl-1,10-phenanthroline
DIPEA or DIEA diisopropylethylamine
DMAEDE 2′-*O*-2-[2-(*N*,*N*-dimethylamino)ethyloxy]ethyl
DMAoE 2′-*O*-[2-(*N*,*N*-dimethylaminooxy)ethyl
DMAP 4-dimethylaminopyridine
DMBOC 3′,5′- dimethoxybenzoin-oxycarbonyl
DMEM Dulbecco's minimal essential medium (or Dulbecco's modified Eagle's medium)
Dmf dimethylaminomethylene
DMF dimethylformamide
DMS dimethyl suberimidate; dimethyl sulfate
DMSO dimethylsulfoxide
DMPC dimyristoylphosphatidylcholine
DMTr 4,4′-dimethoxytrityl
DNA deoxyribonucleic acid
DNBSB 2-(2,4-dinitrophenylsulfenyl-oxymethyl)benzoyl
dNDP deoxynucleoside diphosphate
dNMP deoxynucleoside monophosphate
DNP 2,4-dinitrophenyl
DNPEOC 2-(2,4-dinitrophenyl)-ethoxycarbonyl
dNTP deoxynucleoside triphosphate
DODC 3,3′-diethyloxadicarbocyanine
DPC diphenylcarbamoyl
DPI 1,2-dihydro-3*H*-pyrrolo[3,2-e]indole-carboxylate
dpm disintegrations per minute
DSC differential scanning calorimetry; disuccinimidyl carbonate
dsDNA double-stranded DNA
dT deoxythymidine
dTDP deoxythymidine diphosphate
DTE dithioerythritol
dTMP deoxythymidine monophosphate
DTMT 2-(isopropylthiomethoxymethyl)-benzoyl
DTr 4-decyloxytrityl (C_{10}Tr)
DTT dithiothreitol
dTTP deoxythymidine triphosphate
dUTP deoxyuridine triphosphate
DVB divinylbenzene
DX double cross-over
EC Enzyme Commission
EDC 1-[3-(dimethylamino)propyl]-3-ethylcarbodiimide
EDITH 3-ethoxy-1,2,4-dithiazoline-5-one
EDTA ethylenediaminetetraacetic acid
EI electron impact (mass spectrometry)
ENU ethylnitrosourea
ESI electrospray ionization (mass spectrometry)
Et ethyl
FAB fast atom bombardment (mass spectrometry)
FAM 5-carboxyfluorescein
FDA (United States) Food and Drug Administration
FFT fast Fourier transform
FLB formamide loading buffer
Fm fluorenylmethyl
FMN flavin mononucleotide
FMOC 9-fluorenylmethoxycarbonyl
For formyl
FPLC fast protein liquid chromatography
Fpmp 1-(2-fluorophenyl)-4-methoxypiperidin-4-yl
FRET fluorescence resonance energy transfer
FTICR Fourier-transform ion-cyclotron resonance (mass spectrometry)
G guanine; guanosine
GDP guanosine 5′-diphosphate
GMP guanosine 5′-monophosphate
GTP guanosine 5′-triphosphate
HATU *O*-(7-azabenzotriazol-1-yl)-1,1,3,3-tetramethyluronium hexafluorophosphate
HBTU 2-(1*H*-benzotriazol-1-yl)-1,1,3,3-tetramethyluronium hexafluorophosphate
HEC hydroxyethylcellulose
HEG hexa(ethylene glycol)
HEPES *N*-(2-hydroxyethyl)piperazine-*N*′-(2-ethanesulfonic acid)
HEPPSO *N*-(2-hydroxyethyl)piperazine-*N*′-(2-hydroxypropanesulfonic acid)

HMDS hexamethyldisilazane
HMFS *N*-[9-(hydroxymethyl)-2-fluorenyl]succinamic acid
HMQC heteronuclear multiple quantum coherence
HNA hexitol nucleic acid
HOAt 7-aza-1-hydroxybenzotriazole
HOBt or HOBT 1-hydroxybenzotriazole
3-HPA 3-hydroxypicolinic acid
HPLC high-performance liquid chromatography
HPMC hydroxypropylmethylcellulose
HQDA hydroquinone-*O*,*O*′-diacetic acid
HRMS high-resolution mass spectrometry
HSDIS hydroxystyryldiisopropylsilyl
HSDMS hydroxystyryldimethylsilyl
HSQC heteronuclear single quantum coherence
HZ hydrazine
I inosine
***i*-Bu** isobutyl; isobutyryl
ICS isocarbostyril
IEC ion-exchange chromatography
IMT imidazolium triflate
***i*-Pr** isopropyl
IR infrared
IRAA internal reference amino acid
ITC isothermal titration calorimetry
IUB International Union of Biochemistry
IUPAC International Union of Pure and Applied Chemistry
JOE 6-carboxy-4′,5′-dichloro-2′,7′-dimethoxyfluorescein
LCAA long-chain alkylamine
LNA locked nucleic acid
LSIMS liquid secondary-ion mass spectrometry
L-TOF linear time-of-flight (mass spectrometry)
MALDI matrix-assisted laser desorption/ionization (mass spectrometry)
MAST [bis(2-methoxyethyl)amino]sulfur trifluoride
MB minor groove binder
MB-ODN minor groove binder–oligodeoxyribonucleotide conjugate
MBHA *p*-methylbenzhydrylamine
MC Monte Carlo
mCPBA *meta*-chloroperoxybenzoic acid (also 3-chloroperoxybenzoic acid)
MD molecular dynamics
MDMP 1,5-dimethoxylcarbonyl-3-methoxypentan-3-yl
Me methyl
MeNPOC methylnitropiperonyloxy-carbonyl
Me-P methylphosphonate
MES 2-(*N*-morpholino)ethanesulfonic acid
MICS methylisocarbostyril
MM molecular mechanical
MMI methylenemethylimino
MMTr 4-monomethoxytrityl
MOPS 3-(*N*-morpholino)propane sulfonic acid
MOTr 4-methoxy-4′-octyloxytrityl
MOX 9-(*p*-anisyl)xanthen-9-yl
MPC *N*-methylpyrrolecarboxamide
MPLC medium-pressure liquid chromatography
mRNA messenger ribonucleic acid
MS mass spectrometry
MSNT 1-(mesitylene-2-sulfonyl)-3-nitro-1,2,4-triazole
MTHP 4-methoxytetrahydropyran-4-yl
MTMB 2-(methylthiomethoxymethyl) butyryl
MTMT 2-(methylthiomethoxymethyl) benzoyl
MTPI methyltriphenoxyphosphonium iodide
MWCO molecular weight cutoff
NAB nucleic acid builder (computer program)
NAIM nucleotide analog interference mapping
NAIS nucleotide analog interference suppression
NBOM 2-nitrobenzyloxymethyl
NBT 5-nitrobenzimidazolium triflate; nitroblue tetrazolium
***n*-Bu** *n*-butyl
NDB Nucleic Acid Database
NDP nucleoside diphosphate
NDPK nucleoside diphosphate kinase
NHS *N*-hydroxysuccinimide
NMI *N*-methylimidazole
NMM *N*-methylmesoporphyrin
NMP nucleoside monophosphate; *N*-methylpyrrolidinone
NMR nuclear magnetic resonance
NOE nuclear Overhauser effect
NOESY nuclear Overhauser effect spectroscopy
N-P phosphoramidate
NP1 nuclease P1
NPE 2-(4-nitrophenyl)ethyl
NPEOC 2-(4-nitrophenyl)ethoxycarbonyl
NPOC nitrophenyloxycarbonyl

NPPOC 2-(2-nitrophenyl) propoxycarbonyl
NRC Nuclear Regulatory Commission
nt nucleotide
NTP nucleoside triphosphate
ODN oligodeoxyribonucleotide
PA picolinic acid
Pac or pac phenoxyacetyl
PACE phosphonoacetate
PAGE polyacrylamide gel electrophoresis
PAL peptide amide linker (resin)
PAM 4-hydroxymethylphenylamido-methyl (resin)
PAPOC *p*-phenylazophenyloxycarbonyl
PAPS 3′-phosphoadenosine-5′-phosphosulfate
PASS product-anchored sequential synthesis
PBS phosphate-buffered saline
PCR polymerase chain reaction
PDITC phenylene diisothiocyanate
PEG polyethylene glycol
PEG-MME polyethylene glycol–monomethyl ether
PEO polyethylene oxide
PEP phosphoenolpyruvate
PFP pentafluorophenyl
PFPC bis(pentafluorophenyl) carbonate
Ph phenyl
PICS 7-propynyloxycarbostyril
PIM 7-propynyl-3-methylisocarbostyril
PIPES piperazine-*N*,*N*′-bis(2-ethanesulfonic acid)
PMSF phenylmethylsulfonyl fluoride
PMT photomultiplier tube
pn or PN phosphoramidate (linkage)
PNA peptide nucleic acid
PNK polynucleotide kinase
pnODN oligodeoxyribonucleotide N3′→P5′ phosphoramidate
PNP purine nucleoside phosphorylase
po or PO phosphodiester (linkage)
Pr propyl
PPA or PPG pyrazolo[3,4-*d*]pyrimidine analog of dA or dG
ps or PS phosphorothioate (linkage)
PS polystyrene
PTFE polytetrafluoroethylene
PTMT 2-(isopropylthiomethoxymethyl) benzoyl
Pu purine
Pv pivaloyl
Px 9-phenylxanthen-9-yl (pixyl)
PX paranemic cross-over
Py pyrimidine
PyAOP 7-aza-benzotriazol-1-yl-oxytripyrrolidinophosphonium hexafluorophosphate
PyBOP 1*H*-benzotriazol-1-yl-oxytripyrrolidinophosphonium hexafluorophosphate
QM quantum mechanics or quantum mechanical
QNAIM quantitative nucleotide analog interference mapping
R, R′. . . alkyl groups
R_f retention factor (TLC)
RFP radiofrequency plasma
RFLP restriction fragment length polymorphism
rMD restrained molecular dynamics
RMSD root mean squared deviation
RNA ribonucleic acid
RNAi RNA interference
RNAP RNA polymerase
RNase ribonuclease
RNP ribonucleoprotein
ROX 5-(and 6-)carboxy-X-rhodamine
RP-HPLC reversed-phase high-performance liquid chromatography
RT-PCR reverse transcription polymerase chain reaction
SA sinapinic acid
SDS sodium dodecyl sulfate
***sec*-Bu** *sec*-butyl
SELEX Systematic Evolution of Ligands by Exponential Enrichment
SET 5-ethylthio-1*H*-tetrazole
siRNA small interfering RNA
SNP single nucleotide polymorphism
S-PACE thiophosphonoacetate
3SR self-sustained sequence replication
SSC sodium chloride/sodium citrate (buffer)
SSCP single-stranded conformational polymorphism
ssDNA single-stranded DNA
SSPE saline sodium phosphate/EDTA (buffer)
STM scanning tunneling microscopy
STR short tandem repeats
SVPD or SVP snake venom phosphodiesterase
T thymidine; thymine
T-jump temperature-jump (relaxation)
tac *tert*-butylphenoxyacetyl (also *t*-PAC)
TAE Tris/acetate/EDTA (buffer)
TAMRA 5-(and 6-)carboxy-*N*,*N*,*N*′,*N*′-tetramethylrhodamine
TBAF tetrabutylammonium fluoride

TBDMS *tert*-butyldimethylsilyl
TBE Tris/borate/EDTA (buffer)
TBF 4-[17-tetrabenzo(*a*,*c*,*g*,*i*) fluorenylmethyl]
TBS Tris-buffered saline
***t*-Bu** *tert*-butyl
TBAF tetrabutylammonium fluoride
TBAP tetrabutylammonium phosphate (also pyrophosphate or dihydrogenphosphate)
TBE Tris/borate/EDTA (buffer)
TCA trichloroacetic acid
TCEP tris-(2-carboxyethyl)phosphine
TDP thymidine 5′-diphosphate
TE Tris/EDTA (buffer)
TEA triethylamine (also Et_3N)
TEAA triethylammonium acetate
TEAB triethylammonium bicarbonate
TEMED *N*,*N*,*N*′,*N*′-tetramethyl-ethylenediamine
TES *N*-tris(hydroxymethyl)methyl-2-aminoethanesulfonic acid
TFA trifluoroacetic acid
TFC triplex-forming circle
TFMSA trifluoromethanesulfonic acid
TFO triplex-forming oligonucleotide
TFP tetrafluorophenyl
THAP 2′,4′,6′-trihydroxyacetophenone
THF tetrahydrofuran
THP tetrahydropyran-2-yl
TIPS triisopropylsilyl; tetraisopropyldisiloxane
TLC thin-layer chromatography
TMP 3,4,7,8-tetramethyl-1,10-phenanthroline; thymidine 5′-monophosphate; trisodium trimetaphosphate
TMS trimethylsilyl
TMSE trimethylsilylethyl
TMS-OTf trimethylsilyl trifluoromethanesulfonate
TMTr trimethoxytrityl
TNT terminal deoxyribonucleotide transferase
TOCSY total correlation spectroscopy
TOF time-of-flight (mass spectrometry)
Tol toluoyl
TOM [(triisopropylsilyl)oxy]methyl
***t*-PAC** *tert*-butylphenoxyacetyl (also tac)
TPP triphenylphosphine
Tr diphenylmethyl (trityl)
tRNA transfer ribonucleic acid
TREAT-HF triethylammonium trihydrofluoride
Tris tris(hydroxymethyl)aminomethane
TROSY transverse relaxation–optimized spectroscopy
Ts *p*-toluenesulfonyl (tosyl)
TsOH toluene-4-sulfonic acid
TTP thymidine 5′-triphosphate
TX triple cross-over
U uracil; uridine
UDP uridine 5′-diphosphate
UMP uridine 5′-monophosphate
UTP uridine 5′-triphosphate
UV ultraviolet
VNTR variable number tandem repeats
XAL xanthen alkonic acid (linker/resin)
yDBR yeast debranching enzyme