



Full wwPDB X-ray Structure Validation Report ⓘ

Sep 5, 2023 – 08:38 AM EDT

PDB ID : 3V6J
Title : Replication of N2,3-Ethenoguanine by DNA Polymerases
Authors : Zhao, L.
Deposited on : 2011-12-19
Resolution : 2.30 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.35
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.35

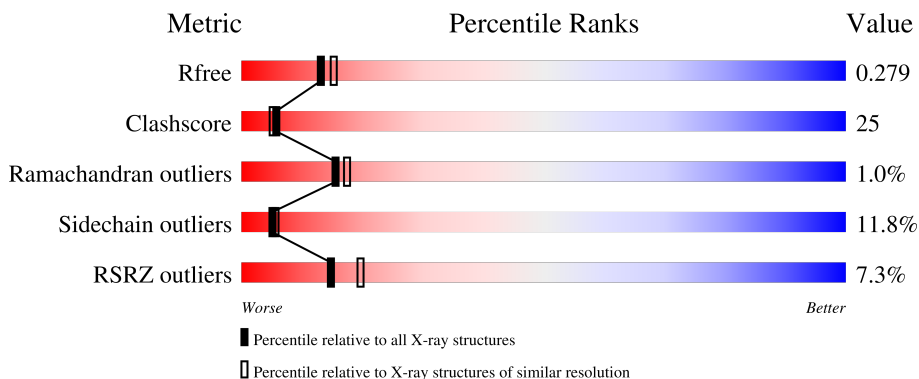
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.30 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.




Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	5042 (2.30-2.30)
Clashscore	141614	5643 (2.30-2.30)
Ramachandran outliers	138981	5575 (2.30-2.30)
Sidechain outliers	138945	5575 (2.30-2.30)
RSRZ outliers	127900	4938 (2.30-2.30)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	348	
1	J	348	
2	K	12	
2	P	12	
3	B	17	

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Mol	Chain	Length	Quality of chain
3	M	17	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	DOC	K	13	-	-	X	-
3	EFG	M	5	-	-	X	-

2 Entry composition i

There are 6 unique types of molecules in this entry. The entry contains 6824 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called DNA polymerase IV.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	343	Total 2762	C 1771	N 476	O 508	S 7	2	0	0
1	J	343	Total 2754	C 1765	N 474	O 508	S 7	1	0	0

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-5	HIS	-	expression tag	UNP Q97W02
A	-4	HIS	-	expression tag	UNP Q97W02
A	-3	HIS	-	expression tag	UNP Q97W02
A	-2	HIS	-	expression tag	UNP Q97W02
A	-1	HIS	-	expression tag	UNP Q97W02
A	0	HIS	-	expression tag	UNP Q97W02
J	-5	HIS	-	expression tag	UNP Q97W02
J	-4	HIS	-	expression tag	UNP Q97W02
J	-3	HIS	-	expression tag	UNP Q97W02
J	-2	HIS	-	expression tag	UNP Q97W02
J	-1	HIS	-	expression tag	UNP Q97W02
J	0	HIS	-	expression tag	UNP Q97W02

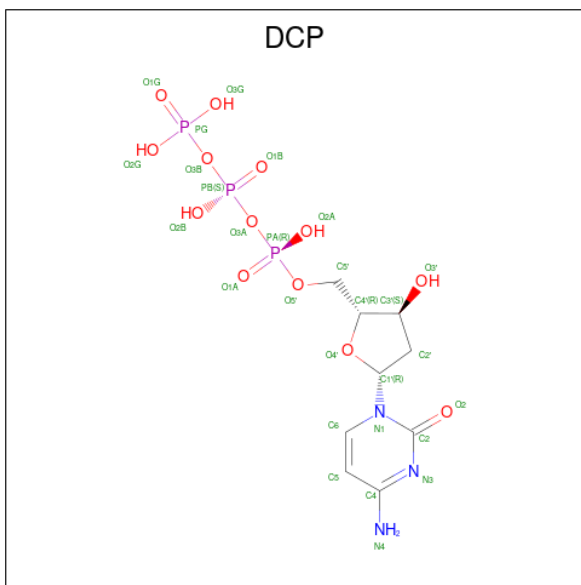
- Molecule 2 is a DNA chain called DNA (5'-D(*GP*GP*GP*GP*AP*AP*GP*GP*AP*TP*TP*(DOC))-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
2	P	12	Total 250	C 119	N 52	O 68	P 11	0	0	0
2	K	11	Total 231	C 109	N 47	O 64	P 11	0	0	0

- Molecule 3 is a DNA chain called DNA (5'-D(*TP*CP*AP*TP*(EFG)P*GP*AP*AP*TP*CP*CP*TP*TP*CP*CP*CP*C)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace	
			Total	C	F	N	O				P
3	B	17	Total 340	C 165	F 1	N 56	O 102	P 16	0	0	0
3	M	13	Total 264	C 127	F 1	N 43	O 80	P 13	0	0	0

- Molecule 4 is 2'-DEOXYCYTIDINE-5'-TRIPHOSPHATE (three-letter code: DCP) (formula: C₉H₁₆N₃O₁₃P₃).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
4	A	1	Total 28	C 9	N 3	O 13	P 3	0	0
4	J	1	Total 28	C 9	N 3	O 13	P 3	0	0

- Molecule 5 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	2	Total 2 Mg 2	0	0
5	J	2	Total 2 Mg 2	0	0
5	K	1	Total 1 Mg 1	0	0

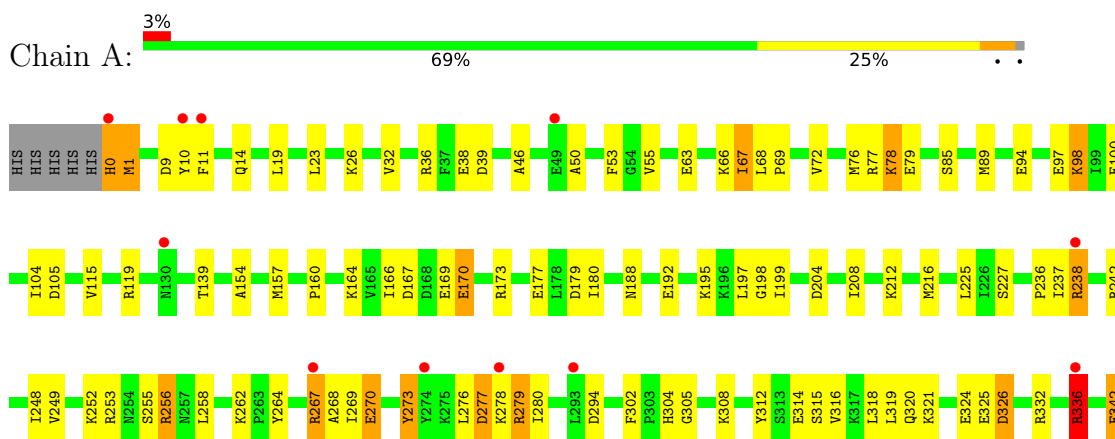
- Molecule 6 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	99	Total O 99 99	0	0
6	J	43	Total O 43 43	0	0
6	P	7	Total O 7 7	0	0
6	B	8	Total O 8 8	0	0
6	K	3	Total O 3 3	0	0
6	M	2	Total O 2 2	0	0

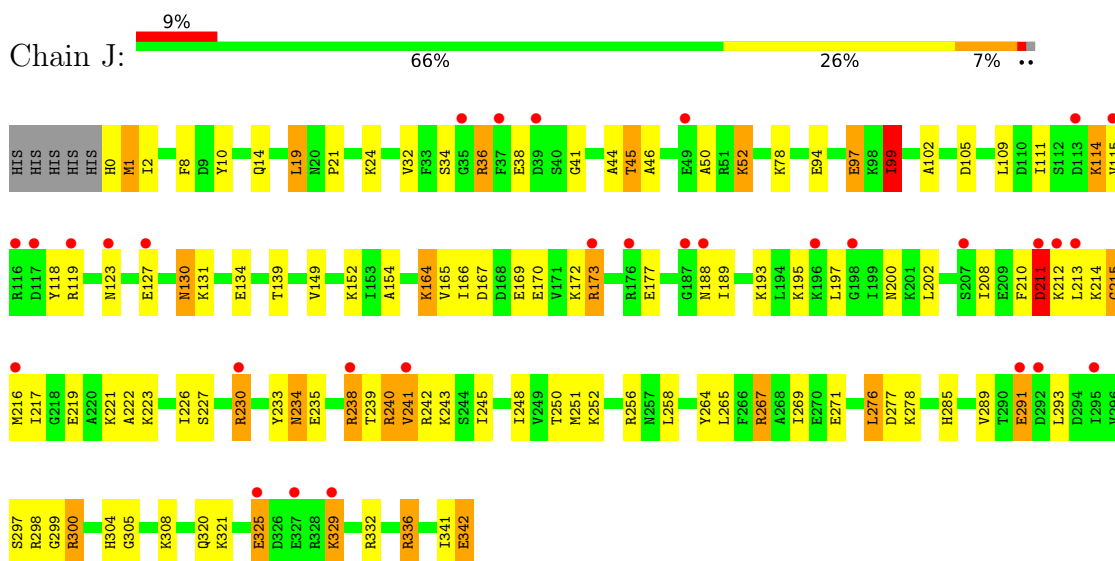
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

- Molecule 1: DNA polymerase IV



- Molecule 1: DNA polymerase IV

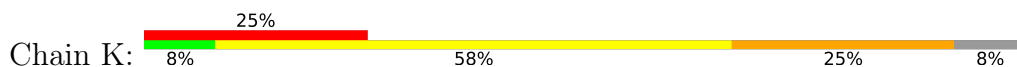


- Molecule 2: DNA (5'-D(*GP*GP*GP*GP*AP*AP*GP*GP*AP*TP*TP*(DOC))-3')

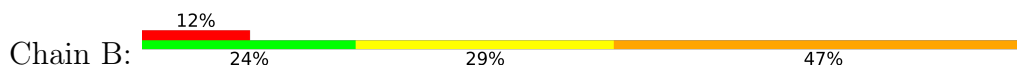




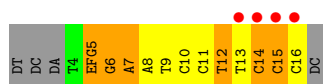
- Molecule 2: DNA (5'-D(*GP*GP*GP*GP*AP*AP*GP*GP*AP*TP*TP*(DOC))-3')



- Molecule 3: DNA (5'-D(*TP*CP*AP*TP*(EFG)P*GP*AP*AP*TP*CP*CP*TP*TP*CP*CP*CP*C)-3')



- Molecule 3: DNA (5'-D(*TP*CP*AP*TP*(EFG)P*GP*AP*AP*TP*CP*CP*TP*TP*CP*CP*CP*C)-3')



4 Data and refinement statistics i

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	52.70Å 111.42Å 98.81Å 90.00° 102.57° 90.00°	Depositor
Resolution (Å)	29.84 – 2.30 29.84 – 2.30	Depositor EDS
% Data completeness (in resolution range)	97.7 (29.84-2.30) 97.8 (29.84-2.30)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.45 (at 2.29Å)	Xtrriage
Refinement program	REFMAC 5.6.0117	Depositor
R, R_{free}	0.210 , 0.273 0.220 , 0.279	Depositor DCC
R_{free} test set	2456 reflections (5.06%)	wwPDB-VP
Wilson B-factor (Å ²)	47.5	Xtrriage
Anisotropy	0.072	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 53.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	0.026 for h,-k,-h-l	Xtrriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	6824	wwPDB-VP
Average B, all atoms (Å ²)	62.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.86% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality i

5.1 Standard geometry i

Bond lengths and bond angles in the following residue types are not validated in this section: MG, EFG, DCP, DOC

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
1	A	0.93	0/2802	1.08	9/3763 (0.2%)
1	J	0.73	0/2794	0.86	1/3755 (0.0%)
2	K	0.49	0/240	1.16	3/370 (0.8%)
2	P	1.00	2/262 (0.8%)	1.45	9/405 (2.2%)
3	B	0.79	1/349 (0.3%)	1.54	11/532 (2.1%)
3	M	0.92	2/264 (0.8%)	1.29	4/401 (1.0%)
All	All	0.83	5/6711 (0.1%)	1.07	37/9226 (0.4%)

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	P	4	DG	O3'-P	-10.61	1.48	1.61
3	M	7	DA	O3'-P	-10.01	1.49	1.61
3	M	6	DG	O3'-P	8.39	1.71	1.61
2	P	3	DG	O3'-P	5.85	1.68	1.61
3	B	3	DA	O3'-P	-5.06	1.55	1.61

All (37) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	M	6	DG	P-O3'-C3'	13.44	135.83	119.70
2	P	3	DG	P-O3'-C3'	11.50	133.50	119.70
3	B	1	DT	P-O3'-C3'	10.28	132.04	119.70
2	P	12	DT	O5'-P-OP1	-9.60	97.06	105.70
2	P	2	DG	P-O3'-C3'	8.59	130.00	119.70
1	A	336	ARG	NE-CZ-NH2	-8.30	116.15	120.30
2	K	11	DT	P-O3'-C3'	8.03	129.33	119.70
2	P	11	DT	P-O3'-C3'	7.79	129.06	119.70
3	M	14	DC	P-O3'-C3'	7.45	128.64	119.70
2	K	12	DT	O5'-P-OP1	-7.30	99.13	105.70

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	P	10	DA	P-O3'-C3'	6.94	128.03	119.70
3	B	10	DC	P-O3'-C3'	-6.93	111.38	119.70
3	B	2	DC	O3'-P-O5'	6.71	116.75	104.00
3	B	7	DA	O5'-P-OP2	-6.65	99.72	105.70
2	K	11	DT	O5'-P-OP1	-6.58	99.78	105.70
2	P	5	DG	P-O3'-C3'	6.50	127.50	119.70
1	J	240	ARG	N-CA-C	6.48	128.50	111.00
1	A	167	ASP	CB-CG-OD1	6.43	124.09	118.30
3	B	6	DG	C1'-O4'-C4'	-6.24	103.86	110.10
3	M	15	DC	P-O3'-C3'	6.10	127.02	119.70
3	B	3	DA	P-O3'-C3'	6.07	126.98	119.70
3	B	11	DC	O5'-P-OP2	-6.03	100.27	105.70
2	P	7	DA	P-O3'-C3'	6.02	126.93	119.70
2	P	8	DG	P-O3'-C3'	6.00	126.90	119.70
3	B	8	DA	O3'-P-O5'	-5.88	92.83	104.00
3	M	12	DT	P-O3'-C3'	5.83	126.69	119.70
1	A	336	ARG	CG-CD-NE	-5.62	99.99	111.80
2	P	2	DG	O3'-P-O5'	5.48	114.41	104.00
3	B	14	DC	P-O3'-C3'	5.42	126.21	119.70
1	A	336	ARG	NE-CZ-NH1	5.39	123.00	120.30
1	A	67	ILE	CB-CA-C	-5.36	100.88	111.60
3	B	11	DC	O3'-P-O5'	-5.36	93.83	104.00
1	A	179	ASP	CB-CG-OD1	5.31	123.08	118.30
1	A	77	ARG	NE-CZ-NH2	5.26	122.93	120.30
1	A	100	GLU	OE1-CD-OE2	-5.17	117.10	123.30
1	A	270	GLU	CB-CA-C	-5.12	100.17	110.40
3	B	6	DG	P-O3'-C3'	5.10	125.82	119.70

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2762	0	2902	98	0
1	J	2754	0	2880	119	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	K	231	0	124	45	0
2	P	250	0	136	20	0
3	B	340	0	193	44	0
3	M	264	0	147	37	0
4	A	28	0	12	2	0
4	J	28	0	12	6	0
5	A	2	0	0	0	0
5	J	2	0	0	0	0
5	K	1	0	0	0	0
6	A	99	0	0	12	0
6	B	8	0	0	2	0
6	J	43	0	0	6	0
6	K	3	0	0	1	0
6	M	2	0	0	0	0
6	P	7	0	0	0	0
All	All	6824	0	6406	324	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 25.

All (324) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:K:4:DG:H1'	2:K:5:DG:C5'	1.56	1.35
3:B:10:DC:C6	3:B:10:DC:H5''	1.67	1.27
1:A:66:LYS:HA	6:A:573:HOH:O	1.36	1.25
2:K:9:DG:H2'	6:K:202:HOH:O	1.36	1.21
1:A:195:LYS:HE2	6:A:585:HOH:O	1.36	1.20
1:J:341:ILE:CG2	1:J:342:GLU:H	1.55	1.19
2:K:12:DT:H2''	2:K:13:DOC:H6	1.26	1.16
1:A:248:ILE:HD11	6:A:512:HOH:O	1.47	1.15
1:J:341:ILE:HG22	1:J:342:GLU:N	1.54	1.12
1:J:342:GLU:HG3	1:J:342:GLU:O	1.48	1.11
3:B:10:DC:H3'	6:B:101:HOH:O	1.48	1.10
1:J:164:LYS:HD2	1:J:165:VAL:O	1.53	1.07
3:B:10:DC:H4'	3:B:10:DC:OP1	1.30	1.07
2:K:4:DG:C1'	2:K:5:DG:H5'	1.88	1.02
2:P:12:DT:N3	3:B:7:DA:H2	1.56	1.01
3:B:10:DC:H6	3:B:10:DC:C5'	1.73	1.00
2:K:4:DG:H2''	2:K:5:DG:O5'	1.59	1.00
2:K:12:DT:H2''	2:K:13:DOC:C6	1.91	1.00

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:J:170:GLU:HG2	1:J:173:ARG:HD2	1.44	1.00
1:J:14:GLN:HE22	1:J:139:THR:H	1.01	0.99
3:B:10:DC:OP1	3:B:10:DC:C4'	2.10	0.99
1:A:264:TYR:O	1:A:267:ARG:HG3	1.61	0.98
2:P:12:DT:N3	3:B:7:DA:C2	2.28	0.98
1:J:211:ASP:OD1	1:J:211:ASP:C	2.00	0.97
2:K:11:DT:H3	3:M:8:DA:H2	0.96	0.95
1:J:238:ARG:HG3	1:J:238:ARG:O	1.65	0.95
3:B:10:DC:H5''	3:B:10:DC:H6	0.78	0.94
1:A:157:MET:CE	1:A:164:LYS:HE3	1.99	0.93
2:K:4:DG:C1'	2:K:5:DG:C5'	2.46	0.93
2:K:12:DT:H2'	2:K:13:DOC:H5	1.52	0.92
3:B:9:DT:H5''	3:B:9:DT:H6	1.32	0.92
1:J:341:ILE:HG22	1:J:342:GLU:H	0.76	0.91
2:P:2:DG:H2'	2:P:3:DG:O4'	1.71	0.91
1:J:173:ARG:HH11	1:J:173:ARG:CG	1.81	0.90
1:J:164:LYS:CD	1:J:165:VAL:O	2.20	0.90
1:J:189:ILE:O	1:J:193:LYS:HG3	1.71	0.89
2:K:4:DG:H1'	2:K:5:DG:H5'	0.91	0.89
1:J:173:ARG:HH11	1:J:173:ARG:HG2	1.35	0.89
3:M:5:EFG:H10	3:M:5:EFG:H1'	1.55	0.89
3:M:16:DC:H2'	3:M:16:DC:O2	1.73	0.89
2:K:12:DT:O2	3:M:7:DA:H2	1.56	0.88
1:J:164:LYS:HE3	1:J:165:VAL:O	1.74	0.87
4:J:401:DCP:H5'2	6:J:503:HOH:O	1.75	0.86
2:K:4:DG:C2'	2:K:5:DG:O5'	2.23	0.86
1:A:157:MET:HE3	1:A:164:LYS:HE3	1.56	0.86
2:P:12:DT:H3	3:B:7:DA:H2	0.90	0.84
1:J:99:ILE:HG13	1:J:109:LEU:CD2	2.08	0.83
1:J:211:ASP:OD1	1:J:211:ASP:O	1.97	0.82
1:J:336:ARG:HH22	3:M:8:DA:P	2.03	0.82
1:A:69:PRO:HA	6:A:564:HOH:O	1.79	0.81
3:M:16:DC:O2	3:M:16:DC:C2'	2.29	0.81
1:J:164:LYS:CE	1:J:165:VAL:O	2.29	0.81
1:A:264:TYR:O	1:A:267:ARG:CG	2.30	0.80
1:A:10:TYR:CZ	1:A:14:GLN:HG3	2.17	0.80
3:M:12:DT:H1'	3:M:13:DT:H5'	1.64	0.80
2:K:11:DT:H2'	2:K:12:DT:H71	1.64	0.80
2:K:12:DT:N3	3:M:7:DA:C2	2.50	0.80
1:A:10:TYR:OH	1:A:14:GLN:HG3	1.82	0.79
1:J:238:ARG:HD2	1:J:239:THR:O	1.83	0.79

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:J:99:ILE:HG13	1:J:109:LEU:HD22	1.62	0.79
1:J:300:ARG:HG3	6:J:530:HOH:O	1.83	0.79
2:K:12:DT:C2'	2:K:13:DOC:C6	2.61	0.79
2:K:12:DT:C2	3:M:7:DA:H2	2.00	0.79
1:A:0:HIS:O	1:A:1:MET:HB3	1.82	0.78
1:A:0:HIS:O	1:A:1:MET:CB	2.32	0.78
1:J:24:LYS:HA	6:J:521:HOH:O	1.84	0.77
1:J:14:GLN:NE2	1:J:139:THR:H	1.82	0.77
2:P:2:DG:H2'	2:P:3:DG:C4'	2.14	0.77
1:A:249:VAL:HG11	1:A:267:ARG:NE	2.00	0.77
1:A:63:GLU:OE2	1:A:66:LYS:HE2	1.85	0.76
4:J:401:DCP:H1'	2:K:13:DOC:H2'	1.67	0.76
1:J:251:MET:HG2	1:J:264:TYR:CD2	2.20	0.76
2:K:12:DT:C2'	2:K:13:DOC:C5	2.64	0.75
1:J:114:LYS:HA	1:J:114:LYS:HE2	1.67	0.75
1:J:173:ARG:CG	1:J:173:ARG:NH1	2.46	0.74
1:A:248:ILE:HD11	6:A:565:HOH:O	1.86	0.74
1:J:164:LYS:HD2	1:J:165:VAL:N	2.02	0.74
1:J:52:LYS:HD2	6:J:537:HOH:O	1.86	0.74
1:A:277:ASP:O	1:A:278:LYS:HB2	1.88	0.74
1:J:210:PHE:CE1	1:J:214:LYS:HB2	2.22	0.74
4:J:401:DCP:C1'	2:K:13:DOC:H2'	2.18	0.74
1:J:291:GLU:HG2	1:J:329:LYS:HB2	1.69	0.73
2:K:12:DT:H2'	2:K:13:DOC:C5	2.18	0.73
3:M:12:DT:H2'	3:M:13:DT:OP2	1.89	0.73
1:A:270:GLU:CD	1:A:312:TYR:HH	1.92	0.72
3:M:5:EFG:H1'	3:M:5:EFG:C9	2.19	0.72
1:J:277:ASP:O	1:J:278:LYS:CB	2.34	0.72
3:B:10:DC:C6	3:B:10:DC:C5'	2.59	0.72
1:A:154:ALA:HB2	1:A:166:ILE:HD12	1.70	0.72
1:A:67:ILE:O	1:A:67:ILE:HG22	1.90	0.71
1:A:332:ARG:NH1	3:B:6:DG:H21	1.87	0.71
3:B:1:DT:C6	3:B:1:DT:C5'	2.74	0.71
2:P:12:DT:C2	3:B:7:DA:H2	2.08	0.71
1:A:14:GLN:HE22	1:A:139:THR:H	1.39	0.70
1:J:267:ARG:NH1	1:J:271:GLU:OE2	2.24	0.70
1:J:336:ARG:NH2	3:M:8:DA:OP2	2.26	0.69
2:P:3:DG:C2'	2:P:4:DG:C8	2.76	0.69
1:J:21:PRO:O	1:J:24:LYS:HB2	1.92	0.69
1:J:219:GLU:OE2	1:J:223:LYS:HE2	1.91	0.69
1:A:302:PHE:HZ	1:A:314:GLU:HG3	1.58	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:38:GLU:O	1:A:39:ASP:HB2	1.93	0.68
1:J:298:ARG:HD2	1:J:321:LYS:HE3	1.76	0.67
1:J:243:LYS:N	3:M:9:DT:OP1	2.21	0.67
3:B:1:DT:H2''	3:B:2:DC:H5'	1.76	0.67
1:A:270:GLU:CD	1:A:312:TYR:OH	2.32	0.67
1:J:332:ARG:HH21	3:M:5:EFG:H2'	1.60	0.66
1:J:154:ALA:HB2	1:J:166:ILE:HD12	1.77	0.66
1:J:332:ARG:NH2	3:M:6:DG:OP2	2.28	0.66
1:J:300:ARG:CG	6:J:530:HOH:O	2.42	0.66
2:P:3:DG:H2'	2:P:4:DG:C8	2.30	0.66
1:A:302:PHE:CZ	1:A:314:GLU:HG3	2.31	0.66
3:B:1:DT:H5''	3:B:1:DT:H6	1.61	0.65
3:B:5:EFG:O5'	3:B:5:EFG:H8	1.95	0.65
1:J:238:ARG:O	1:J:238:ARG:CG	2.40	0.65
2:P:11:DT:H3	3:B:8:DA:H2	1.41	0.65
1:J:211:ASP:CG	1:J:212:LYS:HD3	2.16	0.65
1:A:248:ILE:CD1	6:A:512:HOH:O	2.21	0.65
1:J:211:ASP:OD1	1:J:212:LYS:HD3	1.98	0.64
1:J:304:HIS:HD2	1:J:305:GLY:O	1.79	0.64
3:B:15:DC:H2''	3:B:16:DC:C5	2.31	0.64
1:J:341:ILE:CG2	1:J:342:GLU:N	2.27	0.64
2:K:5:DG:OP1	2:K:5:DG:H3'	1.96	0.64
2:K:10:DA:H2'	2:K:11:DT:H71	1.78	0.64
4:A:401:DCP:HN41	3:B:5:EFG:H1	1.46	0.63
3:B:5:EFG:H1'	3:B:5:EFG:H10	1.81	0.63
1:A:10:TYR:CE2	1:A:14:GLN:HB2	2.33	0.63
1:A:316:VAL:O	1:A:320:GLN:HG3	1.97	0.63
2:K:11:DT:N3	3:M:8:DA:H2	1.81	0.63
2:P:2:DG:N2	2:P:3:DG:C6	2.67	0.63
1:A:32:VAL:HG21	3:B:5:EFG:C9	2.29	0.62
1:A:157:MET:HE1	1:A:164:LYS:HE3	1.81	0.62
1:A:267:ARG:HG3	1:A:268:ALA:N	2.15	0.62
1:A:264:TYR:HA	1:A:267:ARG:HG2	1.80	0.62
1:J:46:ALA:HB1	1:J:50:ALA:HB3	1.80	0.62
3:B:15:DC:H2''	3:B:16:DC:C6	2.35	0.62
2:K:11:DT:N3	3:M:8:DA:C2	2.58	0.62
1:A:248:ILE:CD1	6:A:565:HOH:O	2.46	0.62
2:K:13:DOC:O2	3:M:6:DG:N7	2.33	0.62
1:J:188:ASN:HB3	6:J:518:HOH:O	1.98	0.61
1:J:342:GLU:O	1:J:342:GLU:CG	2.36	0.61
3:B:9:DT:H5''	3:B:9:DT:C6	2.24	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:B:1:DT:C6	3:B:1:DT:H5''	2.35	0.61
3:B:10:DC:H2''	3:B:11:DC:O5'	2.00	0.61
2:K:12:DT:C2	3:M:7:DA:C2	2.83	0.60
2:K:12:DT:O2	3:M:7:DA:C2	2.47	0.60
3:B:9:DT:H6	3:B:9:DT:C5'	2.10	0.60
1:A:11:PHE:HE2	1:A:104:ILE:HG12	1.66	0.60
1:J:2:ILE:HG22	1:J:111:ILE:HG13	1.85	0.59
1:J:32:VAL:HG21	3:M:5:EFG:H9	1.84	0.59
1:J:245:ILE:HB	1:J:276:LEU:HD21	1.84	0.59
2:K:4:DG:H1'	2:K:5:DG:O5'	2.01	0.59
1:J:285:HIS:CD2	1:J:299:GLY:HA3	2.37	0.59
1:A:10:TYR:CZ	1:A:14:GLN:CG	2.86	0.58
2:P:2:DG:H2'	2:P:3:DG:H5''	1.84	0.58
1:A:10:TYR:CE2	1:A:14:GLN:CB	2.87	0.57
4:J:401:DCP:O4'	2:K:13:DOC:H2'	2.05	0.57
3:M:14:DC:H1'	3:M:15:DC:O5'	2.04	0.57
1:A:67:ILE:O	1:A:67:ILE:CG2	2.52	0.57
1:J:245:ILE:HB	1:J:276:LEU:CD2	2.35	0.57
1:A:0:HIS:N	1:A:0:HIS:CD2	2.72	0.57
1:J:214:LYS:HG3	1:J:219:GLU:HA	1.86	0.57
2:P:3:DG:H2''	2:P:4:DG:C8	2.40	0.57
1:J:341:ILE:O	1:J:342:GLU:C	2.43	0.57
2:K:5:DG:H1	3:M:14:DC:N4	2.02	0.57
1:A:332:ARG:NH1	3:B:6:DG:N2	2.53	0.56
1:J:34:SER:HB3	3:M:5:EFG:H4'	1.87	0.56
1:J:289:VAL:HB	1:J:332:ARG:HB2	1.86	0.56
2:K:11:DT:O4	3:M:8:DA:N1	2.38	0.56
3:M:8:DA:H2''	3:M:9:DT:C6	2.40	0.56
1:J:130:ASN:O	1:J:130:ASN:ND2	2.36	0.56
1:J:173:ARG:NH1	1:J:173:ARG:HG3	2.20	0.56
2:P:2:DG:H2'	2:P:3:DG:C5'	2.35	0.56
1:J:241:VAL:CG1	1:J:242:ARG:N	2.69	0.55
1:J:164:LYS:HD2	1:J:165:VAL:C	2.25	0.55
1:J:170:GLU:HA	1:J:173:ARG:HB3	1.89	0.55
3:B:1:DT:C5'	3:B:1:DT:H6	2.16	0.55
1:A:197:LEU:CD1	1:A:216:MET:HG2	2.38	0.54
2:K:4:DG:C1'	2:K:5:DG:O5'	2.53	0.54
1:J:210:PHE:O	1:J:213:LEU:N	2.40	0.54
1:A:157:MET:HE3	1:A:164:LYS:CE	2.33	0.54
2:K:11:DT:H2''	2:K:12:DT:H6	1.73	0.54
1:A:166:ILE:HG23	1:A:170:GLU:HB3	1.90	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:342:GLU:HA	6:A:558:HOH:O	2.08	0.53
2:K:7:DA:N1	3:M:13:DT:O2	2.41	0.53
3:B:1:DT:H2''	3:B:2:DC:C5'	2.38	0.53
1:A:320:GLN:O	1:A:324:GLU:HG2	2.09	0.53
1:A:195:LYS:O	1:A:198:GLY:N	2.35	0.53
1:A:199:ILE:HG23	1:A:204:ASP:HB2	1.92	0.52
1:J:44:ALA:C	1:J:45:THR:HG22	2.29	0.52
3:M:11:DC:H2''	3:M:12:DT:C5	2.45	0.52
1:J:321:LYS:O	1:J:321:LYS:HG2	2.10	0.52
1:A:269:ILE:HD11	1:A:315:SER:OG	2.10	0.52
1:J:210:PHE:HD1	1:J:211:ASP:N	2.08	0.52
2:P:11:DT:O4	3:B:8:DA:N1	2.43	0.52
6:A:589:HOH:O	1:J:19:LEU:HG	2.09	0.51
1:A:173:ARG:HG2	1:A:177:GLU:OE1	2.10	0.51
1:J:211:ASP:OD1	1:J:212:LYS:CD	2.58	0.51
1:A:169:GLU:OE2	1:A:169:GLU:N	2.40	0.51
1:J:164:LYS:HD2	1:J:164:LYS:C	2.31	0.51
1:J:230:ARG:CB	1:J:230:ARG:HH11	2.23	0.51
2:P:2:DG:C2'	2:P:3:DG:C4'	2.87	0.51
1:J:210:PHE:CD1	1:J:211:ASP:N	2.79	0.51
1:A:10:TYR:CE2	1:A:14:GLN:HG3	2.46	0.50
1:A:276:LEU:O	1:A:279:ARG:CD	2.59	0.50
1:J:169:GLU:O	1:J:172:LYS:HB2	2.11	0.50
1:J:210:PHE:CD1	1:J:210:PHE:C	2.84	0.50
1:J:213:LEU:HD23	1:J:222:ALA:HB1	1.93	0.50
2:K:10:DA:C2'	2:K:11:DT:H71	2.41	0.50
1:A:302:PHE:HZ	1:A:314:GLU:CG	2.22	0.50
2:P:12:DT:H2''	2:P:13:DOC:OP1	2.10	0.49
2:K:11:DT:C6	2:K:12:DT:C7	2.96	0.49
3:M:5:EFG:H10	3:M:5:EFG:C1'	2.35	0.49
1:A:238:ARG:CG	6:A:566:HOH:O	2.60	0.49
1:J:41:GLY:HA2	3:M:5:EFG:H4'	1.95	0.49
1:J:214:LYS:HE3	1:J:219:GLU:HG3	1.93	0.49
3:M:9:DT:H2''	3:M:10:DC:H5'	1.94	0.49
1:A:9:ASP:O	1:A:10:TYR:C	2.51	0.49
1:A:63:GLU:O	1:A:66:LYS:HG2	2.13	0.49
1:J:14:GLN:HE22	1:J:139:THR:N	1.86	0.49
1:J:118:TYR:CE2	1:J:167:ASP:HA	2.47	0.49
2:P:11:DT:N3	3:B:8:DA:C2	2.70	0.49
1:A:249:VAL:HG11	1:A:267:ARG:HE	1.78	0.49
1:J:127:GLU:O	1:J:131:LYS:HB2	2.12	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:258:LEU:O	1:A:262:LYS:HG3	2.12	0.48
1:A:55:VAL:HG21	1:A:68:LEU:HD12	1.96	0.48
3:B:10:DC:H2''	3:B:11:DC:C5'	2.44	0.48
1:J:230:ARG:HH11	1:J:230:ARG:HB2	1.79	0.48
1:A:1:MET:O	1:A:1:MET:HG3	2.14	0.48
1:J:114:LYS:HA	1:J:114:LYS:CE	2.41	0.48
1:J:265:LEU:O	1:J:269:ILE:HG13	2.14	0.48
1:A:32:VAL:HG21	3:B:5:EFG:C10	2.44	0.47
1:A:236:PRO:HB2	1:A:238:ARG:HE	1.79	0.47
1:J:240:ARG:O	1:J:241:VAL:HB	2.14	0.47
4:J:401:DCP:H1'	2:K:13:DOC:C2'	2.43	0.47
2:P:2:DG:C2'	2:P:3:DG:O4'	2.55	0.47
2:P:4:DG:H2''	2:P:5:DG:C8	2.49	0.47
1:J:111:ILE:O	1:J:115:VAL:HG22	2.15	0.47
1:J:291:GLU:OE2	1:J:329:LYS:HD2	2.14	0.47
2:K:9:DG:C2'	2:K:10:DA:C8	2.98	0.47
1:A:238:ARG:HG3	6:A:566:HOH:O	2.15	0.47
1:A:276:LEU:O	1:A:279:ARG:HD2	2.15	0.47
1:J:193:LYS:HB3	1:J:216:MET:SD	2.55	0.47
2:K:9:DG:C2'	2:K:10:DA:H8	2.27	0.47
1:A:38:GLU:O	1:A:39:ASP:CB	2.63	0.46
1:J:213:LEU:O	1:J:215:GLY:N	2.48	0.46
1:A:332:ARG:CZ	3:B:6:DG:H21	2.28	0.46
1:A:10:TYR:CD2	1:A:10:TYR:O	2.69	0.46
1:J:36:ARG:HG2	1:J:250:THR:HG21	1.97	0.46
3:B:1:DT:C6	3:B:1:DT:C4'	2.98	0.46
1:A:98:LYS:HE3	1:A:98:LYS:HB2	1.32	0.46
1:A:237:ILE:O	1:A:237:ILE:HG22	2.15	0.46
1:A:68:LEU:O	1:A:69:PRO:C	2.52	0.46
1:A:336:ARG:HH22	3:B:8:DA:P	2.38	0.46
1:A:11:PHE:HB3	4:A:401:DCP:O3'	2.15	0.46
1:J:241:VAL:HG13	1:J:242:ARG:N	2.30	0.46
1:J:291:GLU:H	1:J:291:GLU:HG3	1.45	0.45
1:J:251:MET:HG2	1:J:264:TYR:CG	2.51	0.45
1:A:32:VAL:HG21	3:B:5:EFG:H10	1.99	0.45
1:J:212:LYS:HD3	1:J:212:LYS:N	2.32	0.45
1:A:46:ALA:HB1	1:A:50:ALA:HB3	1.98	0.45
1:A:256:ARG:NH2	1:A:326:ASP:O	2.50	0.45
1:A:308:LYS:HD3	1:A:312:TYR:HE2	1.82	0.45
1:J:24:LYS:HA	1:J:24:LYS:HD2	1.85	0.45
1:J:32:VAL:HG21	3:M:5:EFG:C10	2.47	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:J:217:ILE:HD12	1:J:221:LYS:HB3	1.98	0.45
2:K:11:DT:H2''	2:K:12:DT:C6	2.52	0.45
1:J:114:LYS:NZ	1:J:114:LYS:HB3	2.31	0.44
1:J:243:LYS:HB3	3:M:9:DT:P	2.57	0.44
3:M:8:DA:H2''	3:M:9:DT:H6	1.81	0.44
3:B:1:DT:H2'	3:B:2:DC:C6	2.52	0.44
2:K:5:DG:H2''	2:K:6:DA:C8	2.52	0.44
1:A:304:HIS:HD2	1:A:305:GLY:O	1.99	0.44
2:K:3:DG:O5'	2:K:3:DG:H8	2.01	0.44
1:A:23:LEU:HD22	1:A:72:VAL:HG21	2.00	0.44
1:A:208:ILE:HD11	1:A:212:LYS:HG3	2.00	0.44
1:A:197:LEU:HD11	1:A:216:MET:HG2	1.98	0.43
1:A:267:ARG:HG3	1:A:268:ALA:H	1.83	0.43
3:B:8:DA:N6	6:B:108:HOH:O	2.52	0.43
1:A:258:LEU:HD12	1:A:319:LEU:HD23	2.00	0.43
1:J:123:ASN:N	1:J:123:ASN:HD22	2.15	0.43
1:A:273:TYR:HA	1:A:276:LEU:HD12	1.99	0.43
1:A:270:GLU:OE1	1:A:312:TYR:OH	2.33	0.43
1:J:99:ILE:HG13	1:J:109:LEU:HD23	1.94	0.43
1:J:298:ARG:HH21	1:J:325:GLU:HB2	1.84	0.43
2:K:4:DG:H22	3:M:16:DC:H42	1.65	0.43
1:J:213:LEU:O	1:J:214:LYS:C	2.56	0.43
3:B:1:DT:C6	3:B:1:DT:O5'	2.71	0.43
3:B:16:DC:OP2	3:B:16:DC:H6	2.02	0.42
1:A:10:TYR:CD2	1:A:14:GLN:HB2	2.54	0.42
1:A:276:LEU:O	1:A:279:ARG:HD3	2.19	0.42
1:A:10:TYR:O	1:A:10:TYR:CG	2.72	0.42
1:A:26:LYS:HE3	1:A:26:LYS:HB2	1.94	0.42
1:A:76:MET:HE3	1:A:78:LYS:HD3	2.01	0.42
1:A:85:SER:O	1:A:89:MET:HG2	2.19	0.42
1:A:188:ASN:O	1:A:192:GLU:HG2	2.19	0.42
1:A:197:LEU:HD12	1:A:216:MET:HG2	2.02	0.42
1:J:212:LYS:HD2	1:J:212:LYS:HA	1.84	0.42
1:J:227:SER:O	1:J:233:TYR:N	2.49	0.42
1:J:164:LYS:CD	1:J:164:LYS:C	2.86	0.42
1:J:1:MET:CE	1:J:234:ASN:HD21	2.33	0.41
1:J:44:ALA:O	4:J:401:DCP:H2'1	2.20	0.41
1:J:97:GLU:CD	1:J:97:GLU:H	2.23	0.41
1:J:154:ALA:HB1	1:J:164:LYS:HG3	2.01	0.41
1:J:233:TYR:CZ	1:J:235:GLU:HG2	2.55	0.41
1:J:258:LEU:HD21	1:J:320:GLN:HE21	1.85	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:23:LEU:CD2	1:A:72:VAL:HG21	2.51	0.41
1:J:149:VAL:O	1:J:152:LYS:HB3	2.20	0.41
1:J:210:PHE:CZ	1:J:214:LYS:HB2	2.55	0.41
2:K:4:DG:H22	3:M:16:DC:N4	2.19	0.41
2:K:6:DA:H2'	2:K:7:DA:C8	2.55	0.41
1:J:99:ILE:HG23	1:J:99:ILE:O	2.20	0.41
3:M:12:DT:H1'	3:M:13:DT:C5'	2.43	0.41
2:P:11:DT:C4	3:B:8:DA:N1	2.88	0.41
1:A:180:ILE:HD11	1:A:225:LEU:HD13	2.02	0.41
1:A:336:ARG:NH2	3:B:8:DA:OP2	2.45	0.41
1:J:173:ARG:HH12	1:J:177:GLU:CD	2.24	0.41
1:J:321:LYS:O	1:J:325:GLU:HG2	2.21	0.41
1:A:53:PHE:O	1:A:67:ILE:HG21	2.20	0.40
1:A:169:GLU:H	1:A:169:GLU:CD	2.24	0.40
1:J:304:HIS:CD2	1:J:305:GLY:O	2.67	0.40
1:A:318:LEU:HG	6:A:588:HOH:O	2.21	0.40
1:J:102:ALA:HA	1:J:240:ARG:HD2	2.04	0.40
1:A:280:ILE:CG2	1:A:305:GLY:HA3	2.51	0.40
1:J:222:ALA:O	1:J:226:ILE:HD12	2.21	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	341/348 (98%)	323 (95%)	16 (5%)	2 (1%)	25	31
1	J	341/348 (98%)	300 (88%)	36 (11%)	5 (2%)	10	10
All	All	682/696 (98%)	623 (91%)	52 (8%)	7 (1%)	15	17

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	1	MET
1	J	241	VAL
1	A	277	ASP
1	J	211	ASP
1	J	215	GLY
1	J	10	TYR
1	J	99	ILE

5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	302/307 (98%)	273 (90%)	29 (10%)	8 10
1	J	300/307 (98%)	258 (86%)	42 (14%)	3 3
All	All	602/614 (98%)	531 (88%)	71 (12%)	5 5

All (71) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	0	HIS
1	A	19	LEU
1	A	36	ARG
1	A	78	LYS
1	A	79	GLU
1	A	94	GLU
1	A	97	GLU
1	A	98	LYS
1	A	105	ASP
1	A	115	VAL
1	A	119	ARG
1	A	160	PRO
1	A	170	GLU
1	A	227	SER
1	A	238	ARG
1	A	242	ARG
1	A	252	LYS

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Mol	Chain	Res	Type
1	A	253	ARG
1	A	255	SER
1	A	256	ARG
1	A	267	ARG
1	A	273	TYR
1	A	279	ARG
1	A	294	ASP
1	A	321	LYS
1	A	325	GLU
1	A	326	ASP
1	A	336	ARG
1	A	342	GLU
1	J	0	HIS
1	J	1	MET
1	J	8	PHE
1	J	19	LEU
1	J	36	ARG
1	J	38	GLU
1	J	45	THR
1	J	52	LYS
1	J	78	LYS
1	J	94	GLU
1	J	97	GLU
1	J	99	ILE
1	J	105	ASP
1	J	114	LYS
1	J	119	ARG
1	J	130	ASN
1	J	134	GLU
1	J	164	LYS
1	J	173	ARG
1	J	195	LYS
1	J	197	LEU
1	J	200	ASN
1	J	202	LEU
1	J	208	ILE
1	J	211	ASP
1	J	230	ARG
1	J	234	ASN
1	J	238	ARG
1	J	248	ILE
1	J	252	LYS

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Mol	Chain	Res	Type
1	J	256	ARG
1	J	267	ARG
1	J	276	LEU
1	J	291	GLU
1	J	293	LEU
1	J	297	SER
1	J	300	ARG
1	J	308	LYS
1	J	325	GLU
1	J	329	LYS
1	J	336	ARG
1	J	342	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	0	HIS
1	A	14	GLN
1	A	123	ASN
1	A	304	HIS
1	J	0	HIS
1	J	14	GLN
1	J	123	ASN
1	J	130	ASN
1	J	234	ASN
1	J	285	HIS
1	J	304	HIS

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

4 non-standard protein/DNA/RNA residues are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the

expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# $ Z > 2$	Counts	RMSZ	# $ Z > 2$
2	DOC	P	13	2,3	16,19,20	0.92	0	20,26,29	1.33	2 (10%)
3	EFG	M	5	3	19,28,29	2.83	5 (26%)	19,42,45	2.91	6 (31%)
2	DOC	K	13	2	16,19,20	1.10	2 (12%)	20,26,29	2.63	9 (45%)
3	EFG	B	5	3	19,28,29	3.96	11 (57%)	19,42,45	3.31	7 (36%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	DOC	P	13	2,3	-	2/7/18/19	0/2/2/2
3	EFG	M	5	3	-	2/3/25/26	0/3/4/4
2	DOC	K	13	2	-	2/7/18/19	0/2/2/2
3	EFG	B	5	3	-	0/3/25/26	0/3/4/4

All (18) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	5	EFG	C9-N3	-10.96	1.28	1.38
3	B	5	EFG	C5-C6	-7.29	1.32	1.47
3	M	5	EFG	C9-N3	-6.87	1.32	1.38
3	M	5	EFG	O4'-C1'	6.13	1.49	1.41
3	B	5	EFG	C2'-C1'	-4.93	1.46	1.53
3	M	5	EFG	C5-C6	-4.89	1.37	1.47
3	B	5	EFG	C2'-C3'	-4.79	1.46	1.52
3	M	5	EFG	C2'-C1'	4.40	1.58	1.53
3	B	5	EFG	O4'-C1'	-3.68	1.35	1.41
3	B	5	EFG	C2-N3	-3.66	1.30	1.37
3	B	5	EFG	C6-N1	-3.29	1.32	1.36
3	B	5	EFG	C2-N2	-3.07	1.29	1.34
3	B	5	EFG	C8-N7	-2.81	1.30	1.35
3	B	5	EFG	C2-N1	-2.40	1.32	1.38
2	K	13	DOC	C5-C4	-2.38	1.37	1.42
2	K	13	DOC	C6-N1	-2.27	1.32	1.38
3	M	5	EFG	O3'-C3'	2.20	1.48	1.43
3	B	5	EFG	O3'-C3'	-2.20	1.37	1.43

All (24) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	M	5	EFG	N1-C2-N2	9.34	131.83	123.03
3	B	5	EFG	N1-C2-N2	9.17	131.66	123.03
2	K	13	DOC	C4'-O4'-C1'	6.58	116.02	109.81
3	B	5	EFG	C5-C6-N1	5.02	122.82	113.95
3	B	5	EFG	F-C2'-C3'	-4.78	99.22	109.22
3	B	5	EFG	C3'-C2'-C1'	4.65	108.75	103.13
3	M	5	EFG	O6-C6-N1	-4.52	115.00	120.95
2	K	13	DOC	C3'-C2'-C1'	4.47	107.95	102.78
3	B	5	EFG	C2-N1-C6	-4.45	115.92	128.30
3	B	5	EFG	O6-C6-N1	-4.09	115.56	120.95
2	K	13	DOC	O2-C2-N3	-3.84	116.09	122.33
2	K	13	DOC	C1'-N1-C2	3.84	124.47	117.74
3	M	5	EFG	C2-N1-C6	-3.71	117.99	128.30
3	M	5	EFG	C5-C6-N1	3.55	120.22	113.95
2	K	13	DOC	O4'-C1'-C2'	-3.36	103.04	106.67
2	P	13	DOC	C3'-C2'-C1'	2.95	106.19	102.78
3	B	5	EFG	C8-N7-C5	2.91	108.53	102.99
2	K	13	DOC	C2'-C1'-N1	2.75	117.62	112.40
2	K	13	DOC	O4'-C4'-C5'	2.31	113.31	109.52
3	M	5	EFG	C8-N7-C5	2.19	107.17	102.99
2	K	13	DOC	O2-C2-N1	2.13	123.29	118.89
2	P	13	DOC	C4'-O4'-C1'	2.08	111.77	109.81
3	M	5	EFG	C2'-C3'-C4'	-2.07	99.73	102.40
2	K	13	DOC	C6-N1-C2	-2.02	116.99	120.49

There are no chirality outliers.

All (6) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	K	13	DOC	O4'-C4'-C5'-O5'
2	P	13	DOC	O4'-C4'-C5'-O5'
2	K	13	DOC	C3'-C4'-C5'-O5'
3	M	5	EFG	C4'-C5'-O5'-P
2	P	13	DOC	C3'-C4'-C5'-O5'
3	M	5	EFG	O4'-C4'-C5'-O5'

There are no ring outliers.

4 monomers are involved in 26 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	P	13	DOC	1	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	M	5	EFG	8	0
2	K	13	DOC	11	0
3	B	5	EFG	6	0

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 7 ligands modelled in this entry, 5 are monoatomic - leaving 2 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	DCP	A	401	5	25,29,29	1.36	3 (12%)	37,45,45	1.31	4 (10%)
4	DCP	J	401	5	25,29,29	0.97	1 (4%)	37,45,45	1.70	7 (18%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '2' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	DCP	A	401	5	-	4/22/34/34	0/2/2/2
4	DCP	J	401	5	-	4/22/34/34	0/2/2/2

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	401	DCP	C6-C5	3.17	1.42	1.35
4	A	401	DCP	C2-N1	2.70	1.45	1.40
4	J	401	DCP	C6-C5	2.36	1.40	1.35
4	A	401	DCP	O3'-C3'	2.12	1.47	1.43

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	J	401	DCP	PB-O3B-PG	-4.85	116.18	132.83
4	J	401	DCP	O2-C2-N3	-3.73	116.27	122.33
4	J	401	DCP	O2G-PG-O3B	-3.18	93.97	104.64
4	A	401	DCP	O3'-C3'-C4'	2.73	120.53	110.10
4	J	401	DCP	C1'-N1-C2	2.69	122.46	117.74
4	J	401	DCP	O3G-PG-O2G	2.58	117.51	107.64
4	A	401	DCP	O2G-PG-O3B	-2.53	96.15	104.64
4	J	401	DCP	C2'-C3'-C4'	2.53	108.03	102.76
4	A	401	DCP	O4'-C1'-N1	2.37	112.10	107.86
4	A	401	DCP	C6-C5-C4	2.19	121.04	117.50
4	J	401	DCP	N1-C2-N3	2.05	122.54	118.81

There are no chirality outliers.

All (8) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	J	401	DCP	O4'-C4'-C5'-O5'
4	J	401	DCP	C3'-C4'-C5'-O5'
4	J	401	DCP	PB-O3A-PA-O1A
4	A	401	DCP	PB-O3B-PG-O1G
4	J	401	DCP	PB-O3A-PA-O2A
4	A	401	DCP	PB-O3B-PG-O2G
4	A	401	DCP	PB-O3B-PG-O3G
4	A	401	DCP	PA-O3A-PB-O2B

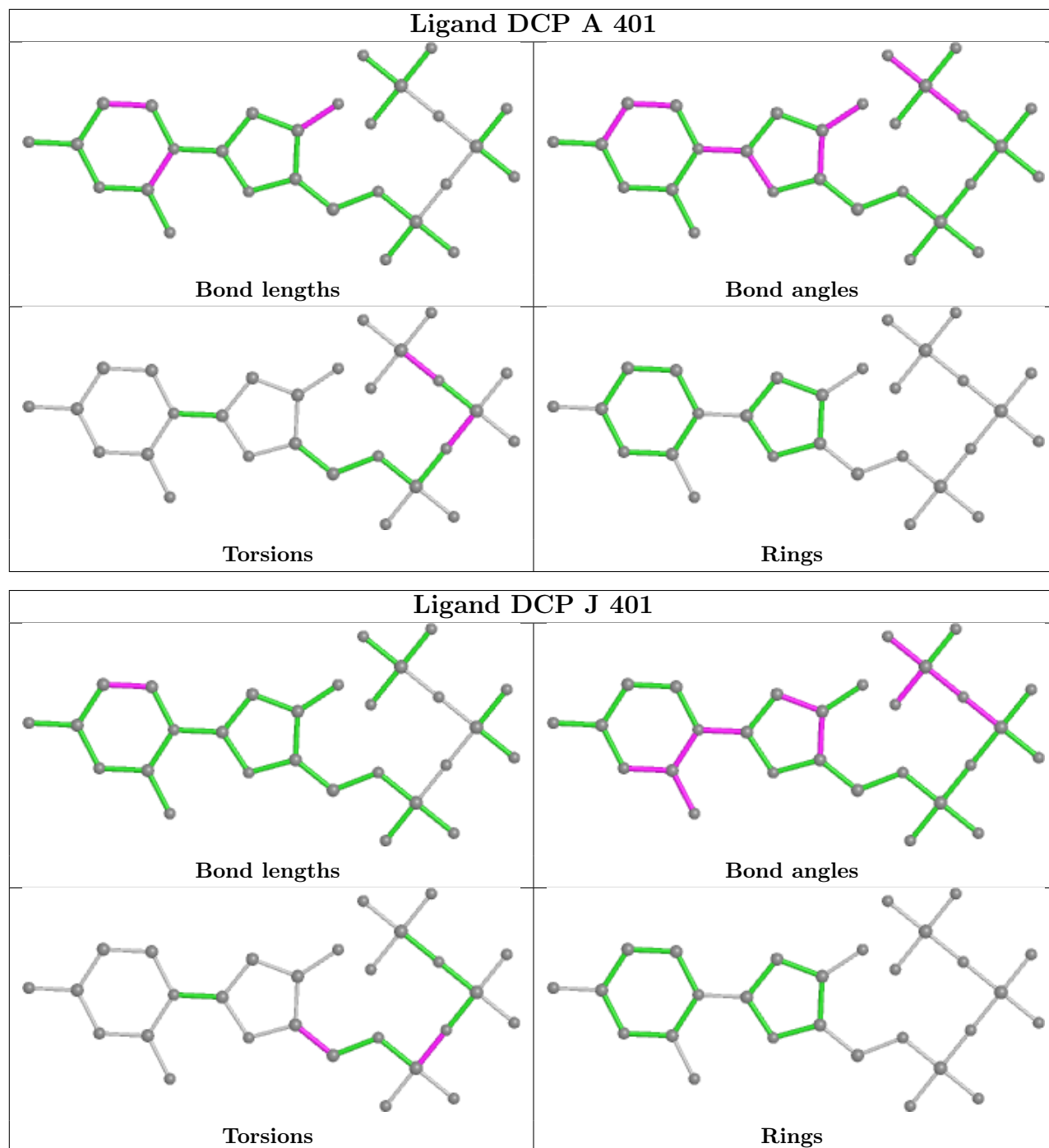
There are no ring outliers.

2 monomers are involved in 8 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	401	DCP	2	0
4	J	401	DCP	6	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and

any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



5.7 Other polymers [\(i\)](#)

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	343/348 (98%)	0.13	11 (3%) 47 54	23, 43, 70, 88	23 (6%)
1	J	343/348 (98%)	0.55	31 (9%) 9 12	33, 69, 102, 118	14 (4%)
2	K	10/12 (83%)	2.28	3 (30%) 0 0	63, 111, 152, 154	3 (30%)
2	P	11/12 (91%)	0.77	3 (27%) 0 0	49, 56, 119, 139	1 (9%)
3	B	16/17 (94%)	0.52	2 (12%) 3 5	37, 57, 105, 120	2 (12%)
3	M	12/17 (70%)	1.24	4 (33%) 0 0	51, 102, 171, 172	1 (8%)
All	All	735/754 (97%)	0.39	54 (7%) 15 20	23, 55, 102, 172	44 (5%)

All (54) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	K	4	DG	8.5
2	K	3	DG	7.0
1	J	241	VAL	5.8
2	P	2	DG	5.8
1	A	336	ARG	5.6
1	J	216	MET	5.4
1	J	212	LYS	5.4
1	J	213	LEU	4.8
1	J	49	GLU	4.5
3	M	16	DC	4.3
2	K	5	DG	4.3
1	J	116	ARG	4.2
1	J	207	SER	4.1
1	J	119	ARG	3.5
1	A	10	TYR	3.4
1	A	0	HIS	3.3
3	B	17	DC	3.3
1	J	188	ASN	3.3
1	J	329	LYS	3.2

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Mol	Chain	Res	Type	RSRZ
1	A	238	ARG	3.2
3	M	13	DT	3.1
1	A	278	LYS	3.1
1	J	291	GLU	3.1
1	J	187	GLY	3.1
1	J	211	ASP	3.0
3	B	15	DC	3.0
1	J	325	GLU	3.0
1	J	115	VAL	2.9
1	A	130	ASN	2.8
1	J	39	ASP	2.8
1	J	35	GLY	2.7
1	A	274	TYR	2.7
1	J	173	ARG	2.6
1	J	113	ASP	2.6
1	A	11	PHE	2.6
2	P	3	DG	2.6
3	M	14	DC	2.5
1	J	198	GLY	2.5
1	J	37	PHE	2.4
1	J	117	ASP	2.4
1	J	127	GLU	2.3
1	J	295	ILE	2.3
1	J	327	GLU	2.3
1	A	293	LEU	2.2
1	J	123	ASN	2.2
2	P	4	DG	2.2
1	J	292	ASP	2.2
1	J	196	LYS	2.1
1	J	230	ARG	2.1
3	M	15	DC	2.1
1	J	176	ARG	2.1
1	J	238	ARG	2.1
1	A	49	GLU	2.0
1	A	267	ARG	2.0

6.2 Non-standard residues in protein, DNA, RNA chains

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
2	DOC	P	13	18/19	0.76	0.25	35,43,87,90	0
2	DOC	K	13	18/19	0.80	0.21	61,76,86,87	0
3	EFG	M	5	25/26	0.91	0.18	48,70,96,98	0
3	EFG	B	5	25/26	0.94	0.13	35,40,51,58	0

6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

6.4 Ligands [i](#)

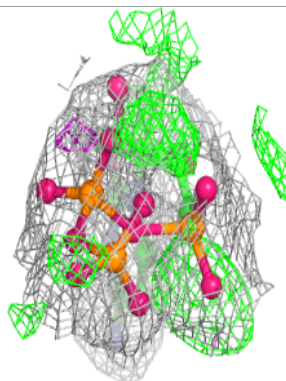
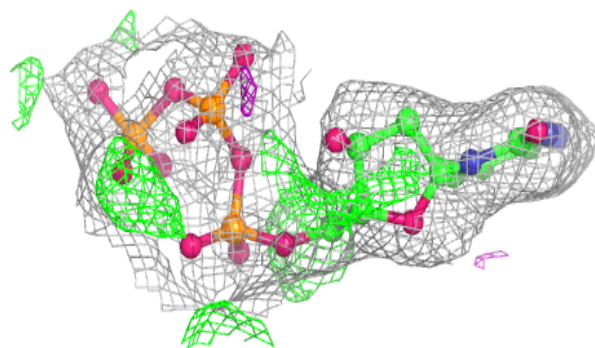
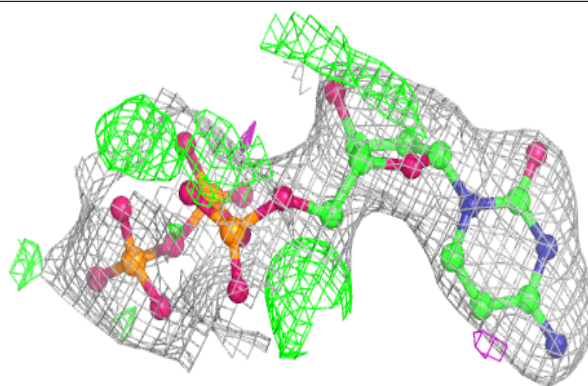
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
5	MG	J	402	1/1	0.49	0.26	43,43,43,43	0
5	MG	K	101	1/1	0.93	0.36	49,49,49,49	0
4	DCP	J	401	28/28	0.94	0.15	45,57,72,90	0
4	DCP	A	401	28/28	0.97	0.14	24,37,46,47	0
5	MG	J	403	1/1	0.97	0.22	28,28,28,28	0
5	MG	A	402	1/1	0.97	0.25	19,19,19,19	0
5	MG	A	403	1/1	0.99	0.20	13,13,13,13	0

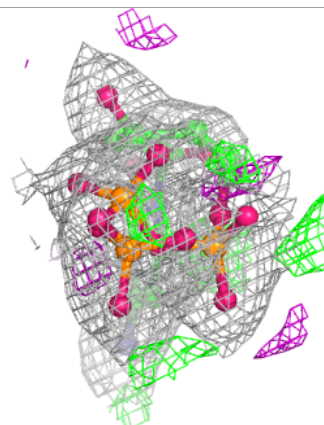
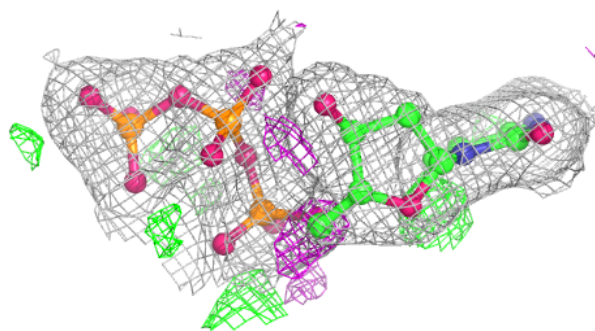
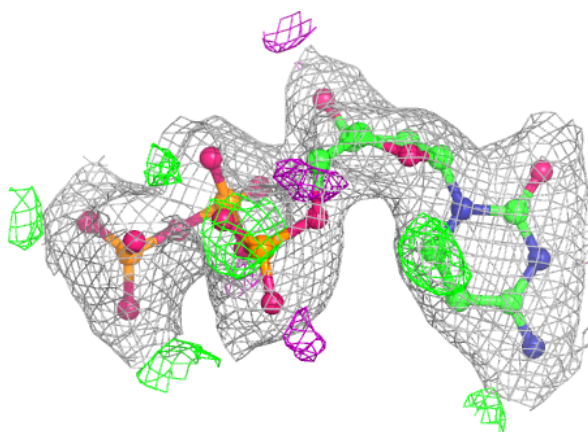
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around DCP J 401:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

**Electron density around DCP A 401:**

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



6.5 Other polymers [i](#)

There are no such residues in this entry.