



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 1, 2026 – 10:36 PM UTC

PDB ID : 5YV2 / pdb_00005yv2
Title : DNA polymerase IV - DNA ternary complex 14
Authors : Kottur, J.; Nair, D.T.
Deposited on : 2017-11-23
Resolution : 1.90 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 : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

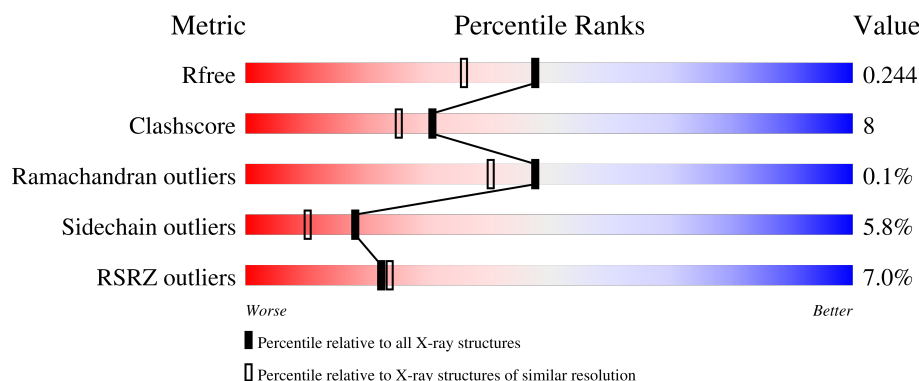
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.90 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}	180053	7789 (1.90-1.90)
Clashscore	190562	8410 (1.90-1.90)
Ramachandran outliers	187476	8333 (1.90-1.90)
Sidechain outliers	187428	8333 (1.90-1.90)
RSRZ outliers	180081	7790 (1.90-1.90)

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	352	7% 80% 16% ..
1	F	352	5% 80% 16% ..
2	B	18	11% 78% 22%
2	G	18	11% 56% 44%
3	C	19	11% 63% 32% 5%

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Mol	Chain	Length	Quality of chain
3	H	19	

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
5	PO4	A	904	-	-	X	-

2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 7513 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
1	F	342	Total	C	N	O	S	0	0	0
			2687	1695	494	484	14			
1	A	342	Total	C	N	O	S	0	0	0
			2687	1695	494	484	14			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
F	0	GLY	-	expression tag	UNP Q47155
F	1	SER	-	expression tag	UNP Q47155
A	0	GLY	-	expression tag	UNP Q47155
A	1	SER	-	expression tag	UNP Q47155

- Molecule 2 is a DNA chain called DTN1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	G	18	Total	C	N	O	P	0	0	0
			364	174	66	107	17			
2	B	18	Total	C	N	O	P	0	0	0
			364	174	66	107	17			

- Molecule 3 is a DNA chain called DTN2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	H	15	Total	C	N	O	P	0	0	0
			304	145	56	89	14			
3	C	18	Total	C	N	O	P	0	0	0
			364	174	66	107	17			

- Molecule 4 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	F	2	Total	Mg	0	0
			2	2		
4	A	2	Total	Mg	0	0
			2	2		

- Molecule 5 is PHOSPHATE ION (CCD ID: PO4) (formula: O_4P).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	F	1	Total	O	P	0	0
			5	4	1		
5	A	1	Total	O	P	0	0
			5	4	1		
5	A	1	Total	O	P	0	0
			5	4	1		

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	F	292	Total	O	0	0
			292	292		
6	A	263	Total	O	0	0
			263	263		
6	G	43	Total	O	0	0
			43	43		
6	H	40	Total	O	0	0
			40	40		
6	B	35	Total	O	0	0
			35	35		

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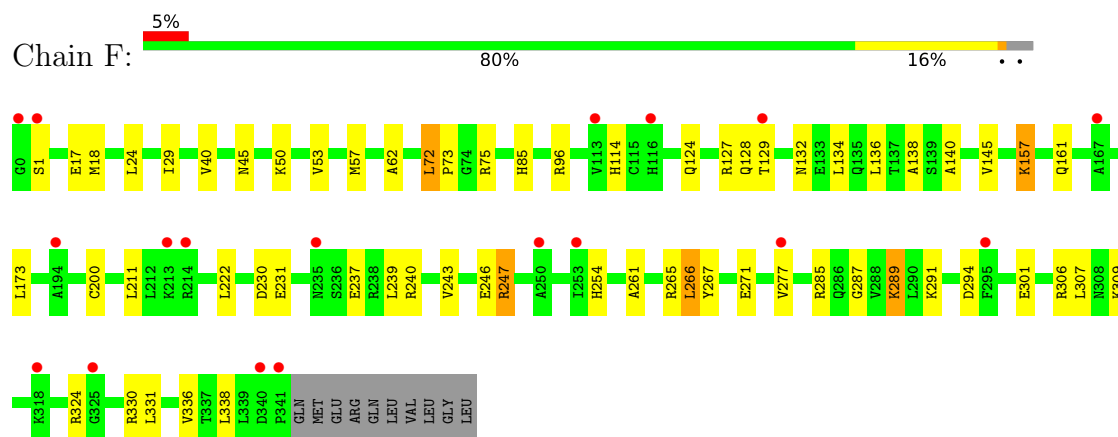
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	C	51	Total	O	0	0
			51	51		

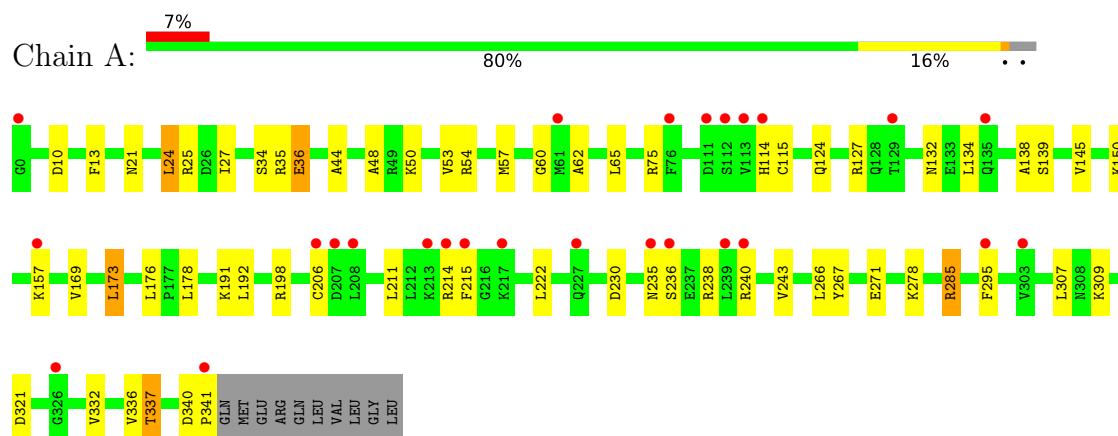
3 Residue-property plots [i](#)

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



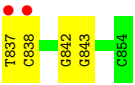
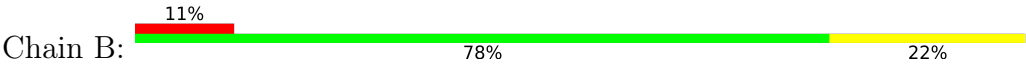
• Molecule 1: DNA polymerase IV



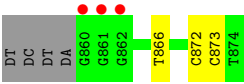
• Molecule 2: DTN1



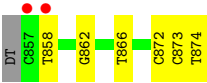
• Molecule 2: DTN1



● Molecule 3: DTN2



● Molecule 3: DTN2



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	86.40Å 57.25Å 110.95Å 90.00° 94.75° 90.00°	Depositor
Resolution (Å)	44.86 – 1.90 44.86 – 1.90	Depositor EDS
% Data completeness (in resolution range)	97.4 (44.86-1.90) 98.5 (44.86-1.90)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.14 (at 1.90Å)	Xtriage
Refinement program	PHENIX (1.10.1 _2155: ???)	Depositor
R, R_{free}	0.204 , 0.245 0.205 , 0.244	Depositor DCC
R_{free} test set	4292 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å ²)	31.3	Xtriage
Anisotropy	0.621	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 51.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	7513	wwPDB-VP
Average B, all atoms (Å ²)	47.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.63% 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: PO4, MG

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	0.28	0/2738	0.51	0/3699
1	F	0.37	0/2738	0.60	0/3699
2	B	0.36	0/407	0.54	0/626
2	G	0.40	0/407	0.55	0/626
3	C	0.36	0/407	0.57	0/626
3	H	0.43	0/340	0.58	0/523
All	All	0.34	0/7037	0.56	0/9799

There are no bond length outliers.

There are no bond angle outliers.

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	2687	0	2738	44	0
1	F	2687	0	2739	50	0
2	B	364	0	204	4	0
2	G	364	0	204	8	0
3	C	364	0	204	7	0
3	H	304	0	170	2	0
4	A	2	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	F	2	0	0	0	0
5	A	10	0	0	2	0
5	F	5	0	0	1	0
6	A	263	0	0	9	2
6	B	35	0	0	0	1
6	C	51	0	0	1	0
6	F	292	0	0	20	2
6	G	43	0	0	2	0
6	H	40	0	0	0	0
All	All	7513	0	6259	108	3

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 8.

All (108) 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)
1:A:132:ASN:ND2	6:A:1001:HOH:O	1.93	0.99
3:C:862:DG:O6	6:C:901:HOH:O	1.80	0.99
1:A:53:VAL:HA	1:A:57:MET:HE1	1.56	0.86
1:F:96:ARG:NH2	6:F:1001:HOH:O	1.86	0.83
2:G:850:DG:OP2	6:G:901:HOH:O	2.00	0.79
1:F:246:GLU:OE1	6:F:1002:HOH:O	2.00	0.79
1:A:271:GLU:OE2	6:A:1002:HOH:O	2.01	0.79
1:F:231:GLU:OE2	6:F:1003:HOH:O	2.02	0.78
1:A:191:LYS:HD3	1:A:215:PHE:CE1	2.21	0.76
1:F:53:VAL:HA	1:F:57:MET:HE1	1.67	0.75
1:F:247:ARG:NH2	6:F:1013:HOH:O	2.21	0.72
1:A:115:CYS:N	6:A:1005:HOH:O	2.23	0.71
1:F:254:HIS:O	6:F:1004:HOH:O	2.08	0.71
1:F:294:ASP:OD2	6:F:1005:HOH:O	2.09	0.71
1:F:240:ARG:HH21	1:F:277:VAL:HG21	1.56	0.70
3:C:858:DT:H5''	3:C:858:DT:H6	1.57	0.70
1:A:235:ASN:O	6:A:1003:HOH:O	2.10	0.70
1:A:57:MET:HE3	1:A:62:ALA:HB2	1.72	0.70
1:A:285:ARG:NH2	3:C:866:DT:OP2	2.26	0.69
1:A:321:ASP:OD2	6:A:1004:HOH:O	2.10	0.68
1:F:124:GLN:OE1	1:F:127:ARG:NH2	2.28	0.67
1:A:24:LEU:HD12	1:A:27:ILE:HD11	1.76	0.67
1:F:96:ARG:NE	6:F:1001:HOH:O	2.27	0.66
1:F:129:THR:HA	1:F:132:ASN:HB2	1.78	0.65

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:73:PRO:O	6:F:1006:HOH:O	2.15	0.65
1:F:18:MET:HE3	1:F:45:ASN:HD22	1.62	0.64
1:F:287:GLY:HA3	1:F:301:GLU:HG2	1.78	0.63
1:F:285:ARG:NH1	3:H:866:DT:OP2	2.32	0.63
1:F:18:MET:CE	1:F:45:ASN:HD22	2.12	0.62
1:F:240:ARG:NH1	2:G:843:DG:OP1	2.32	0.62
1:A:340:ASP:HB2	1:A:341:PRO:HD3	1.81	0.62
1:F:50:LYS:O	6:F:1007:HOH:O	2.16	0.61
1:A:157:LYS:NZ	5:A:904:PO4:O2	2.22	0.60
1:F:128:GLN:NE2	6:F:1023:HOH:O	2.35	0.59
1:F:237:GLU:OE1	6:F:1009:HOH:O	2.17	0.59
1:A:10:ASP:OD1	1:A:157:LYS:HE2	2.03	0.58
1:F:85:HIS:HB3	1:F:134:LEU:HD21	1.85	0.58
1:A:285:ARG:HG3	1:A:337:THR:OG1	2.03	0.57
1:A:240:ARG:HD3	1:A:243:VAL:HG22	1.85	0.57
1:A:178:LEU:HD13	1:A:192:LEU:HD13	1.87	0.57
1:A:150:LYS:NZ	3:C:873:DC:OP1	2.36	0.57
1:A:75:ARG:NH2	6:A:1009:HOH:O	2.31	0.56
5:F:903:PO4:O4	6:F:1011:HOH:O	2.17	0.56
2:G:840:DA:OP2	6:G:902:HOH:O	2.18	0.55
1:F:17:GLU:HG3	1:F:72:LEU:HD23	1.89	0.55
1:A:35:ARG:NH2	1:A:60:GLY:HA3	2.22	0.54
1:A:139:SER:CB	1:A:157:LYS:HG2	2.38	0.54
1:F:306:ARG:NH1	6:F:1008:HOH:O	2.16	0.53
1:A:124:GLN:HE22	1:A:127:ARG:HH21	1.56	0.53
1:A:214:ARG:HD3	1:A:215:PHE:H	1.73	0.53
1:F:287:GLY:HA3	1:F:301:GLU:CG	2.40	0.52
1:A:35:ARG:NH2	2:B:838:DC:OP1	2.43	0.51
1:F:53:VAL:HA	1:F:57:MET:CE	2.39	0.51
3:C:858:DT:H5''	3:C:858:DT:C6	2.42	0.50
1:A:132:ASN:O	1:A:134:LEU:N	2.43	0.49
1:A:211:LEU:HA	1:A:214:ARG:HG3	1.94	0.48
1:A:54:ARG:H	1:A:57:MET:HE2	1.77	0.48
1:F:330:ARG:NH2	6:F:1029:HOH:O	2.44	0.47
2:G:838:DC:H1'	2:G:839:DT:C6	2.49	0.47
3:H:872:DC:H2'	3:H:873:DC:C6	2.49	0.47
1:A:34:SER:OG	1:A:36:GLU:HG3	2.15	0.47
1:A:21:ASN:HB3	1:A:24:LEU:HD22	1.96	0.46
1:F:261:ALA:O	1:F:265:ARG:HD2	2.15	0.46
1:A:267:TYR:CG	1:A:309:LYS:HG3	2.50	0.46
1:F:57:MET:HE3	1:F:62:ALA:HA	1.97	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:128:GLN:O	1:F:129:THR:OG1	2.26	0.46
2:G:848:DA:H2''	2:G:849:DG:C8	2.51	0.46
1:F:324:ARG:NE	6:F:1012:HOH:O	2.18	0.45
1:F:57:MET:HE3	1:F:62:ALA:CA	2.47	0.45
1:F:289:LYS:NZ	6:F:1002:HOH:O	2.30	0.45
1:A:25:ARG:NH2	6:A:1020:HOH:O	2.43	0.45
1:F:173:LEU:O	1:F:200:CYS:HB2	2.17	0.45
1:A:214:ARG:HD3	1:A:215:PHE:N	2.32	0.45
1:A:238:ARG:HD2	6:A:1123:HOH:O	2.17	0.45
1:F:75:ARG:NH1	6:F:1038:HOH:O	2.50	0.45
1:A:145:VAL:HB	1:A:230:ASP:HB3	2.00	0.44
3:C:872:DC:H2'	3:C:873:DC:C6	2.52	0.44
1:F:331:LEU:C	1:F:331:LEU:HD23	2.43	0.44
1:A:44:ALA:HB1	1:A:48:ALA:HB3	1.99	0.43
1:A:169:VAL:HG12	1:A:173:LEU:HD22	2.00	0.42
1:F:57:MET:HE3	1:F:62:ALA:HB2	2.01	0.42
1:F:140:ALA:O	1:F:161:GLN:HA	2.19	0.42
1:F:291:LYS:HB3	1:F:331:LEU:HB3	2.00	0.42
1:A:13:PHE:CD2	3:C:874:DT:H2''	2.54	0.42
1:F:96:ARG:CZ	6:F:1001:HOH:O	2.37	0.42
1:F:127:ARG:HD2	1:F:138:ALA:O	2.19	0.42
1:A:340:ASP:N	1:A:340:ASP:OD1	2.53	0.42
1:F:247:ARG:HB2	1:F:266:LEU:HD11	2.02	0.41
1:F:267:TYR:CG	1:F:309:LYS:HG3	2.55	0.41
1:A:191:LYS:HD3	1:A:215:PHE:CZ	2.54	0.41
2:G:838:DC:H2''	2:G:839:DT:H72	2.01	0.41
2:B:842:DG:H2'	2:B:843:DG:O4'	2.21	0.41
1:F:324:ARG:NH2	6:F:1004:HOH:O	2.53	0.41
1:A:191:LYS:HE3	1:A:191:LYS:HB2	1.76	0.41
1:A:192:LEU:HD23	1:A:214:ARG:HH12	1.85	0.41
1:F:24:LEU:HB3	1:F:29:ILE:HG21	2.03	0.41
1:F:271:GLU:OE2	6:F:1014:HOH:O	2.22	0.41
1:A:157:LYS:HD3	5:A:904:PO4:O1	2.21	0.41
1:F:132:ASN:O	1:F:134:LEU:N	2.49	0.41
1:F:157:LYS:HB2	1:F:157:LYS:HE3	1.88	0.41
1:F:145:VAL:HB	1:F:230:ASP:HB3	2.03	0.41
2:G:854:DC:H6	2:G:854:DC:H2'	1.74	0.40
2:B:837:DT:H1'	2:B:838:DC:H5'	2.02	0.40
1:F:29:ILE:HG12	1:F:45:ASN:ND2	2.37	0.40
1:A:127:ARG:HD2	1:A:138:ALA:O	2.22	0.40
1:A:214:ARG:NE	6:A:1034:HOH:O	2.54	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:240:ARG:NH1	2:B:843:DG:OP1	2.47	0.40
1:F:40:VAL:HG13	2:G:840:DA:H5'	2.04	0.40

All (3) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:F:1271:HOH:O	6:A:1225:HOH:O[2_444]	2.14	0.06
6:F:1254:HOH:O	6:B:933:HOH:O[2_454]	2.17	0.03
6:A:1116:HOH:O	6:A:1205:HOH:O[2_455]	2.18	0.02

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	340/352 (97%)	328 (96%)	11 (3%)	1 (0%)	36	29
1	F	340/352 (97%)	326 (96%)	14 (4%)	0	100	100
All	All	680/704 (97%)	654 (96%)	25 (4%)	1 (0%)	48	40

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	114	HIS

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	286/297 (96%)	268 (94%)	18 (6%)	16	8
1	F	286/297 (96%)	271 (95%)	15 (5%)	21	13
All	All	572/594 (96%)	539 (94%)	33 (6%)	18	10

All (33) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	F	1	SER
1	F	72	LEU
1	F	114	HIS
1	F	136	LEU
1	F	157	LYS
1	F	211	LEU
1	F	222	LEU
1	F	239	LEU
1	F	243	VAL
1	F	247	ARG
1	F	266	LEU
1	F	289	LYS
1	F	307	LEU
1	F	336	VAL
1	F	338	LEU
1	A	24	LEU
1	A	36	GLU
1	A	50	LYS
1	A	65	LEU
1	A	173	LEU
1	A	176	LEU
1	A	198	ARG
1	A	206	CYS
1	A	222	LEU
1	A	236	SER
1	A	266	LEU
1	A	278	LYS
1	A	285	ARG
1	A	295	PHE
1	A	307	LEU
1	A	332	VAL
1	A	336	VAL
1	A	337	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (7) such sidechains are listed below:

Mol	Chain	Res	Type
1	F	114	HIS
1	F	116	HIS
1	F	128	GLN
1	F	254	HIS
1	F	296	GLN
1	F	297	GLN
1	A	124	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 7 ligands modelled in this entry, 4 are monoatomic - leaving 3 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	$\# Z > 2$
5	PO4	A	903	4	4,4,4	1.07	0	6,6,6	1.46	1 (16%)
5	PO4	F	903	4	4,4,4	1.06	0	6,6,6	0.80	0
5	PO4	A	904	4	4,4,4	0.79	0	6,6,6	1.02	0

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	903	PO4	O4-P-O1	-2.02	103.80	110.95

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

2 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	F	903	PO4	1	0
5	A	904	PO4	2	0

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

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	342/352 (97%)	0.59	26 (7%)	20 21	30, 44, 70, 107	0
1	F	342/352 (97%)	0.52	18 (5%)	32 34	27, 41, 62, 80	0
2	B	18/18 (100%)	0.67	2 (11%)	10 11	38, 54, 99, 125	0
2	G	18/18 (100%)	0.57	2 (11%)	10 11	31, 55, 108, 114	0
3	C	18/19 (94%)	0.61	2 (11%)	10 11	37, 51, 70, 121	0
3	H	15/19 (78%)	0.49	3 (20%)	3 2	30, 40, 104, 111	0
All	All	753/778 (96%)	0.56	53 (7%)	22 24	27, 44, 69, 125	0

All (53) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	341	PRO	6.3
1	F	129	THR	5.8
1	A	215	PHE	5.1
2	B	837	DT	4.5
1	A	113	VAL	4.4
2	G	837	DT	3.7
1	F	341	PRO	3.6
1	F	113	VAL	3.4
1	A	214	ARG	3.3
3	C	857	DC	3.1
1	A	0	GLY	3.1
3	H	862	DG	3.1
1	F	235	ASN	3.0
1	A	217	LYS	3.0
1	F	325	GLY	2.9
1	A	208	LEU	2.9
1	F	340	ASP	2.8
1	A	114	HIS	2.8
1	A	129	THR	2.8

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Mol	Chain	Res	Type	RSRZ
3	H	861	DG	2.8
2	B	838	DC	2.8
1	A	239	LEU	2.8
2	G	838	DC	2.7
1	F	250	ALA	2.7
1	F	213	LYS	2.6
3	H	860	DG	2.6
1	A	76	PHE	2.5
1	F	1	SER	2.5
1	F	214	ARG	2.4
1	F	277	VAL	2.4
1	F	116	HIS	2.4
1	A	227	GLN	2.4
3	C	858	DT	2.3
1	A	112	SER	2.3
1	A	303	VAL	2.3
1	F	253	ILE	2.3
1	A	326	GLY	2.3
1	A	111	ASP	2.2
1	A	235	ASN	2.2
1	F	167	ALA	2.2
1	A	157	LYS	2.2
1	A	206	CYS	2.2
1	A	213	LYS	2.2
1	A	61	MET	2.1
1	A	236	SER	2.1
1	A	295	PHE	2.1
1	F	0	GLY	2.1
1	F	295	PHE	2.1
1	A	135	GLN	2.1
1	A	240	ARG	2.1
1	F	194	ALA	2.0
1	A	207	ASP	2.0
1	F	318	LYS	2.0

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

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates [i](#)

There are no oligosaccharides 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($\text{\AA}^2$)	Q<0.9
5	PO4	A	904	5/5	0.48	0.35	60,60,66,73	5
5	PO4	A	903	5/5	0.90	0.14	39,48,65,77	0
5	PO4	F	903	5/5	0.93	0.15	30,33,56,75	5
4	MG	A	901	1/1	0.98	0.14	41,41,41,41	0
4	MG	F	901	1/1	0.98	0.15	29,29,29,29	0
4	MG	A	902	1/1	0.99	0.04	46,46,46,46	0
4	MG	F	902	1/1	0.99	0.03	29,29,29,29	0

6.5 Other polymers [i](#)

There are no such residues in this entry.