



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 05:34 PM GMT

PDB ID : 4IRD  
Title : Structure of Polymerase-DNA complex  
Authors : Nair, D.T.; Sharma, A.  
Deposited on : 2013-01-14  
Resolution : 2.48 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](mailto:validation@mail.wwpdb.org)  
A user guide is available at  
<http://wwpdb.org/validation/2016/XrayValidationReportHelp>  
with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467  
Mogul : 1.7 (RC4), CSD as536be (2015)  
Xtriage (Phenix) : 1.9-1692  
EDS : rb-20026688  
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)  
Refmac : 5.8.0135  
CCP4 : 6.5.0  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : trunk26865

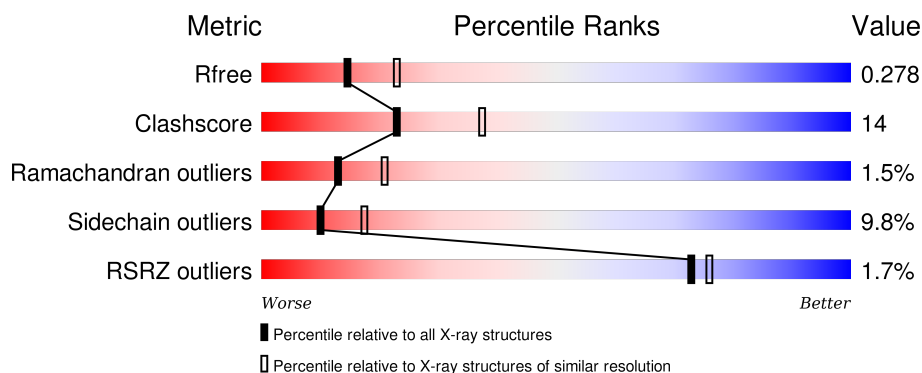
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.48 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))
$R_{free}$	91344	4309 (2.50-2.46)
Clashscore	102246	5050 (2.50-2.46)
Ramachandran outliers	100387	4961 (2.50-2.46)
Sidechain outliers	100360	4963 (2.50-2.46)
RSRZ outliers	91569	4319 (2.50-2.46)

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 on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. 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	B	18	<div> <div>67%</div> <div>33%</div> </div>
1	G	18	<div>6%</div> <div>78%</div> <div>17%</div> <div>6%</div>

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Mol	Chain	Length	Quality of chain
4	F	342	

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
6	MG	F	903	-	-	-	X

## 2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 6900 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 DNA chain called DNA (5'-D(\*TP\*CP\*TP\*TP\*GP\*GP\*GP\*TP\*CP\*CP\*TP\*AP\*GP\*GP\*AP\*CP\*CP\*C)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	G	18	Total	C	N	O	P	0	0	0
			363	174	63	109	17			
1	B	18	Total	C	N	O	P	0	0	0
			363	174	63	109	17			

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	H	14	Total	C	N	O	P	0	0	0
			284	135	54	82	13			

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	C	17	Total	C	N	O	P	0	0	0
			344	164	64	100	16			

- Molecule 4 is a protein called DNA polymerase IV.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	F	342	Total	C	N	O	S	0	0	0
			2688	1695	494	485	14			
4	A	342	Total	C	N	O	S	0	0	0
			2688	1695	494	485	14			

There are 8 discrepancies between the modelled and reference sequences:

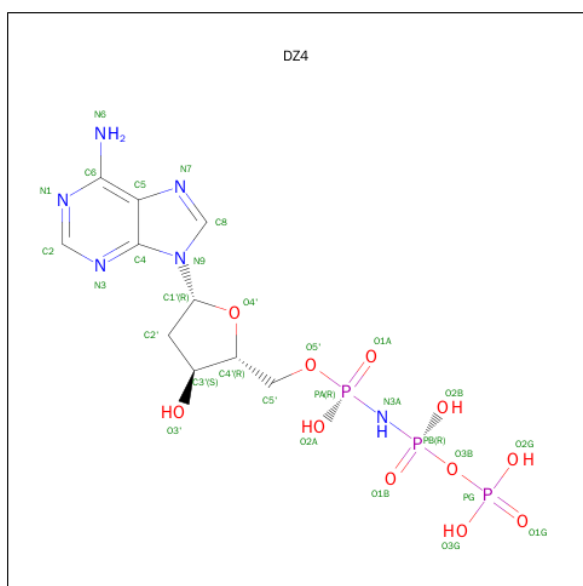
Chain	Residue	Modelled	Actual	Comment	Reference
F	0	GLY	-	EXPRESSION TAG	UNP Q47155

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Chain	Residue	Modelled	Actual	Comment	Reference
F	1	SER	-	EXPRESSION TAG	UNP Q47155
F	64	ALA	LYS	CONFLICT	UNP Q47155
F	205	ALA	LYS	CONFLICT	UNP Q47155
A	0	GLY	-	EXPRESSION TAG	UNP Q47155
A	1	SER	-	EXPRESSION TAG	UNP Q47155
A	64	ALA	LYS	CONFLICT	UNP Q47155
A	205	ALA	LYS	CONFLICT	UNP Q47155

- Molecule 5 is 2'-DEOXY-5'-O-[(R)-HYDROXY{[(R)-HYDROXY(PHOSPHONOOXY)P HOSPHORYL]AMINO}PHOSPHORYL]ADENOSINE (three-letter code: DZ4) (formula: C<sub>10</sub>H<sub>17</sub>N<sub>6</sub>O<sub>11</sub>P<sub>3</sub>).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	F	1	Total	C	N	O	P	0	0
			30	10	6	11	3		
5	A	1	Total	C	N	O	P	0	0
			30	10	6	11	3		

- Molecule 6 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

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

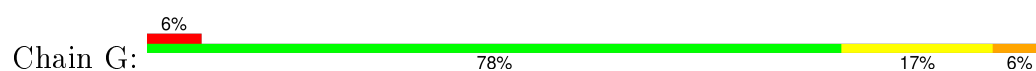
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	G	17	Total 17	O 17	0	0
7	H	10	Total 10	O 10	0	0
7	B	4	Total 4	O 4	0	0
7	C	8	Total 8	O 8	0	0
7	F	57	Total 57	O 57	0	0
7	A	10	Total 10	O 10	0	0

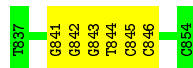
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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.

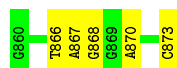
- Molecule 1: DNA (5'-D(\*TP\*CP\*TP\*TP\*GP\*GP\*GP\*TP\*CP\*CP\*TP\*AP\*GP\*GP\*AP\*CP\*CP\*C)-3')



- Molecule 1: DNA (5'-D(\*TP\*CP\*TP\*TP\*GP\*GP\*GP\*TP\*CP\*CP\*TP\*AP\*GP\*GP\*AP\*CP\*CP\*C)-3')



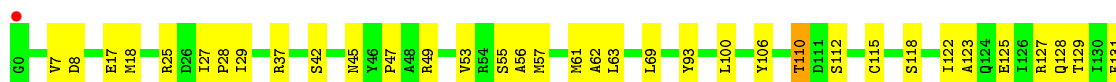
- Molecule 2: DNA (5'-D(\*GP\*GP\*GP\*TP\*CP\*CP\*TP\*AP\*GP\*GP\*AP\*CP\*CP\*C)-3')

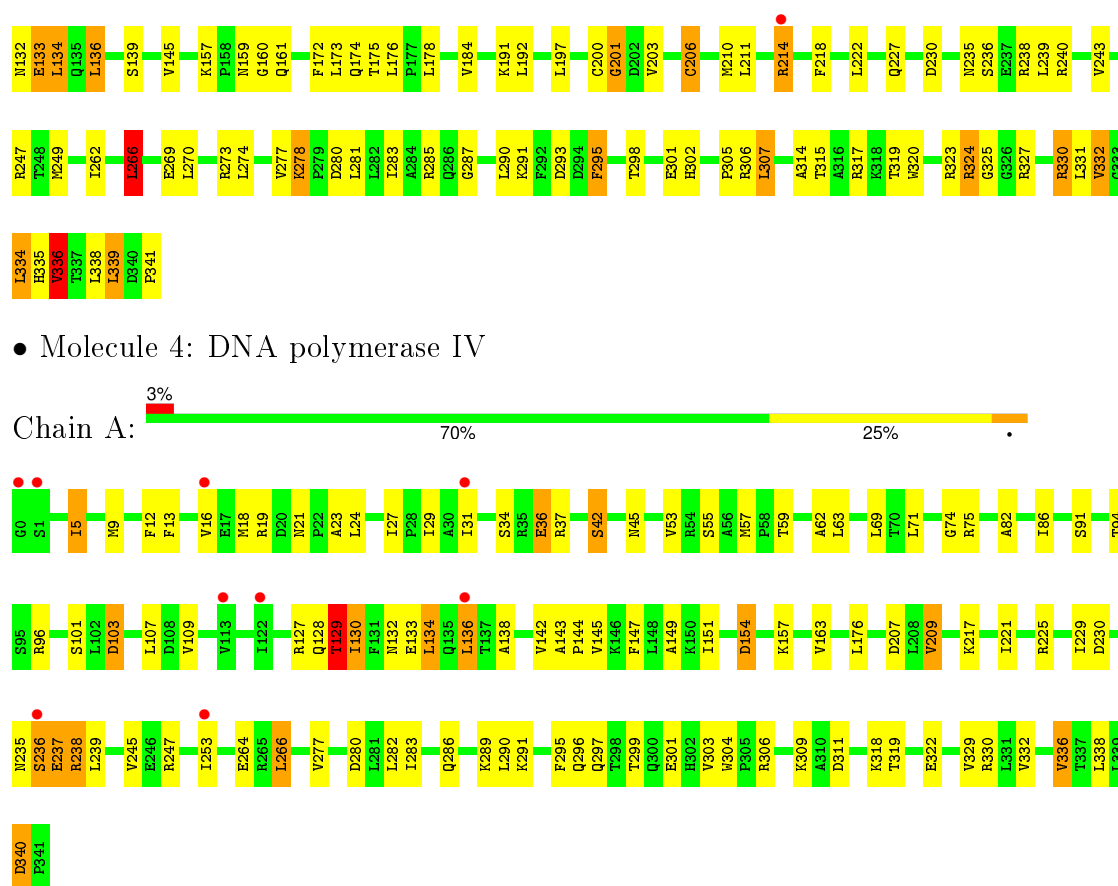


- Molecule 3: DNA (5'-D(\*CP\*TP\*AP\*GP\*GP\*GP\*TP\*CP\*CP\*TP\*AP\*GP\*GP\*AP\*CP\*CP\*C)-3')



- Molecule 4: DNA polymerase IV







## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	86.69 Å 56.88 Å 110.93 Å 90.00° 93.99° 90.00°	Depositor
Resolution (Å)	43.28 – 2.48 48.15 – 2.48	Depositor EDS
% Data completeness (in resolution range)	99.7 (43.28-2.48) 99.7 (48.15-2.48)	Depositor EDS
$R_{merge}$	0.06	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.24 (at 2.48 Å)	Xtriage
Refinement program	REFMAC 5.7.0029	Depositor
R, $R_{free}$	0.213 , 0.277 0.218 , 0.278	Depositor DCC
$R_{free}$ test set	1906 reflections (5.22%)	DCC
Wilson B-factor (Å <sup>2</sup> )	55.3	Xtriage
Anisotropy	0.633	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.28 , 43.4	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtriage
Outliers	0 of 38444 reflections	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	6900	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	62.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.37% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

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

## 5 Model quality

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: MG, DZ4

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	B	0.41	0/405	0.80	0/623
1	G	0.60	0/405	0.91	1/623 (0.2%)
2	H	0.64	0/318	0.87	1/489 (0.2%)
3	C	0.43	0/385	0.80	0/592
4	A	0.59	0/2739	0.82	0/3699
4	F	0.74	0/2739	0.98	3/3699 (0.1%)
All	All	0.64	0/6991	0.89	5/9725 (0.1%)

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	F	266	LEU	CA-CB-CG	5.90	128.87	115.30
1	G	838	DC	C1'-O4'-C4'	-5.58	104.52	110.10
4	F	334	LEU	CB-CG-CD1	-5.13	102.28	111.00
2	H	873	DC	O5'-P-OP1	-5.09	101.11	105.70
4	F	336	VAL	CG1-CB-CG2	-5.02	102.86	110.90

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts

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	B	363	0	205	4	0
1	G	363	0	205	3	0
2	H	284	0	158	3	0
3	C	344	0	192	8	0
4	A	2688	0	2745	67	0
4	F	2688	0	2745	93	0
5	A	30	0	13	3	0
5	F	30	0	13	0	0
6	A	2	0	0	0	0
6	F	2	0	0	0	0
7	A	10	0	0	0	0
7	B	4	0	0	0	0
7	C	8	0	0	3	0
7	F	57	0	0	10	0
7	G	17	0	0	1	0
7	H	10	0	0	1	0
All	All	6900	0	6276	177	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 14.

All (177) 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)
3:C:870:DA:H2"	7:C:1098:HOH:O	1.18	1.34
4:F:324:ARG:HG2	7:F:1019:HOH:O	1.51	1.08
4:F:18:MET:HE3	4:F:45:ASN:HD22	1.27	1.00
4:A:127:ARG:O	4:A:130:ILE:HG22	1.61	0.99
4:A:128:GLN:O	4:A:129:THR:HB	1.58	0.99
4:F:18:MET:CE	4:F:45:ASN:HD22	1.77	0.96
4:F:129:THR:N	7:F:1040:HOH:O	2.07	0.87
3:C:859:DA:N3	7:C:1096:HOH:O	2.09	0.86
4:F:235:ASN:HD21	4:F:238:ARG:HD2	1.42	0.85
4:F:27:ILE:HG13	4:F:28:PRO:HD2	1.59	0.84
1:G:846:DC:OP2	7:G:1028:HOH:O	1.95	0.83
4:A:157:LYS:HE2	5:A:875:DZ4:PG	2.24	0.78
4:F:175:THR:OG1	7:F:1082:HOH:O	2.02	0.77
4:F:327:ARG:N	7:F:1019:HOH:O	2.18	0.77
4:A:304:TRP:CD1	4:A:306:ARG:O	2.39	0.75
4:F:302:HIS:HE1	4:F:315:THR:HG21	1.50	0.75
4:F:128:GLN:O	4:F:129:THR:OG1	2.06	0.73
4:F:240:ARG:HH21	4:F:277:VAL:HG21	1.53	0.73

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:F:323:ARG:O	4:F:324:ARG:HB2	1.86	0.73
4:F:249:MET:HA	4:F:249:MET:HE3	1.71	0.72
4:F:18:MET:HE3	4:F:45:ASN:ND2	2.03	0.71
4:A:18:MET:CE	4:A:45:ASN:HD22	2.04	0.70
4:A:238:ARG:CZ	4:A:238:ARG:HB3	2.19	0.70
4:F:118:SER:O	4:F:122:ILE:HG13	1.89	0.70
4:F:280:ASP:O	4:F:281:LEU:HB2	1.92	0.70
2:H:866:DT:H2''	2:H:867:DA:O5'	1.92	0.69
4:A:340:ASP:OD1	4:A:340:ASP:N	2.25	0.69
4:A:264:GLU:OE1	4:A:309:LYS:NZ	2.19	0.68
4:A:91:SER:HA	4:A:94:THR:O	1.94	0.68
4:A:18:MET:HE3	4:A:45:ASN:HD22	1.59	0.68
2:H:870:DA:OP1	7:H:1060:HOH:O	2.12	0.67
4:A:12:PHE:O	4:A:16:VAL:HG23	1.94	0.67
4:F:203:VAL:O	4:F:206:CYS:HB2	1.95	0.67
4:F:132:ASN:O	4:F:133:GLU:HB2	1.95	0.66
4:A:53:VAL:HA	4:A:57:MET:CE	2.26	0.66
4:F:298:THR:OG1	4:F:323:ARG:NH1	2.29	0.65
3:C:871:DC:H6	7:C:1098:HOH:O	1.78	0.65
4:A:304:TRP:HD1	4:A:306:ARG:O	1.80	0.64
4:A:289:LYS:HB2	4:A:299:THR:HG22	1.79	0.64
4:F:93:TYR:OH	4:F:125:GLU:HG2	1.97	0.64
1:B:844:DT:H2''	1:B:845:DC:H5'	1.80	0.63
4:A:147:PHE:O	4:A:151:ILE:HG13	1.97	0.63
4:F:18:MET:HE1	4:F:45:ASN:HD22	1.64	0.63
4:F:235:ASN:OD1	4:F:236:SER:N	2.31	0.62
4:F:125:GLU:O	4:F:128:GLN:O	2.17	0.62
4:A:235:ASN:HB3	4:A:237:GLU:OE1	2.00	0.62
4:F:262:ILE:HG21	4:F:332:VAL:HG13	1.81	0.62
4:F:63:LEU:CD2	4:F:69:LEU:HB3	2.30	0.62
4:F:57:MET:HG3	4:F:61:MET:CE	2.31	0.61
4:F:63:LEU:HD23	4:F:69:LEU:HB3	1.82	0.61
4:A:235:ASN:HB3	4:A:238:ARG:HH12	1.65	0.61
4:F:115:CYS:N	7:F:1095:HOH:O	2.13	0.60
4:A:286:GLN:NE2	4:A:311:ASP:OD2	2.31	0.60
4:F:173:LEU:O	4:F:200:CYS:HB2	2.00	0.60
4:A:235:ASN:O	4:A:236:SER:HB2	2.00	0.60
4:F:55:SER:O	4:F:56:ALA:HB3	2.01	0.60
4:A:82:ALA:O	4:A:86:ILE:HG13	2.03	0.59
4:F:283:ILE:HG21	4:F:336:VAL:HG21	1.85	0.59
4:F:210:MET:HG2	4:F:214:ARG:HD3	1.85	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:F:235:ASN:HD21	4:F:238:ARG:CD	2.14	0.58
4:F:184:VAL:HG22	4:F:218:PHE:HZ	1.68	0.58
1:G:843:DG:OP1	4:F:240:ARG:NH1	2.37	0.58
4:F:287:GLY:HA3	4:F:301:GLU:HG3	1.85	0.58
4:F:306:ARG:O	4:F:307:LEU:C	2.42	0.58
4:F:302:HIS:CE1	4:F:315:THR:HG21	2.37	0.58
4:A:34:SER:OG	4:A:37:ARG:HG2	2.04	0.58
4:F:290:LEU:HD12	4:F:319:THR:HG22	1.86	0.57
4:F:57:MET:HG3	4:F:61:MET:HE2	1.87	0.57
4:F:178:LEU:HD13	4:F:192:LEU:HD13	1.86	0.56
4:A:53:VAL:HA	4:A:57:MET:HE2	1.88	0.56
4:F:269:GLU:O	4:F:273:ARG:HG3	2.06	0.56
4:F:29:ILE:O	4:F:29:ILE:HG13	2.06	0.56
4:F:210:MET:HE2	4:F:211:LEU:HD12	1.87	0.56
4:F:320:TRP:O	4:F:324:ARG:NH1	2.37	0.55
4:A:145:VAL:HB	4:A:230:ASP:HB3	1.88	0.55
3:C:863:DT:H2"	3:C:864:DC:C6	2.41	0.55
3:C:858:DT:H6	3:C:858:DT:H5"	1.71	0.55
4:F:127:ARG:HH21	4:F:159:ASN:C	2.11	0.54
4:F:127:ARG:NH2	4:F:159:ASN:C	2.61	0.54
4:A:34:SER:OG	4:A:36:GLU:HG3	2.08	0.54
4:A:74:GLY:C	4:A:75:ARG:HG3	2.28	0.54
4:A:283:ILE:HD12	4:A:336:VAL:CG2	2.38	0.53
4:A:127:ARG:HD2	4:A:138:ALA:O	2.08	0.53
4:A:13:PHE:HD2	4:A:31:ILE:HG21	1.73	0.53
4:F:18:MET:HE2	4:F:25:ARG:O	2.09	0.53
4:A:31:ILE:O	4:A:42:SER:HB2	2.08	0.53
4:F:283:ILE:HG21	4:F:336:VAL:CG2	2.40	0.52
4:F:339:LEU:HB3	4:F:341:PRO:HD3	1.91	0.52
4:A:53:VAL:HA	4:A:57:MET:HE1	1.92	0.51
4:A:5:ILE:HG23	4:A:107:LEU:HB2	1.91	0.51
1:B:841:DG:H5"	4:A:247:ARG:NH1	2.26	0.51
4:F:53:VAL:HA	4:F:57:MET:CE	2.40	0.51
4:F:134:LEU:HB3	4:F:136:LEU:HD22	1.93	0.51
4:F:129:THR:O	4:F:132:ASN:O	2.28	0.51
4:F:293:ASP:C	4:F:295:PHE:H	2.14	0.50
4:F:301:GLU:OE1	4:F:335:HIS:ND1	2.44	0.50
4:F:128:GLN:HA	7:F:1040:HOH:O	2.12	0.50
5:A:875:DZ4:PB	5:A:875:DZ4:H5'	2.52	0.50
4:A:318:LYS:O	4:A:322:GLU:HG3	2.12	0.50
4:A:19:ARG:HD3	4:A:136:LEU:HD13	1.94	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:A:57:MET:HE3	4:A:62:ALA:HB2	1.93	0.50
4:A:245:VAL:HG12	4:A:266:LEU:HG	1.94	0.49
4:F:100:LEU:HD11	4:F:106:TYR:CE1	2.48	0.49
4:F:53:VAL:HA	4:F:57:MET:HE2	1.93	0.49
4:F:17:GLU:OE1	4:F:17:GLU:HA	2.12	0.49
4:F:192:LEU:HD21	4:F:222:LEU:HD21	1.95	0.49
4:A:143:ALA:HB1	4:A:144:PRO:HD2	1.93	0.49
3:C:863:DT:H2''	3:C:864:DC:H6	1.78	0.49
3:C:857:DC:H3'	3:C:857:DC:H6	1.77	0.48
4:A:235:ASN:CB	4:A:238:ARG:HH12	2.24	0.48
4:F:210:MET:CE	4:F:211:LEU:HD12	2.43	0.48
4:F:45:ASN:O	4:F:49:ARG:HG3	2.13	0.48
4:F:127:ARG:NH2	4:F:159:ASN:O	2.47	0.48
4:F:291:LYS:HE3	4:F:330:ARG:HD2	1.95	0.48
4:A:291:LYS:HG3	4:A:296:GLN:O	2.14	0.48
4:A:280:ASP:OD2	4:A:282:LEU:HD12	2.14	0.48
4:F:319:THR:OG1	7:F:1062:HOH:O	2.20	0.47
4:F:266:LEU:HD23	4:F:334:LEU:HG	1.95	0.47
4:A:142:VAL:HB	4:A:163:VAL:HG22	1.97	0.47
1:B:846:DC:OP1	4:A:217:LYS:HE2	2.15	0.47
4:F:172:PHE:CE1	4:F:176:LEU:HD13	2.50	0.47
4:A:147:PHE:CD1	4:A:225:ARG:HG2	2.49	0.46
4:F:57:MET:CE	4:F:62:ALA:HA	2.45	0.46
4:F:57:MET:HG3	4:F:61:MET:HE3	1.97	0.46
4:A:290:LEU:HD12	4:A:319:THR:HG22	1.98	0.46
4:F:285:ARG:NH2	7:F:1057:HOH:O	2.43	0.46
4:F:235:ASN:ND2	4:F:238:ARG:HD2	2.20	0.46
4:A:207:ASP:OD1	4:A:209:VAL:HG23	2.16	0.46
4:F:277:VAL:O	4:F:277:VAL:HG12	2.16	0.46
4:F:123:ALA:O	4:F:127:ARG:HG3	2.15	0.46
4:A:154:ASP:HA	4:A:157:LYS:HG3	1.99	0.46
4:A:283:ILE:HD12	4:A:336:VAL:HG22	1.96	0.46
4:A:127:ARG:C	4:A:130:ILE:HG22	2.30	0.45
4:F:131:PHE:HB3	7:F:1040:HOH:O	2.15	0.45
4:F:132:ASN:O	4:F:133:GLU:CB	2.63	0.45
4:A:57:MET:CE	4:A:62:ALA:HA	2.47	0.45
4:F:274:LEU:HD23	4:F:281:LEU:HD22	1.97	0.45
4:A:127:ARG:O	4:A:130:ILE:CG2	2.49	0.45
4:A:132:ASN:O	4:A:133:GLU:HB3	2.17	0.45
1:G:838:DC:H2''	1:G:839:DT:H72	1.98	0.44
4:F:37:ARG:HG3	4:F:37:ARG:NH1	2.32	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:A:63:LEU:HD23	4:A:69:LEU:HB3	1.98	0.44
4:F:200:CYS:O	4:F:201:GLY:C	2.56	0.44
4:F:37:ARG:HG3	4:F:37:ARG:HH11	1.83	0.44
4:A:143:ALA:HB1	4:A:144:PRO:CD	2.47	0.44
4:F:174:GLN:HG2	7:F:1021:HOH:O	2.17	0.44
4:A:57:MET:HE3	4:A:62:ALA:CA	2.48	0.44
3:C:857:DC:C3'	3:C:857:DC:C6	3.01	0.44
4:A:24:LEU:HB3	4:A:29:ILE:HG21	2.00	0.43
4:A:34:SER:HA	4:A:71:LEU:HD21	1.99	0.43
4:F:125:GLU:O	4:F:129:THR:OG1	2.37	0.43
4:F:127:ARG:HD3	4:F:161:GLN:OE1	2.19	0.43
4:F:145:VAL:HB	4:F:230:ASP:HB3	2.01	0.42
4:F:7:VAL:HG12	4:F:8:ASP:N	2.34	0.42
4:A:74:GLY:O	4:A:75:ARG:HG3	2.20	0.42
4:A:130:ILE:O	4:A:134:LEU:HB2	2.20	0.42
4:F:277:VAL:O	4:F:278:LYS:HG2	2.20	0.42
1:B:842:DG:H2'	1:B:843:DG:O4'	2.20	0.42
4:A:21:ASN:OD1	4:A:23:ALA:HB3	2.20	0.42
4:F:27:ILE:HG13	4:F:28:PRO:CD	2.39	0.41
4:A:18:MET:HE1	4:A:45:ASN:HB2	2.01	0.41
4:A:291:LYS:NZ	4:A:330:ARG:HD3	2.35	0.41
4:F:249:MET:SD	4:F:249:MET:N	2.93	0.41
2:H:867:DA:H2''	2:H:868:DG:O5'	2.20	0.41
4:A:143:ALA:HB3	4:A:149:ALA:N	2.36	0.41
4:F:57:MET:HE3	4:F:62:ALA:CA	2.51	0.41
4:F:139:SER:HA	4:F:160:GLY:O	2.20	0.41
5:A:875:DZ4:O1B	5:A:875:DZ4:H5'	2.20	0.41
4:A:129:THR:O	4:A:132:ASN:O	2.39	0.41
4:F:249:MET:HA	4:F:249:MET:CE	2.44	0.41
4:A:253:ILE:HG13	4:A:329:VAL:HB	2.02	0.41
4:F:55:SER:O	4:F:56:ALA:CB	2.64	0.40
4:F:63:LEU:HD21	4:F:69:LEU:HB3	2.01	0.40
4:A:42:SER:O	4:A:55:SER:OG	2.30	0.40
4:F:37:ARG:HA	4:F:37:ARG:HD2	1.87	0.40
4:A:9:MET:HB2	4:A:103:ASP:HB2	2.04	0.40
4:A:59:THR:HG22	4:A:59:THR:O	2.22	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles

### 5.3.1 Protein backbone

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	
4	A	340/342 (99%)	318 (94%)	21 (6%)	1 (0%)	46	66
4	F	340/342 (99%)	289 (85%)	42 (12%)	9 (3%)	7	9
All	All	680/684 (99%)	607 (89%)	63 (9%)	10 (2%)	13	21

All (10) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
4	F	295	PHE
4	F	324	ARG
4	A	129	THR
4	F	133	GLU
4	F	201	GLY
4	F	307	LEU
4	F	314	ALA
4	F	110	THR
4	F	325	GLY
4	F	305	PRO

### 5.3.2 Protein sidechains

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	
4	A	286/286 (100%)	255 (89%)	31 (11%)	8	14
4	F	286/286 (100%)	261 (91%)	25 (9%)	13	22
All	All	572/572 (100%)	516 (90%)	56 (10%)	10	17



All (56) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
4	F	42	SER
4	F	47	PRO
4	F	110	THR
4	F	112	SER
4	F	134	LEU
4	F	136	LEU
4	F	157	LYS
4	F	191	LYS
4	F	197	LEU
4	F	206	CYS
4	F	214	ARG
4	F	227	GLN
4	F	239	LEU
4	F	243	VAL
4	F	247	ARG
4	F	266	LEU
4	F	270	LEU
4	F	278	LYS
4	F	317	ARG
4	F	330	ARG
4	F	331	LEU
4	F	332	VAL
4	F	336	VAL
4	F	338	LEU
4	F	339	LEU
4	A	5	ILE
4	A	27	ILE
4	A	36	GLU
4	A	42	SER
4	A	96	ARG
4	A	101	SER
4	A	103	ASP
4	A	109	VAL
4	A	129	THR
4	A	130	ILE
4	A	134	LEU
4	A	136	LEU
4	A	154	ASP
4	A	176	LEU
4	A	209	VAL
4	A	221	ILE
4	A	229	ILE

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Mol	Chain	Res	Type
4	A	236	SER
4	A	237	GLU
4	A	238	ARG
4	A	239	LEU
4	A	266	LEU
4	A	277	VAL
4	A	295	PHE
4	A	297	GLN
4	A	301	GLU
4	A	303	VAL
4	A	332	VAL
4	A	336	VAL
4	A	338	LEU
4	A	340	ASP

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
4	F	45	ASN
4	F	128	GLN
4	A	45	ASN
4	A	128	GLN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

### 5.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

### 5.6 Ligand geometry [i](#)

Of 6 ligands modelled in this entry, 4 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$
5	DZ4	A	875	6	27,32,32	1.90	5 (18%)	32,50,50	2.08	8 (25%)
5	DZ4	F	876	6	27,32,32	1.73	4 (14%)	32,50,50	2.21	5 (15%)

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
5	DZ4	A	875	6	-	0/13/34/34	0/3/3/3
5	DZ4	F	876	6	-	0/13/34/34	0/3/3/3

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	875	DZ4	C2-N3	2.18	1.36	1.32
5	F	876	DZ4	C2-N1	2.36	1.38	1.33
5	A	875	DZ4	C5-C4	2.88	1.47	1.40
5	F	876	DZ4	C5-C4	2.95	1.47	1.40
5	A	875	DZ4	PB-O3B	3.33	1.63	1.59
5	F	876	DZ4	PB-O1B	4.69	1.51	1.46
5	F	876	DZ4	PA-O1A	4.77	1.51	1.46
5	A	875	DZ4	PA-O1A	4.94	1.51	1.46
5	A	875	DZ4	PB-O1B	5.21	1.52	1.46

All (13) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	F	876	DZ4	N3-C2-N1	-7.64	123.04	128.89
5	A	875	DZ4	N3-C2-N1	-6.37	124.02	128.89
5	F	876	DZ4	O1A-PA-N3A	-5.78	103.04	111.90
5	F	876	DZ4	PG-O3B-PB	-3.72	120.21	132.67
5	A	875	DZ4	C2'-C1'-N9	-3.04	106.77	114.16
5	A	875	DZ4	O3B-PB-N3A	-2.61	99.26	106.44

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	875	DZ4	O1A-PA-N3A	-2.37	108.26	111.90
5	A	875	DZ4	PG-O3B-PB	-2.32	124.89	132.67
5	A	875	DZ4	C4-C5-N7	-2.13	107.52	109.48
5	F	876	DZ4	O2B-PB-O1B	2.23	114.66	110.00
5	A	875	DZ4	O2A-PA-O1A	3.70	117.73	110.00
5	A	875	DZ4	O2B-PB-O1B	4.92	120.26	110.00
5	F	876	DZ4	O2A-PA-O1A	5.07	120.58	110.00

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	875	DZ4	3	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 [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	B	18/18 (100%)	-0.69	0 <span>100</span> <span>100</span>	49, 65, 119, 124	0
1	G	18/18 (100%)	-0.34	1 (5%) <span>28</span> <span>31</span>	36, 55, 128, 140	0
2	H	14/14 (100%)	-0.37	0 <span>100</span> <span>100</span>	35, 53, 95, 108	0
3	C	17/17 (100%)	-0.67	1 (5%) <span>26</span> <span>29</span>	56, 63, 81, 145	0
4	A	342/342 (100%)	0.01	9 (2%) <span>59</span> <span>63</span>	36, 65, 100, 153	0
4	F	342/342 (100%)	-0.20	2 (0%) <span>90</span> <span>91</span>	21, 49, 75, 102	0
All	All	751/751 (100%)	-0.13	13 (1%) <span>73</span> <span>76</span>	21, 59, 95, 153	0

All (13) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
4	A	0	GLY	11.9
4	A	136	LEU	3.9
3	C	857	DC	2.7
4	A	1	SER	2.6
4	A	253	ILE	2.5
4	A	31	ILE	2.3
4	A	16	VAL	2.3
4	A	236	SER	2.3
4	F	214	ARG	2.3
4	A	113	VAL	2.2
4	F	0	GLY	2.1
1	G	837	DT	2.1
4	A	122	ILE	2.0

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

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

### 6.3 Carbohydrates [i](#)

There are no carbohydrates 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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. The B-factors column lists the minimum, median, 95<sup>th</sup> 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	LLDF	B-factors(Å <sup>2</sup> )	Q<0.9
6	MG	F	903	1/1	0.97	0.18	3.14	23,23,23,23	0
6	MG	A	901	1/1	0.96	0.14	0.65	38,38,38,38	0
5	DZ4	F	876	30/30	0.98	0.14	0.22	28,32,35,36	0
6	MG	A	902	1/1	0.95	0.11	-0.18	101,101,101,101	0
5	DZ4	A	875	30/30	0.98	0.09	-0.97	41,52,58,60	0
6	MG	F	904	1/1	0.89	0.08	-	47,47,47,47	0

### 6.5 Other polymers [i](#)

There are no such residues in this entry.