



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 12:46 AM GMT

PDB ID : 2BFM  
Title : LEISHMANIA MAJOR PTERIDINE REDUCTASE 1 IN COMPLEX WITH  
NADP AND TRIMETHOPRIM  
Authors : Schuettelkopf, A.W.; Hunter, W.N.  
Deposited on : 2004-12-09  
Resolution : 2.60 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

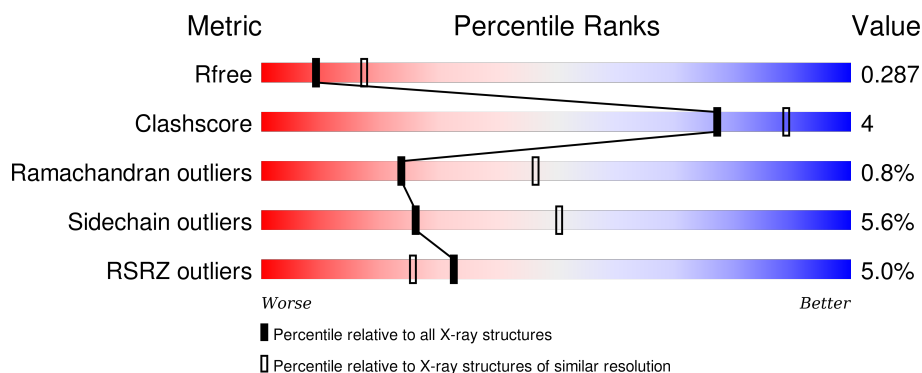
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.60 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	2328 (2.60-2.60)
Clashscore	102246	2679 (2.60-2.60)
Ramachandran outliers	100387	2635 (2.60-2.60)
Sidechain outliers	100360	2635 (2.60-2.60)
RSRZ outliers	91569	2334 (2.60-2.60)

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	A	288	<div> <div>3%</div> <div>81% 10% • 8%</div> </div>
1	B	288	<div> <div>5%</div> <div>79% 12% • 8%</div> </div>
1	C	288	<div> <div>4%</div> <div>78% 9% • 12%</div> </div>
1	D	288	<div> <div>6%</div> <div>77% 11% • 11%</div> </div>

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
3	TOP	A	1290	-	-	-	X

## 2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 8188 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 PTERIDINE REDUCTASE 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	266	Total	C	N	O	S	0	0	0
			1984	1250	353	370	11			
1	B	266	Total	C	N	O	S	0	0	0
			1987	1253	354	369	11			
1	C	254	Total	C	N	O	S	0	0	0
			1892	1192	340	350	10			
1	D	256	Total	C	N	O	S	0	0	0
			1906	1201	342	353	10			

- Molecule 2 is NADPH DIHYDRO-NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (three-letter code: NDP) (formula:  $C_{21}H_{30}N_7O_{17}P_3$ ).



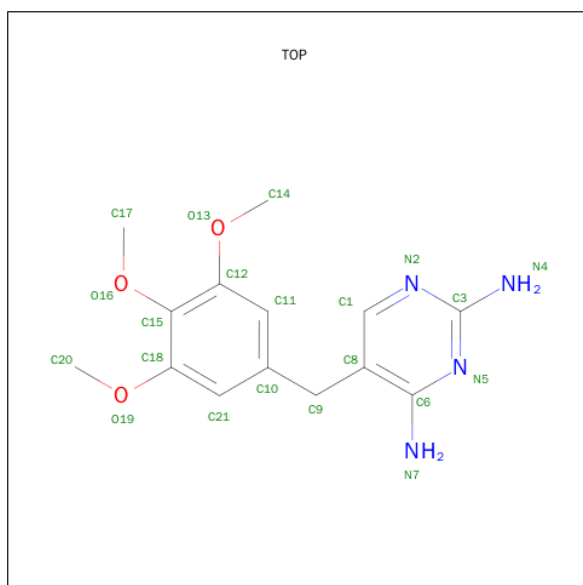
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			48	21	7	17	3		
2	B	1	Total	C	N	O	P	0	0
			48	21	7	17	3		

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	C	1	Total	C	N	O	P	0	0
			48	21	7	17	3		
2	D	1	Total	C	N	O	P	0	0
			48	21	7	17	3		

- Molecule 3 is TRIMETHOPRIM (three-letter code: TOP) (formula:  $C_{14}H_{18}N_4O_3$ ).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			21	14	4	3		
3	B	1	Total	C	N	O	0	0
			21	14	4	3		

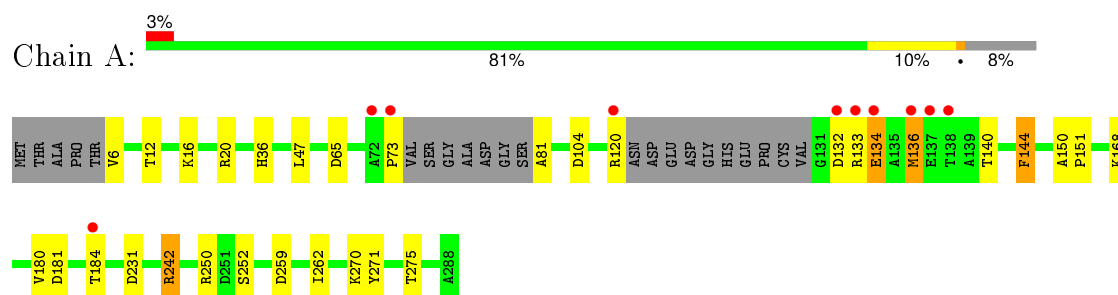
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	60	Total	O	0	0
			60	60		
4	B	45	Total	O	0	0
			45	45		
4	C	44	Total	O	0	0
			44	44		
4	D	36	Total	O	0	0
			36	36		

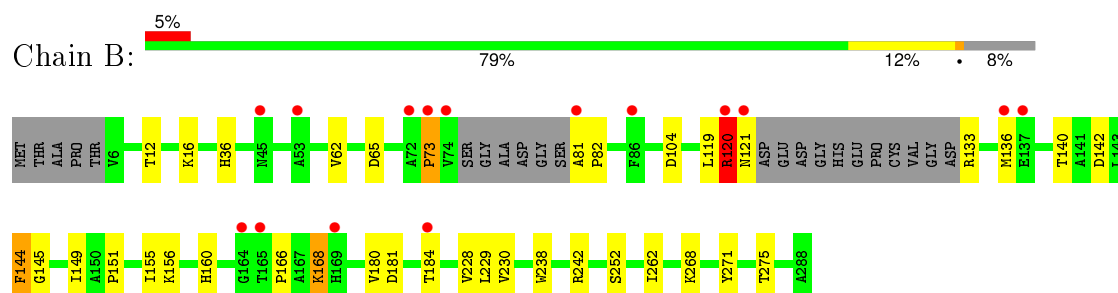
### 3 Residue-property plots [i](#)

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 ( $\text{RSRZ} > 2$ ). 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.

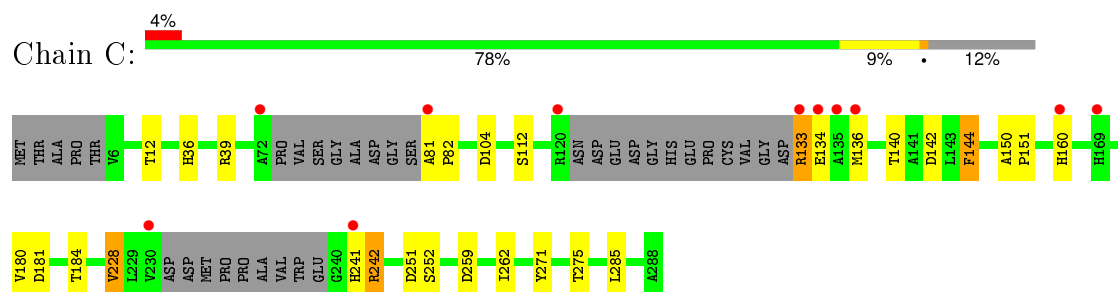
#### • Molecule 1: PTERIDINE REDUCTASE 1



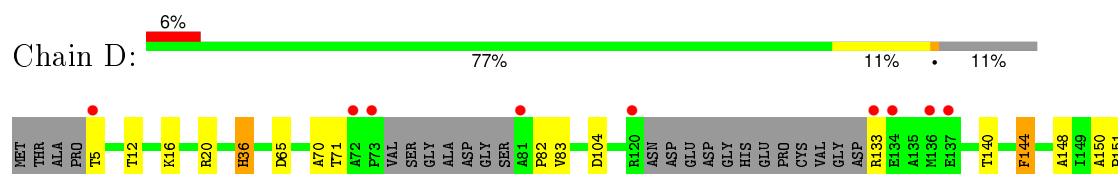
#### • Molecule 1: PTERIDINE REDUCTASE 1

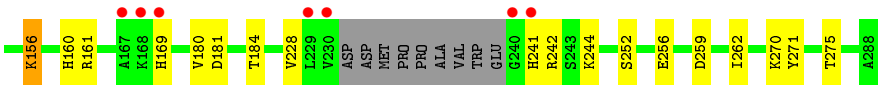


#### • Molecule 1: PTERIDINE REDUCTASE 1



#### • Molecule 1: PTERIDINE REDUCTASE 1





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	94.70Å 104.44Å 138.06Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	24.50 – 2.60 24.76 – 2.60	Depositor EDS
% Data completeness (in resolution range)	100.0 (24.50-2.60) 97.7 (24.76-2.60)	Depositor EDS
$R_{merge}$	0.09	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	5.23 (at 2.60Å)	Xtriage
Refinement program	REFMAC 5.1.24	Depositor
R, $R_{free}$	0.253 , 0.288 0.253 , 0.287	Depositor DCC
$R_{free}$ test set	2085 reflections (5.28%)	DCC
Wilson B-factor (Å <sup>2</sup> )	25.9	Xtriage
Anisotropy	0.349	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.32 , 38.1	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.47$ , $\langle L^2 \rangle = 0.31$	Xtriage
Outliers	1 of 41587 reflections (0.002%)	Xtriage
$F_o, F_c$ correlation	0.88	EDS
Total number of atoms	8188	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	29.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 32.01 % of the origin peak, indicating pseudo translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo translational symmetry is equal to 1.0083e-03. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

<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: NDP, TOP

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	0.53	0/2023	0.85	6/2755 (0.2%)
1	B	0.51	0/2026	0.77	4/2760 (0.1%)
1	C	0.47	0/1925	0.76	5/2616 (0.2%)
1	D	0.49	0/1940	0.74	3/2638 (0.1%)
All	All	0.50	0/7914	0.78	18/10769 (0.2%)

There are no bond length outliers.

All (18) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	104	ASP	CB-CG-OD2	14.62	131.45	118.30
1	A	104	ASP	OD1-CG-OD2	-11.04	102.33	123.30
1	A	104	ASP	CB-CG-OD1	8.80	126.22	118.30
1	B	104	ASP	CB-CG-OD2	8.48	125.94	118.30
1	C	104	ASP	CB-CG-OD2	8.34	125.81	118.30
1	D	104	ASP	CB-CG-OD2	7.41	124.97	118.30
1	C	259	ASP	CB-CG-OD2	7.16	124.75	118.30
1	B	142	ASP	CB-CG-OD2	6.73	124.36	118.30
1	A	259	ASP	CB-CG-OD2	6.58	124.22	118.30
1	D	259	ASP	CB-CG-OD2	6.03	123.72	118.30
1	D	65	ASP	CB-CG-OD2	5.63	123.37	118.30
1	B	65	ASP	CB-CG-OD2	5.50	123.25	118.30
1	B	104	ASP	OD1-CG-OD2	-5.48	112.89	123.30
1	C	251	ASP	CB-CG-OD2	5.40	123.16	118.30
1	A	231	ASP	CB-CG-OD2	5.17	122.95	118.30
1	C	104	ASP	OD1-CG-OD2	-5.16	113.50	123.30
1	C	142	ASP	CB-CG-OD2	5.03	122.83	118.30
1	A	65	ASP	CB-CG-OD2	5.02	122.82	118.30

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	A	1984	0	1990	17	0
1	B	1987	0	1998	21	0
1	C	1892	0	1914	13	0
1	D	1906	0	1928	14	0
2	A	48	0	26	0	0
2	B	48	0	26	0	0
2	C	48	0	26	0	0
2	D	48	0	26	0	0
3	A	21	0	18	0	0
3	B	21	0	18	0	0
4	A	60	0	0	1	0
4	B	45	0	0	2	0
4	C	44	0	0	0	0
4	D	36	0	0	3	0
All	All	8188	0	7970	59	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 4.

All (59) 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:C:12:THR:HA	1:C:36:HIS:HB3	1.69	0.73
1:B:168:LYS:H	1:B:168:LYS:HD3	1.56	0.70
1:B:166:PRO:HB3	1:B:168:LYS:NZ	2.08	0.68
1:B:156:LYS:HE2	4:B:2017:HOH:O	1.95	0.67
1:B:166:PRO:HB3	1:B:168:LYS:HZ3	1.62	0.63
1:A:120:ARG:NH1	1:B:160:HIS:HB2	2.16	0.61
1:A:20:ARG:HE	1:A:47:LEU:HD13	1.65	0.60
1:B:229:LEU:HD23	1:B:238:TRP:CD1	2.36	0.60
1:A:120:ARG:CZ	1:B:160:HIS:HB2	2.32	0.58
1:B:12:THR:HA	1:B:36:HIS:HB3	1.85	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:39:ARG:HH11	1:C:39:ARG:HG2	1.69	0.57
1:C:133:ARG:O	1:C:136:MET:HG2	2.03	0.57
1:A:120:ARG:N	1:A:120:ARG:HD2	2.20	0.57
1:A:252:SER:HB3	1:C:271:TYR:CE2	2.40	0.57
1:A:242:ARG:HB2	1:A:250:ARG:HA	1.86	0.57
1:C:81:ALA:HB3	1:C:82:PRO:HD3	1.87	0.56
1:D:181:ASP:HB3	1:D:184:THR:HG23	1.87	0.55
1:B:73:PRO:HD3	1:B:82:PRO:HA	1.86	0.55
1:C:181:ASP:HB3	1:C:184:THR:HG23	1.87	0.55
1:D:140:THR:O	1:D:144:PHE:HB2	2.09	0.53
1:A:134:GLU:C	1:A:136:MET:H	2.12	0.53
1:A:271:TYR:CE2	1:C:252:SER:HB3	2.44	0.52
1:A:73:PRO:HA	1:A:81:ALA:O	2.09	0.52
4:B:2025:HOH:O	1:C:285:LEU:HD23	2.09	0.52
1:D:161:ARG:NH1	4:D:2013:HOH:O	2.42	0.52
1:D:156:LYS:HG2	1:D:160:HIS:HE1	1.75	0.52
1:C:150:ALA:HB3	1:C:151:PRO:HD3	1.91	0.52
1:A:181:ASP:HB3	1:A:184:THR:HG23	1.92	0.50
1:B:252:SER:HB3	1:D:271:TYR:CE2	2.45	0.50
1:D:150:ALA:HB3	1:D:151:PRO:HD3	1.93	0.50
1:A:20:ARG:NH2	4:A:2001:HOH:O	2.43	0.50
1:B:73:PRO:HG3	1:B:81:ALA:O	2.12	0.49
1:B:168:LYS:H	1:B:168:LYS:CD	2.19	0.48
1:B:271:TYR:CE2	1:D:252:SER:HB3	2.49	0.47
1:B:166:PRO:CB	1:B:168:LYS:HZ3	2.27	0.47
1:C:39:ARG:NH1	1:C:39:ARG:HG2	2.28	0.47
1:D:156:LYS:HG2	1:D:160:HIS:CE1	2.50	0.47
1:B:181:ASP:HB3	1:B:184:THR:HG23	1.98	0.46
1:D:71:THR:O	1:D:83:VAL:N	2.47	0.45
1:C:140:THR:O	1:C:144:PHE:HB2	2.16	0.45
1:C:242:ARG:H	1:C:242:ARG:HG3	1.59	0.45
1:C:160:HIS:HB2	4:D:2012:HOH:O	2.16	0.45
1:B:145:GLY:HA2	1:B:149:ILE:HB	1.97	0.45
1:D:12:THR:HA	1:D:36:HIS:HB3	1.99	0.45
1:B:119:LEU:O	1:B:121:ASN:N	2.49	0.45
1:A:120:ARG:CD	1:A:120:ARG:N	2.81	0.44
1:B:140:THR:O	1:B:144:PHE:HB2	2.17	0.44
1:B:151:PRO:O	1:B:155:ILE:HG13	2.18	0.44
1:D:70:ALA:HB1	1:D:82:PRO:HB2	1.99	0.43
1:B:238:TRP:CE2	1:B:242:ARG:HD2	2.54	0.43
1:A:133:ARG:HA	1:A:136:MET:HB3	1.99	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:119:LEU:HB3	1:B:120:ARG:H	1.52	0.42
1:D:244:LYS:HA	1:D:244:LYS:HD3	1.59	0.42
1:A:150:ALA:HB3	1:A:151:PRO:HD3	2.02	0.42
1:A:12:THR:HA	1:A:36:HIS:HB3	2.01	0.42
1:D:148:ALA:C	1:D:151:PRO:HD2	2.41	0.41
1:D:256:GLU:HA	4:D:2029:HOH:O	2.21	0.41
1:A:120:ARG:CD	1:A:120:ARG:H	2.33	0.41
1:A:140:THR:O	1:A:144:PHE:HB2	2.20	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	260/288 (90%)	241 (93%)	18 (7%)	1 (0%)	39	65
1	B	260/288 (90%)	242 (93%)	14 (5%)	4 (2%)	13	26
1	C	246/288 (85%)	234 (95%)	10 (4%)	2 (1%)	24	46
1	D	248/288 (86%)	235 (95%)	12 (5%)	1 (0%)	39	65
All	All	1014/1152 (88%)	952 (94%)	54 (5%)	8 (1%)	24	46

All (8) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	120	ARG
1	B	136	MET
1	A	180	VAL
1	B	180	VAL
1	C	228	VAL
1	D	180	VAL
1	C	180	VAL

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Mol	Chain	Res	Type
1	B	73	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	
1	A	206/223 (92%)	195 (95%)	11 (5%)	28	53
1	B	207/223 (93%)	196 (95%)	11 (5%)	28	53
1	C	196/223 (88%)	187 (95%)	9 (5%)	33	61
1	D	198/223 (89%)	184 (93%)	14 (7%)	18	36
All	All	807/892 (90%)	762 (94%)	45 (6%)	26	50

All (45) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	6	VAL
1	A	16	LYS
1	A	132	ASP
1	A	134	GLU
1	A	136	MET
1	A	144	PHE
1	A	168	LYS
1	A	242	ARG
1	A	262	ILE
1	A	270	LYS
1	A	275	THR
1	B	16	LYS
1	B	62	VAL
1	B	120	ARG
1	B	133	ARG
1	B	144	PHE
1	B	168	LYS
1	B	228	VAL
1	B	230	VAL
1	B	262	ILE

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Mol	Chain	Res	Type
1	B	268	LYS
1	B	275	THR
1	C	112	SER
1	C	133	ARG
1	C	134	GLU
1	C	144	PHE
1	C	228	VAL
1	C	241	HIS
1	C	242	ARG
1	C	262	ILE
1	C	275	THR
1	D	5	THR
1	D	16	LYS
1	D	20	ARG
1	D	36	HIS
1	D	133	ARG
1	D	144	PHE
1	D	156	LYS
1	D	169	HIS
1	D	228	VAL
1	D	241	HIS
1	D	242	ARG
1	D	262	ILE
1	D	270	LYS
1	D	275	THR

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	38	HIS
1	A	216	GLN
1	B	68	ASN
1	B	216	GLN
1	C	216	GLN
1	D	216	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 carbohydrates in this entry.

## 5.6 Ligand geometry ⓘ

6 ligands 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	NDP	A	1289	-	42,52,52	1.50	4 (9%)	55,80,80	1.91	7 (12%)
3	TOP	A	1290	-	22,22,22	2.40	3 (13%)	30,30,30	2.32	13 (43%)
2	NDP	B	1289	-	42,52,52	1.46	4 (9%)	55,80,80	1.89	6 (10%)
3	TOP	B	1290	-	22,22,22	2.44	3 (13%)	30,30,30	2.44	13 (43%)
2	NDP	C	1289	-	42,52,52	1.50	4 (9%)	55,80,80	1.93	6 (10%)
2	NDP	D	1289	-	42,52,52	1.49	4 (9%)	55,80,80	1.95	6 (10%)

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	NDP	A	1289	-	-	0/30/77/77	0/5/5/5
3	TOP	A	1290	-	-	0/10/10/10	0/2/2/2
2	NDP	B	1289	-	-	0/30/77/77	0/5/5/5
3	TOP	B	1290	-	-	0/10/10/10	0/2/2/2
2	NDP	C	1289	-	-	0/30/77/77	0/5/5/5
2	NDP	D	1289	-	-	0/30/77/77	0/5/5/5

All (22) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	1290	TOP	O13-C12	-6.69	1.26	1.37
3	B	1290	TOP	O13-C12	-6.49	1.26	1.37
3	B	1290	TOP	O19-C18	-6.41	1.26	1.37
3	B	1290	TOP	O16-C15	-6.21	1.27	1.38
3	A	1290	TOP	O19-C18	-6.20	1.27	1.37
3	A	1290	TOP	O16-C15	-5.90	1.27	1.38
2	D	1289	NDP	C2A-N1A	2.27	1.38	1.33
2	B	1289	NDP	C2A-N1A	2.36	1.38	1.33
2	A	1289	NDP	C2A-N1A	2.55	1.38	1.33
2	B	1289	NDP	C6N-C5N	2.69	1.38	1.33
2	C	1289	NDP	C2A-N1A	2.83	1.39	1.33
2	C	1289	NDP	C6N-C5N	2.94	1.39	1.33
2	D	1289	NDP	C6N-C5N	3.11	1.39	1.33
2	A	1289	NDP	C6N-C5N	3.20	1.39	1.33
2	A	1289	NDP	C2A-N3A	3.26	1.38	1.32
2	B	1289	NDP	C2A-N3A	3.38	1.38	1.32
2	D	1289	NDP	C2A-N3A	3.39	1.38	1.32
2	C	1289	NDP	C2A-N3A	3.66	1.38	1.32
2	C	1289	NDP	O7N-C7N	6.57	1.40	1.24
2	B	1289	NDP	O7N-C7N	6.61	1.41	1.24
2	A	1289	NDP	O7N-C7N	6.64	1.41	1.24
2	D	1289	NDP	O7N-C7N	6.65	1.41	1.24

All (51) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	1289	NDP	N3A-C2A-N1A	-12.00	119.70	128.89
2	A	1289	NDP	N3A-C2A-N1A	-11.80	119.86	128.89
2	B	1289	NDP	N3A-C2A-N1A	-11.77	119.89	128.89
2	C	1289	NDP	N3A-C2A-N1A	-11.64	119.98	128.89
3	B	1290	TOP	N2-C3-N5	-5.48	120.06	125.78
3	A	1290	TOP	N2-C3-N5	-5.06	120.50	125.78
3	B	1290	TOP	O13-C12-C11	-3.52	118.20	124.21
3	A	1290	TOP	O13-C12-C11	-3.50	118.22	124.21
2	C	1289	NDP	C4B-O4B-C1B	-3.20	106.21	109.72
3	A	1290	TOP	C8-C1-N2	-3.14	118.42	123.86
2	D	1289	NDP	C4B-O4B-C1B	-3.07	106.34	109.72
3	B	1290	TOP	C8-C1-N2	-2.91	118.81	123.86
2	C	1289	NDP	C4N-C5N-C6N	-2.90	117.80	122.58
2	A	1289	NDP	C4B-O4B-C1B	-2.86	106.58	109.72
2	D	1289	NDP	C4N-C5N-C6N	-2.86	117.87	122.58
2	A	1289	NDP	C4N-C5N-C6N	-2.79	117.97	122.58
2	C	1289	NDP	C4A-C5A-N7A	-2.75	106.94	109.48

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	1289	NDP	C4N-C5N-C6N	-2.68	118.16	122.58
2	B	1289	NDP	C4B-O4B-C1B	-2.65	106.81	109.72
3	A	1290	TOP	O19-C18-C21	-2.63	119.72	124.21
3	B	1290	TOP	O19-C18-C21	-2.41	120.10	124.21
2	D	1289	NDP	PN-O3-PA	-2.37	126.07	132.73
2	C	1289	NDP	PN-O3-PA	-2.35	126.13	132.73
2	D	1289	NDP	C4A-C5A-N7A	-2.32	107.34	109.48
2	B	1289	NDP	C1B-N9A-C4A	-2.09	123.79	126.94
2	A	1289	NDP	PN-O3-PA	-2.01	127.09	132.73
2	A	1289	NDP	O4B-C1B-N9A	2.08	112.44	108.10
2	A	1289	NDP	O2A-PA-O3	2.11	114.67	105.09
2	B	1289	NDP	C5N-C4N-C3N	2.12	118.36	112.52
2	D	1289	NDP	C5N-C4N-C3N	2.17	118.49	112.52
2	C	1289	NDP	C5N-C4N-C3N	2.22	118.62	112.52
2	A	1289	NDP	C5N-C4N-C3N	2.25	118.72	112.52
3	A	1290	TOP	C1-C8-C6	2.30	119.02	115.72
3	A	1290	TOP	C3-N5-C6	2.39	119.76	117.04
2	B	1289	NDP	O4B-C1B-N9A	2.50	113.34	108.10
3	B	1290	TOP	C1-C8-C6	2.61	119.46	115.72
3	B	1290	TOP	C3-N5-C6	2.81	120.23	117.04
3	A	1290	TOP	C14-O13-C12	2.87	121.89	117.54
3	B	1290	TOP	O19-C18-C15	3.11	120.87	115.26
3	A	1290	TOP	O13-C12-C15	3.22	121.07	115.26
3	B	1290	TOP	C20-O19-C18	3.26	122.48	117.54
3	A	1290	TOP	O19-C18-C15	3.30	121.22	115.26
3	B	1290	TOP	C17-O16-C15	3.31	123.52	114.82
3	A	1290	TOP	C20-O19-C18	3.52	122.88	117.54
3	A	1290	TOP	N4-C3-N2	3.52	120.57	117.39
3	B	1290	TOP	N4-C3-N2	3.56	120.60	117.39
3	A	1290	TOP	C17-O16-C15	3.68	124.50	114.82
3	B	1290	TOP	O13-C12-C15	3.73	122.00	115.26
3	B	1290	TOP	C1-N2-C3	3.99	121.56	116.05
3	A	1290	TOP	C1-N2-C3	4.12	121.74	116.05
3	B	1290	TOP	C14-O13-C12	4.12	123.80	117.54

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

## 5.7 Other polymers

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, 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	A	266/288 (92%)	0.07	10 (3%) 44 36	17, 27, 42, 74	1 (0%)
1	B	266/288 (92%)	0.20	15 (5%) 28 21	17, 27, 43, 66	1 (0%)
1	C	254/288 (88%)	-0.02	11 (4%) 39 31	17, 27, 42, 71	3 (1%)
1	D	256/288 (88%)	0.13	16 (6%) 23 17	17, 28, 45, 71	3 (1%)
All	All	1042/1152 (90%)	0.10	52 (4%) 32 26	17, 27, 43, 74	8 (0%)

All (52) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	134	GLU	5.9
1	D	81	ALA	5.9
1	A	132	ASP	4.8
1	C	133	ARG	4.8
1	B	164	GLY	4.5
1	D	72	ALA	4.3
1	B	74	VAL	4.2
1	C	120	ARG	4.0
1	C	136	MET	3.9
1	A	133	ARG	3.9
1	B	73	PRO	3.7
1	D	133	ARG	3.6
1	A	137	GLU	3.5
1	C	135	ALA	3.5
1	C	230	VAL	3.5
1	B	121	ASN	3.4
1	C	81	ALA	3.4
1	D	230	VAL	3.4
1	A	134	GLU	3.3
1	B	120	ARG	3.2
1	A	184	THR	3.2

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Mol	Chain	Res	Type	RSRZ
1	D	136	MET	3.2
1	C	72	ALA	3.2
1	D	5	THR	3.2
1	B	165	THR	3.1
1	D	120	ARG	3.1
1	C	241	HIS	3.1
1	D	169	HIS	3.0
1	D	240	GLY	2.9
1	A	73	PRO	2.9
1	D	73	PRO	2.7
1	C	160	HIS	2.7
1	B	53	ALA	2.7
1	D	167	ALA	2.7
1	B	137	GLU	2.6
1	A	72	ALA	2.6
1	A	136	MET	2.5
1	D	134	GLU	2.5
1	B	184	THR	2.4
1	A	138	THR	2.4
1	B	136	MET	2.3
1	B	72	ALA	2.3
1	B	169	HIS	2.3
1	D	241	HIS	2.3
1	B	81	ALA	2.2
1	A	120	ARG	2.2
1	D	168	LYS	2.2
1	C	169	HIS	2.1
1	D	137	GLU	2.1
1	D	229	LEU	2.1
1	B	45	ASN	2.1
1	B	86	PHE	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 ⓘ

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
3	TOP	A	1290	21/21	0.84	0.22	3.30	42,50,54,57	0
3	TOP	B	1290	21/21	0.84	0.23	1.39	48,54,58,59	0
2	NDP	B	1289	48/48	0.95	0.18	0.52	37,40,44,44	0
2	NDP	A	1289	48/48	0.95	0.18	0.28	37,40,44,44	0
2	NDP	C	1289	48/48	0.94	0.16	-0.33	37,40,44,44	0
2	NDP	D	1289	48/48	0.95	0.15	-0.50	37,40,44,45	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.