



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 2, 2026 – 02:59 AM UTC

PDB ID : 1QP4 / pdb_00001qp4
Title : PURINE REPRESSOR-HYPOXANTHINE-PALINDROMIC OPERATOR
COMPLEX
Authors : Glasfeld, A.; Koehler, A.N.; Schumacher, M.A.; Brennan, R.G.
Deposited on : 1999-06-01
Resolution : 3.00 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)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

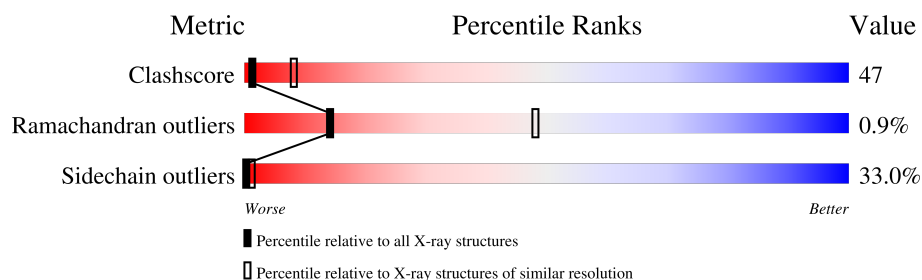
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.00 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))
Clashscore	190562	2977 (3.00-3.00)
Ramachandran outliers	187476	2877 (3.00-3.00)
Sidechain outliers	187428	2880 (3.00-3.00)

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 $\leq 5\%$.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	M	17	35% 65%
2	A	340	28% 44% 22% 6%

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 3009 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.

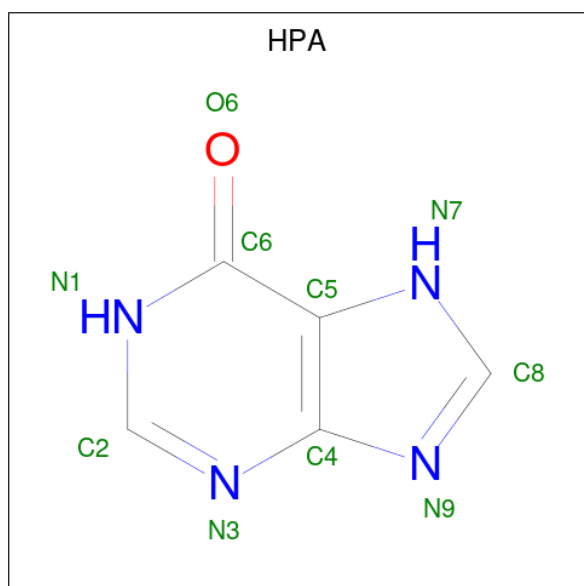
- Molecule 1 is a DNA chain called DNA (5'-D(*TP*AP*CP*GP*CP*AP*AP*TP*CP*GP*AP*TP*TP*GP*CP*GP*T)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	M	17	Total	C	N	O	P	0	0	0
			345	166	62	101	16			

- Molecule 2 is a protein called PROTEIN (PURINE NUCLEOTIDE SYNTHESIS REPRESSOR).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	A	338	Total	C	N	O	S	0	0	0
			2652	1671	469	493	19			

- Molecule 3 is HYPOXANTHINE (CCD ID: HPA) (formula: C₅H₄N₄O).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			10	5	4	1		

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	2	Total	O	0	0
			2	2		

3 Residue-property plots

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. 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. 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.

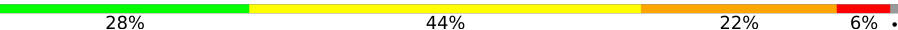
Note EDS was not executed.

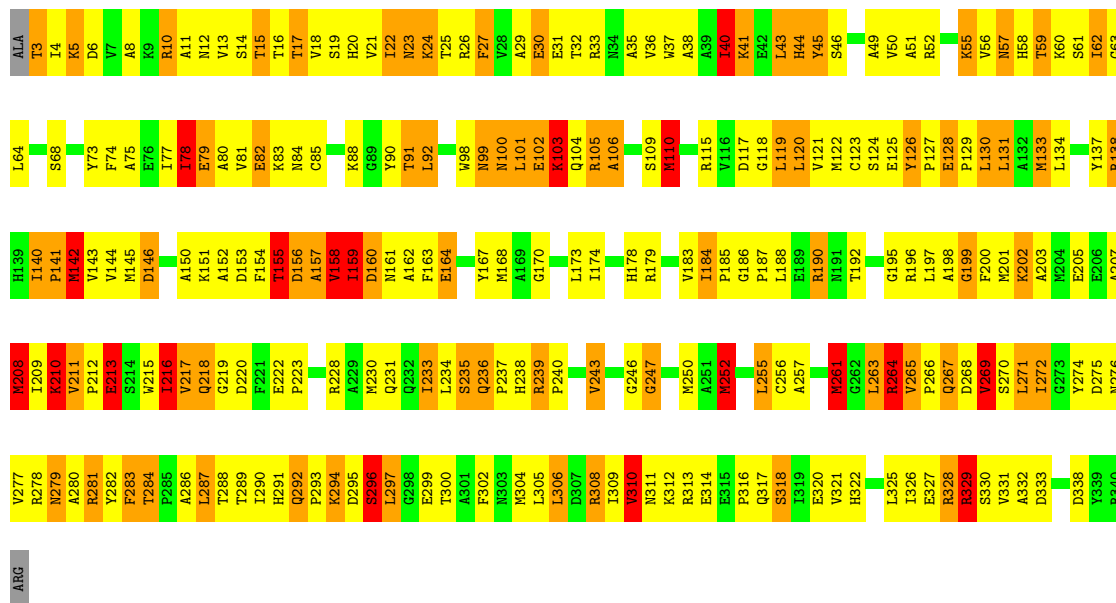
- Molecule 1: DNA (5'-D(*TP*AP*CP*GP*CP*AP*AP*TP*CP*GP*AP*TP*TP*GP*CP*GP*T)-3')

Chain M: 



- Molecule 2: PROTEIN (PURINE NUCLEOTIDE SYNTHESIS REPRESSOR)

Chain A: 



4 Data and refinement statistics

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α , β , γ	176.48Å 95.26Å 81.18Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	10.00 – 3.00	Depositor
% Data completeness (in resolution range)	(Not available) (10.00-3.00)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	7.97	Depositor
Refinement program	TNT	Depositor
R, R_{free}	0.157 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	3009	wwPDB-VP
Average B, all atoms (Å ²)	46.0	wwPDB-VP

5 Model quality

5.1 Standard geometry

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

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	M	0.40	0/386	0.89	0/594
2	A	1.42	16/2706 (0.6%)	1.68	63/3660 (1.7%)
All	All	1.34	16/3092 (0.5%)	1.59	63/4254 (1.5%)

All (16) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	184	ILE	CA-CB	-10.12	1.45	1.54
2	A	110	MET	SD-CE	8.00	1.99	1.79
2	A	106	ALA	CA-CB	-6.80	1.42	1.53
2	A	78	ILE	CA-CB	-6.72	1.47	1.54
2	A	81	VAL	CA-CB	-6.43	1.47	1.54
2	A	216	ILE	CA-CB	6.21	1.62	1.54
2	A	195	GLY	CA-C	-6.08	1.45	1.52
2	A	333	ASP	C-O	-5.90	1.16	1.23
2	A	40	ILE	CA-CB	-5.70	1.47	1.54
2	A	198	ALA	CA-CB	-5.52	1.44	1.53
2	A	247	GLY	CA-C	5.50	1.56	1.51
2	A	208	MET	SD-CE	5.49	1.93	1.79
2	A	329	ARG	CA-C	-5.39	1.45	1.52
2	A	75	ALA	CA-CB	-5.25	1.45	1.53
2	A	243	VAL	CA-CB	-5.23	1.47	1.54
2	A	74	PHE	CA-C	-5.05	1.46	1.52

All (63) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	322	HIS	N-CA-C	9.38	124.41	109.40
2	A	283	PHE	N-CA-C	-9.23	99.06	110.41
2	A	210	LYS	CA-C-N	-9.16	112.41	122.85

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	210	LYS	C-N-CA	-9.16	112.41	122.85
2	A	57	ASN	N-CA-C	9.05	124.05	111.92
2	A	160	ASP	N-CA-C	8.96	124.03	113.18
2	A	250	MET	N-CA-C	-8.95	101.44	111.82
2	A	146	ASP	N-CA-C	8.84	124.33	111.87
2	A	287	LEU	N-CA-C	8.72	123.04	109.96
2	A	326	ILE	CB-CA-C	-8.12	99.47	110.42
2	A	290	ILE	CB-CA-C	-7.72	101.34	110.91
2	A	51	ALA	N-CA-C	-7.58	102.95	111.07
2	A	252	MET	N-CA-C	-7.44	103.19	111.82
2	A	121	VAL	N-CA-C	7.38	118.51	107.80
2	A	296	SER	N-CA-C	-7.24	103.47	111.36
2	A	199	GLY	N-CA-C	-7.05	104.33	112.50
2	A	15	THR	N-CA-C	-7.02	103.67	111.82
2	A	44	HIS	N-CA-C	-7.02	102.70	110.91
2	A	142	MET	N-CA-C	7.01	119.83	109.24
2	A	156	ASP	N-CA-C	-6.98	100.47	110.59
2	A	236	GLN	N-CA-C	6.92	120.77	110.39
2	A	211	VAL	CB-CA-C	6.39	118.58	111.04
2	A	40	ILE	CB-CA-C	-6.24	103.87	112.04
2	A	308	ARG	N-CA-C	-6.21	104.42	111.07
2	A	184	ILE	N-CA-C	-6.21	102.01	108.15
2	A	159	ILE	N-CA-C	6.19	116.78	108.11
2	A	58	HIS	N-CA-C	-6.04	99.35	108.46
2	A	73	TYR	N-CA-C	-6.00	104.44	110.97
2	A	157	ALA	CA-C-N	-5.94	115.83	123.19
2	A	157	ALA	C-N-CA	-5.94	115.83	123.19
2	A	103	LYS	N-CA-C	-5.82	105.02	111.36
2	A	261	MET	N-CA-C	-5.74	106.50	112.93
2	A	45	TYR	N-CA-C	5.73	118.98	109.46
2	A	126	TYR	N-CA-C	5.72	119.64	108.21
2	A	178	HIS	N-CA-C	5.65	119.46	109.96
2	A	310	VAL	N-CA-C	5.58	115.66	110.42
2	A	297	LEU	N-CA-C	-5.53	105.25	111.28
2	A	158	VAL	N-CA-C	-5.52	100.45	108.17
2	A	264	ARG	N-CA-C	5.51	118.80	109.76
2	A	279	ASN	N-CA-C	5.46	119.47	112.26
2	A	49	ALA	N-CA-C	-5.45	105.36	112.23
2	A	267	GLN	N-CA-C	5.36	118.61	111.75
2	A	59	THR	CB-CA-C	-5.35	101.16	110.09
2	A	153	ASP	CA-C-N	-5.32	114.17	122.73
2	A	153	ASP	C-N-CA	-5.32	114.17	122.73

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	213	GLU	N-CA-C	5.30	117.80	111.71
2	A	150	ALA	N-CA-C	5.27	116.74	109.15
2	A	329	ARG	N-CA-C	5.24	118.80	111.56
2	A	265	VAL	CB-CA-C	5.23	116.33	110.52
2	A	27	PHE	N-CA-C	5.22	118.00	110.28
2	A	141	PRO	CB-CA-C	-5.19	105.10	111.64
2	A	92	LEU	N-CA-C	5.16	117.66	109.24
2	A	184	ILE	CB-CA-C	-5.16	106.18	111.08
2	A	243	VAL	N-CA-C	5.13	115.51	108.12
2	A	46	SER	CA-C-O	5.12	123.58	119.59
2	A	197	LEU	CB-CA-C	-5.12	102.62	110.81
2	A	5	LYS	N-CA-C	-5.11	105.71	111.28
2	A	16	THR	N-CA-C	-5.10	105.16	111.33
2	A	155	THR	CB-CA-C	-5.10	99.29	110.67
2	A	269	VAL	CB-CA-C	-5.07	101.92	111.30
2	A	59	THR	N-CA-CB	-5.05	103.02	110.49
2	A	338	ASP	N-CA-C	5.03	118.52	112.38
2	A	5	LYS	CB-CA-C	-5.02	102.46	110.79

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	M	345	0	194	12	0
2	A	2652	0	2636	262	0
3	A	10	0	4	2	0
4	A	2	0	0	0	0
All	All	3009	0	2834	272	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 47.

All (272) 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:M:713:DC:H2''	1:M:714:DG:H5''	1.22	1.10
1:M:713:DC:H2''	1:M:714:DG:C5'	1.91	1.00
2:A:101:LEU:HD13	2:A:104:GLN:HE21	1.29	0.96
2:A:210:LYS:H	2:A:210:LYS:HD3	1.31	0.95
1:M:713:DC:C2'	1:M:714:DG:H5''	1.97	0.94
2:A:20:HIS:HA	2:A:25:THR:HG22	1.48	0.94
2:A:126:TYR:HB3	2:A:131:LEU:HD21	1.49	0.92
2:A:236:GLN:HB2	2:A:237:PRO:HD2	1.47	0.92
2:A:3:THR:HG23	2:A:45:TYR:HE1	1.34	0.90
2:A:20:HIS:ND1	2:A:25:THR:HG23	1.86	0.89
2:A:105:ARG:HA	2:A:133:MET:HE3	1.55	0.86
2:A:100:ASN:HD22	2:A:103:LYS:H	1.21	0.86
2:A:100:ASN:O	2:A:104:GLN:HG2	1.74	0.86
1:M:712:DG:H2''	1:M:713:DC:H5''	1.56	0.84
2:A:127:PRO:HB2	2:A:129:PRO:HD2	1.59	0.84
2:A:140:ILE:HD12	2:A:141:PRO:CD	2.07	0.84
2:A:3:THR:HG23	2:A:45:TYR:CE1	2.13	0.83
2:A:20:HIS:HA	2:A:25:THR:CG2	2.08	0.83
2:A:20:HIS:HD1	2:A:25:THR:HG23	1.42	0.81
2:A:142:MET:HG2	2:A:155:THR:HG23	1.60	0.80
2:A:52:ARG:O	2:A:56:VAL:HG22	1.81	0.80
2:A:236:GLN:CB	2:A:237:PRO:HD2	2.12	0.79
2:A:281:ARG:HH11	2:A:281:ARG:HG2	1.48	0.79
2:A:140:ILE:HD12	2:A:141:PRO:N	1.97	0.78
2:A:167:TYR:CD1	2:A:202:LYS:HG2	2.19	0.78
2:A:118:GLY:HA2	2:A:140:ILE:HD11	1.64	0.78
1:M:714:DG:H2''	1:M:715:DT:O5'	1.83	0.78
2:A:105:ARG:HG3	2:A:106:ALA:N	1.99	0.77
2:A:37:TRP:HA	2:A:37:TRP:CE3	2.17	0.77
2:A:105:ARG:HB2	2:A:105:ARG:HH11	1.48	0.77
2:A:152:ALA:HB1	2:A:154:PHE:CE1	2.21	0.76
2:A:100:ASN:ND2	2:A:103:LYS:H	1.84	0.75
2:A:210:LYS:HD3	2:A:210:LYS:N	2.01	0.75
2:A:192:THR:O	2:A:196:ARG:HD2	1.87	0.74
2:A:255:LEU:CD1	2:A:271:LEU:HD23	2.16	0.74
2:A:82:GLU:HG3	2:A:83:LYS:N	2.02	0.73
2:A:118:GLY:HA2	2:A:140:ILE:CD1	2.19	0.72
2:A:237:PRO:HG2	2:A:238:HIS:H	1.54	0.72
2:A:308:ARG:HH21	2:A:316:PRO:HA	1.55	0.72
2:A:257:ALA:O	2:A:261:MET:HG2	1.89	0.71
2:A:120:LEU:HD13	2:A:305:LEU:HD22	1.73	0.71
2:A:138:ARG:NH2	2:A:154:PHE:HB3	2.05	0.71

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:156:ASP:HB3	2:A:304:MET:HE2	1.72	0.70
2:A:105:ARG:CA	2:A:133:MET:HE3	2.21	0.70
2:A:130:LEU:HD22	2:A:130:LEU:O	1.93	0.69
2:A:101:LEU:HD13	2:A:104:GLN:NE2	2.05	0.68
2:A:126:TYR:HB3	2:A:131:LEU:CD2	2.23	0.68
2:A:40:ILE:HG22	2:A:41:LYS:CD	2.24	0.67
2:A:202:LYS:HG3	2:A:203:ALA:N	2.09	0.66
2:A:3:THR:HA	2:A:6:ASP:OD2	1.97	0.65
2:A:63:GLY:O	2:A:119:LEU:HD12	1.96	0.65
2:A:236:GLN:HB2	2:A:237:PRO:CD	2.26	0.65
2:A:40:ILE:HG22	2:A:41:LYS:HD2	1.79	0.65
2:A:297:LEU:HD23	2:A:297:LEU:O	1.97	0.65
2:A:101:LEU:O	2:A:104:GLN:HG3	1.97	0.65
2:A:304:MET:HE3	2:A:317:GLN:HB3	1.79	0.64
2:A:101:LEU:HA	2:A:104:GLN:NE2	2.12	0.64
2:A:167:TYR:HD1	2:A:202:LYS:HG2	1.62	0.64
2:A:210:LYS:H	2:A:210:LYS:CD	2.09	0.64
2:A:140:ILE:HD12	2:A:141:PRO:HD2	1.79	0.64
2:A:281:ARG:HG2	2:A:281:ARG:NH1	2.10	0.64
2:A:30:GLU:CG	2:A:33:ARG:HH12	2.12	0.63
2:A:200:PHE:HD2	2:A:201:MET:HE2	1.62	0.63
1:M:704:DA:H2''	1:M:705:DA:OP2	1.99	0.63
2:A:159:ILE:CG1	2:A:320:GLU:HG2	2.29	0.63
2:A:216:ILE:HD13	2:A:216:ILE:O	1.99	0.63
2:A:222:GLU:HB3	2:A:223:PRO:HD2	1.80	0.62
2:A:255:LEU:HD13	2:A:271:LEU:HD23	1.81	0.62
2:A:142:MET:O	2:A:155:THR:HG22	2.01	0.61
2:A:159:ILE:HD12	2:A:161:ASN:H	1.65	0.61
2:A:231:GLN:O	2:A:235:SER:HB2	2.00	0.61
1:M:707:DC:C2'	1:M:708:DG:H5''	2.31	0.61
2:A:293:PRO:O	2:A:297:LEU:HB2	2.00	0.60
2:A:10:ARG:HG3	2:A:10:ARG:HH11	1.65	0.60
2:A:61:SER:CB	2:A:91:THR:HG22	2.30	0.60
2:A:200:PHE:HD2	2:A:201:MET:CE	2.15	0.59
2:A:118:GLY:CA	2:A:140:ILE:HD11	2.33	0.59
2:A:101:LEU:HA	2:A:104:GLN:HE21	1.68	0.58
2:A:200:PHE:CD2	2:A:201:MET:HE2	2.38	0.58
2:A:310:VAL:HG22	2:A:311:ASN:N	2.18	0.58
2:A:265:VAL:HG13	2:A:269:VAL:O	2.04	0.58
2:A:145:MET:HA	2:A:158:VAL:HG13	1.86	0.58
2:A:234:LEU:HD13	2:A:263:LEU:HD23	1.85	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:101:LEU:CD1	2:A:104:GLN:HE21	2.11	0.58
2:A:105:ARG:HB2	2:A:105:ARG:NH1	2.16	0.58
2:A:161:ASN:HB3	2:A:164:GLU:HG2	1.85	0.57
2:A:184:ILE:HA	2:A:217:VAL:O	2.03	0.57
2:A:88:LYS:HG3	2:A:302:PHE:HE2	1.70	0.57
2:A:185:PRO:HD2	2:A:217:VAL:O	2.05	0.57
2:A:284:THR:O	2:A:284:THR:HG22	2.04	0.56
2:A:142:MET:CG	2:A:155:THR:HG23	2.31	0.56
2:A:267:GLN:CD	2:A:267:GLN:H	2.13	0.56
2:A:159:ILE:O	2:A:159:ILE:HG13	2.04	0.56
2:A:101:LEU:HA	2:A:104:GLN:HG3	1.89	0.55
2:A:264:ARG:HD2	2:A:265:VAL:N	2.21	0.55
2:A:264:ARG:HD2	2:A:265:VAL:H	1.71	0.55
2:A:30:GLU:HG3	2:A:33:ARG:HH12	1.70	0.55
2:A:281:ARG:HG2	2:A:281:ARG:O	2.05	0.55
2:A:247:GLY:HA2	2:A:274:TYR:O	2.07	0.55
2:A:105:ARG:HG3	2:A:106:ALA:H	1.72	0.55
2:A:217:VAL:HG23	2:A:233:ILE:HD11	1.89	0.55
2:A:125:GLU:HG2	2:A:190:ARG:HG3	1.88	0.54
2:A:297:LEU:HD23	2:A:297:LEU:C	2.33	0.54
2:A:218:GLN:CA	2:A:218:GLN:HE21	2.19	0.54
2:A:20:HIS:CE1	2:A:26:ARG:HD3	2.42	0.54
2:A:233:ILE:O	2:A:236:GLN:HG2	2.07	0.54
2:A:120:LEU:CD1	2:A:305:LEU:HD22	2.36	0.54
2:A:134:LEU:HD22	2:A:142:MET:HE1	1.89	0.54
2:A:310:VAL:HG22	2:A:311:ASN:OD1	2.08	0.54
2:A:313:ARG:HG3	2:A:314:GLU:N	2.22	0.54
2:A:159:ILE:HG13	2:A:320:GLU:HG2	1.88	0.54
2:A:264:ARG:HB2	2:A:268:ASP:OD2	2.07	0.54
2:A:288:THR:HG23	2:A:327:GLU:HA	1.90	0.54
2:A:196:ARG:NH2	3:A:599:HPA:H8	2.22	0.54
2:A:237:PRO:CG	2:A:238:HIS:H	2.21	0.54
2:A:308:ARG:O	2:A:312:LYS:HA	2.08	0.53
2:A:101:LEU:HA	2:A:104:GLN:CG	2.37	0.53
2:A:239:ARG:HG3	2:A:240:PRO:O	2.08	0.53
2:A:145:MET:HA	2:A:158:VAL:CG1	2.39	0.53
2:A:212:PRO:O	2:A:215:TRP:HB2	2.09	0.53
2:A:32:THR:O	2:A:36:VAL:HG23	2.08	0.53
2:A:22:ILE:HG22	2:A:23:ASN:CG	2.33	0.53
2:A:159:ILE:HG12	2:A:320:GLU:HG2	1.90	0.53
2:A:8:ALA:HB1	2:A:13:VAL:O	2.09	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:128:GLU:N	2:A:129:PRO:CD	2.73	0.52
2:A:310:VAL:C	2:A:312:LYS:H	2.18	0.52
2:A:222:GLU:HB3	2:A:223:PRO:CD	2.40	0.52
2:A:264:ARG:H	2:A:268:ASP:HB2	1.74	0.52
2:A:101:LEU:HD21	2:A:129:PRO:HB2	1.90	0.52
1:M:712:DG:C2'	1:M:713:DC:H5''	2.35	0.52
2:A:30:GLU:HG2	2:A:33:ARG:NH1	2.25	0.52
2:A:276:ASN:HB2	2:A:291:HIS:HA	1.92	0.52
2:A:309:ILE:HG22	2:A:310:VAL:N	2.24	0.52
2:A:144:VAL:HG12	2:A:146:ASP:H	1.75	0.51
2:A:299:GLU:HG2	2:A:300:THR:N	2.25	0.51
2:A:187:PRO:HG2	2:A:190:ARG:HD3	1.91	0.51
2:A:8:ALA:HB2	2:A:15:THR:HA	1.93	0.51
2:A:30:GLU:HG2	2:A:33:ARG:HH12	1.76	0.51
2:A:62:ILE:HG23	2:A:90:TYR:HD2	1.76	0.51
2:A:61:SER:HA	2:A:91:THR:HG22	1.92	0.50
2:A:188:LEU:N	2:A:188:LEU:HD23	2.26	0.50
2:A:35:ALA:O	2:A:38:ALA:HB3	2.12	0.50
2:A:304:MET:CE	2:A:317:GLN:HB3	2.40	0.50
2:A:328:ARG:C	2:A:329:ARG:HG2	2.36	0.50
2:A:130:LEU:HD22	2:A:130:LEU:C	2.36	0.50
2:A:160:ASP:O	2:A:161:ASN:HB2	2.11	0.50
2:A:252:MET:HE3	2:A:283:PHE:CZ	2.47	0.50
2:A:218:GLN:HE21	2:A:218:GLN:HA	1.77	0.50
2:A:62:ILE:HG23	2:A:90:TYR:CD2	2.46	0.49
2:A:62:ILE:HD11	2:A:120:LEU:HD22	1.93	0.49
2:A:313:ARG:HG3	2:A:314:GLU:H	1.77	0.49
2:A:117:ASP:O	2:A:141:PRO:HG2	2.12	0.49
2:A:292:GLN:HG3	2:A:293:PRO:CD	2.42	0.49
2:A:62:ILE:CD1	2:A:120:LEU:HD22	2.43	0.49
2:A:265:VAL:HG13	2:A:266:PRO:HA	1.94	0.49
2:A:207:ALA:O	2:A:208:MET:HB2	2.12	0.49
2:A:310:VAL:CG2	2:A:311:ASN:N	2.75	0.49
1:M:713:DC:H2''	1:M:714:DG:H5'	1.88	0.49
2:A:281:ARG:HD3	2:A:282:TYR:CE1	2.48	0.48
2:A:61:SER:HB3	2:A:91:THR:HG22	1.95	0.48
2:A:152:ALA:HB1	2:A:154:PHE:CD1	2.47	0.48
2:A:164:GLU:O	2:A:168:MET:HG3	2.12	0.48
2:A:22:ILE:HD12	2:A:22:ILE:HA	1.69	0.48
2:A:160:ASP:HA	2:A:321:VAL:HG12	1.95	0.47
2:A:140:ILE:HD12	2:A:140:ILE:C	2.39	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:167:TYR:CE1	2:A:202:LYS:CG	2.97	0.47
2:A:84:ASN:HB3	2:A:302:PHE:CD2	2.50	0.47
2:A:163:PHE:O	2:A:199:GLY:HA3	2.15	0.47
2:A:200:PHE:CD2	2:A:201:MET:CE	2.95	0.46
2:A:218:GLN:HE21	2:A:219:GLY:H	1.63	0.46
2:A:236:GLN:CB	2:A:237:PRO:CD	2.87	0.46
2:A:306:LEU:O	2:A:310:VAL:HG13	2.15	0.46
2:A:123:CYS:O	2:A:124:SER:HB2	2.15	0.46
2:A:202:LYS:HB2	2:A:202:LYS:HE2	1.35	0.46
2:A:331:VAL:CG1	2:A:332:ALA:N	2.78	0.46
2:A:170:GLY:O	2:A:173:LEU:HB2	2.15	0.46
2:A:313:ARG:CG	2:A:314:GLU:N	2.78	0.46
2:A:126:TYR:CD2	2:A:130:LEU:CD1	2.99	0.46
2:A:105:ARG:NH1	2:A:105:ARG:CB	2.79	0.46
2:A:40:ILE:HG22	2:A:41:LYS:HD3	1.96	0.46
2:A:308:ARG:HH21	2:A:316:PRO:CA	2.27	0.46
2:A:13:VAL:HG23	2:A:14:SER:O	2.16	0.46
2:A:292:GLN:O	2:A:294:LYS:HE3	2.16	0.45
1:M:700:DA:H2''	1:M:701:DC:O5'	2.14	0.45
2:A:161:ASN:HB3	2:A:164:GLU:CG	2.46	0.45
2:A:101:LEU:HA	2:A:104:GLN:CD	2.42	0.45
2:A:156:ASP:CB	2:A:304:MET:HE2	2.45	0.45
2:A:137:TYR:O	2:A:140:ILE:HG23	2.17	0.45
2:A:274:TYR:CD1	2:A:274:TYR:C	2.94	0.45
2:A:10:ARG:HH11	2:A:10:ARG:CG	2.30	0.45
2:A:20:HIS:CA	2:A:25:THR:HG22	2.35	0.45
2:A:325:LEU:CD1	2:A:327:GLU:HG3	2.47	0.45
2:A:325:LEU:HD11	2:A:327:GLU:HG3	1.99	0.45
2:A:265:VAL:HA	2:A:266:PRO:HA	1.63	0.45
2:A:179:ARG:HA	2:A:209:ILE:HD13	1.98	0.45
2:A:102:GLU:O	2:A:105:ARG:HG2	2.17	0.45
2:A:154:PHE:CD1	2:A:154:PHE:N	2.82	0.44
2:A:187:PRO:HD3	2:A:220:ASP:HA	1.98	0.44
2:A:293:PRO:HG2	2:A:321:VAL:HG22	1.98	0.44
2:A:37:TRP:HA	2:A:37:TRP:HE3	1.76	0.44
2:A:43:LEU:HD13	2:A:43:LEU:N	2.31	0.44
2:A:102:GLU:HA	2:A:105:ARG:HG2	2.00	0.44
2:A:156:ASP:HB3	2:A:304:MET:CE	2.45	0.44
2:A:208:MET:HE3	2:A:208:MET:HB3	1.86	0.44
2:A:30:GLU:CG	2:A:33:ARG:NH1	2.79	0.44
2:A:281:ARG:NH1	2:A:281:ARG:CG	2.78	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:100:ASN:C	2:A:104:GLN:HG2	2.41	0.44
2:A:286:ALA:HB1	2:A:328:ARG:HG2	2.00	0.44
2:A:40:ILE:CG2	2:A:41:LYS:HD3	2.48	0.44
2:A:218:GLN:HE21	2:A:219:GLY:N	2.16	0.44
2:A:276:ASN:HA	2:A:289:THR:HG21	1.98	0.44
2:A:306:LEU:HD12	2:A:306:LEU:HA	1.76	0.44
2:A:85:CYS:HA	2:A:302:PHE:CZ	2.52	0.44
2:A:186:GLY:C	2:A:218:GLN:HE22	2.26	0.44
2:A:280:ALA:HA	2:A:283:PHE:CE1	2.53	0.44
2:A:100:ASN:ND2	2:A:100:ASN:C	2.76	0.44
2:A:252:MET:HE3	2:A:283:PHE:CE1	2.53	0.44
1:M:706:DT:O2	2:A:55:LYS:HE3	2.18	0.43
2:A:261:MET:HG2	2:A:261:MET:H	1.50	0.43
2:A:40:ILE:HD13	2:A:45:TYR:HD2	1.83	0.43
2:A:157:ALA:O	2:A:318:SER:HA	2.18	0.43
2:A:292:GLN:HG3	2:A:293:PRO:HD2	2.00	0.43
2:A:167:TYR:CE1	2:A:202:LYS:HG2	2.53	0.43
2:A:292:GLN:HG3	2:A:293:PRO:N	2.30	0.43
2:A:167:TYR:CD1	2:A:202:LYS:CG	2.96	0.43
2:A:152:ALA:CB	2:A:154:PHE:CE1	2.98	0.43
2:A:192:THR:HG21	3:A:599:HPA:C8	2.49	0.43
2:A:80:ALA:O	2:A:83:LYS:HB2	2.18	0.43
2:A:106:ALA:O	2:A:110:MET:HG2	2.19	0.43
2:A:210:LYS:O	2:A:210:LYS:HG2	2.19	0.43
2:A:252:MET:HE2	2:A:252:MET:HB2	1.89	0.43
2:A:296:SER:O	2:A:300:THR:HB	2.18	0.43
2:A:134:LEU:HD22	2:A:142:MET:CE	2.48	0.42
2:A:160:ASP:HA	2:A:321:VAL:CG1	2.49	0.42
2:A:266:PRO:HB3	2:A:330:SER:O	2.19	0.42
2:A:61:SER:CA	2:A:91:THR:HG22	2.48	0.42
2:A:101:LEU:HD12	2:A:133:MET:HE1	2.01	0.42
2:A:192:THR:HG22	2:A:196:ARG:HH21	1.84	0.42
2:A:266:PRO:HA	2:A:269:VAL:O	2.19	0.42
2:A:276:ASN:CB	2:A:291:HIS:HA	2.50	0.42
2:A:17:THR:O	2:A:18:VAL:C	2.62	0.42
2:A:329:ARG:CZ	2:A:329:ARG:CB	2.98	0.42
2:A:27:PHE:CD1	2:A:27:PHE:C	2.97	0.42
2:A:59:THR:HG21	2:A:115:ARG:O	2.20	0.41
2:A:99:ASN:HD22	2:A:99:ASN:HA	1.51	0.41
2:A:11:ALA:O	2:A:13:VAL:HG13	2.20	0.41
2:A:78:ILE:HG22	2:A:79:GLU:N	2.32	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:213:GLU:C	2:A:215:TRP:N	2.78	0.41
2:A:331:VAL:HG12	2:A:332:ALA:N	2.36	0.41
2:A:105:ARG:HH11	2:A:105:ARG:CB	2.27	0.41
1:M:701:DC:OP1	2:A:29:ALA:HB3	2.20	0.41
2:A:131:LEU:HD22	2:A:131:LEU:HA	1.70	0.41
2:A:271:LEU:HD12	2:A:272:ILE:N	2.35	0.41
2:A:280:ALA:HA	2:A:283:PHE:CD1	2.56	0.41
2:A:287:LEU:HD12	2:A:287:LEU:HA	1.66	0.41
2:A:98:TRP:HD1	2:A:103:LYS:HE2	1.86	0.41
2:A:192:THR:HG22	2:A:196:ARG:NH2	2.36	0.41
2:A:40:ILE:HD13	2:A:45:TYR:CD2	2.56	0.41
2:A:77:ILE:O	2:A:80:ALA:HB3	2.20	0.41
2:A:292:GLN:HA	2:A:293:PRO:HD3	1.79	0.41
2:A:265:VAL:CG1	2:A:266:PRO:HA	2.51	0.41
2:A:270:SER:HB3	2:A:331:VAL:HG22	2.03	0.41
2:A:23:ASN:O	2:A:24:LYS:C	2.64	0.40
2:A:105:ARG:CG	2:A:106:ALA:N	2.79	0.40
2:A:126:TYR:N	2:A:126:TYR:CD1	2.89	0.40
2:A:291:HIS:CD2	2:A:291:HIS:C	2.93	0.40
2:A:37:TRP:O	2:A:40:ILE:HB	2.21	0.40
2:A:105:ARG:CA	2:A:133:MET:CE	2.96	0.40
2:A:288:THR:HA	2:A:328:ARG:HB2	2.02	0.40
2:A:162:ALA:HB1	2:A:196:ARG:HG3	2.02	0.40
2:A:237:PRO:HG2	2:A:238:HIS:N	2.30	0.40
2:A:4:ILE:HG23	2:A:15:THR:HG22	2.04	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	
2	A	336/340 (99%)	303 (90%)	30 (9%)	3 (1%)	14	48

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	A	275	ASP
2	A	246	GLY
2	A	19	SER

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
2	A	279/280 (100%)	187 (67%)	92 (33%)	0 1

All (92) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	A	3	THR
2	A	5	LYS
2	A	10	ARG
2	A	12	ASN
2	A	17	THR
2	A	21	VAL
2	A	22	ILE
2	A	23	ASN
2	A	24	LYS
2	A	30	GLU
2	A	31	GLU
2	A	40	ILE
2	A	41	LYS
2	A	43	LEU
2	A	44	HIS
2	A	50	VAL
2	A	55	LYS
2	A	57	ASN
2	A	60	LYS
2	A	62	ILE
2	A	64	LEU
2	A	68	SER

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Mol	Chain	Res	Type
2	A	78	ILE
2	A	79	GLU
2	A	82	GLU
2	A	91	THR
2	A	92	LEU
2	A	99	ASN
2	A	100	ASN
2	A	101	LEU
2	A	102	GLU
2	A	103	LYS
2	A	105	ARG
2	A	109	SER
2	A	110	MET
2	A	119	LEU
2	A	120	LEU
2	A	122	MET
2	A	128	GLU
2	A	130	LEU
2	A	131	LEU
2	A	133	MET
2	A	138	ARG
2	A	140	ILE
2	A	142	MET
2	A	143	VAL
2	A	151	LYS
2	A	155	THR
2	A	158	VAL
2	A	159	ILE
2	A	164	GLU
2	A	174	ILE
2	A	183	VAL
2	A	190	ARG
2	A	202	LYS
2	A	205	GLU
2	A	208	MET
2	A	210	LYS
2	A	211	VAL
2	A	213	GLU
2	A	216	ILE
2	A	217	VAL
2	A	218	GLN
2	A	228	ARG

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Mol	Chain	Res	Type
2	A	230	MET
2	A	233	ILE
2	A	235	SER
2	A	239	ARG
2	A	243	VAL
2	A	252	MET
2	A	255	LEU
2	A	256	CYS
2	A	261	MET
2	A	263	LEU
2	A	264	ARG
2	A	269	VAL
2	A	271	LEU
2	A	272	ILE
2	A	277	VAL
2	A	278	ARG
2	A	279	ASN
2	A	281	ARG
2	A	284	THR
2	A	292	GLN
2	A	294	LYS
2	A	295	ASP
2	A	296	SER
2	A	306	LEU
2	A	310	VAL
2	A	318	SER
2	A	328	ARG
2	A	329	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
2	A	23	ASN
2	A	34	ASN
2	A	84	ASN
2	A	99	ASN
2	A	100	ASN
2	A	104	GLN
2	A	113	GLN
2	A	218	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 ⓘ

1 ligand is 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	$\# Z > 2$
3	HPA	A	599	-	10,11,11	1.26	2 (20%)	11,15,15	1.34	1 (9%)

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
3	HPA	A	599	-	-	-	0/2/2/2

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	599	HPA	C8-N7	-2.62	1.30	1.35
3	A	599	HPA	C8-N9	2.05	1.37	1.33

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	599	HPA	C6-C5-C4	-3.13	119.47	121.61

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	599	HPA	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

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

6.4 Ligands

EDS was not executed - this section is therefore empty.

6.5 Other polymers

EDS was not executed - this section is therefore empty.