



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 2, 2026 – 04:34 AM UTC

PDB ID : 1BDH / pdb_00001bdh
Title : PURINE REPRESSOR MUTANT-HYPOXANTHINE-PALINDROMIC
OPERATOR COMPLEX
Authors : Glasfeld, A.; Schumacher, M.A.; Choi, K.Y.; Zalkin, H.; Brennan, R.G.
Deposited on : 1996-07-25
Resolution : 2.70 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

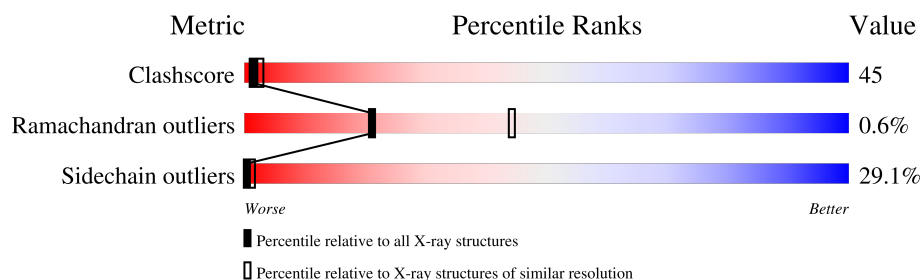
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.70 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	3843 (2.70-2.70)
Ramachandran outliers	187476	3778 (2.70-2.70)
Sidechain outliers	187428	3778 (2.70-2.70)

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	B	17	
2	A	340	

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 3056 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*AP*CP*GP*TP*TP*TP*GP*CP*GP*T)-3').

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

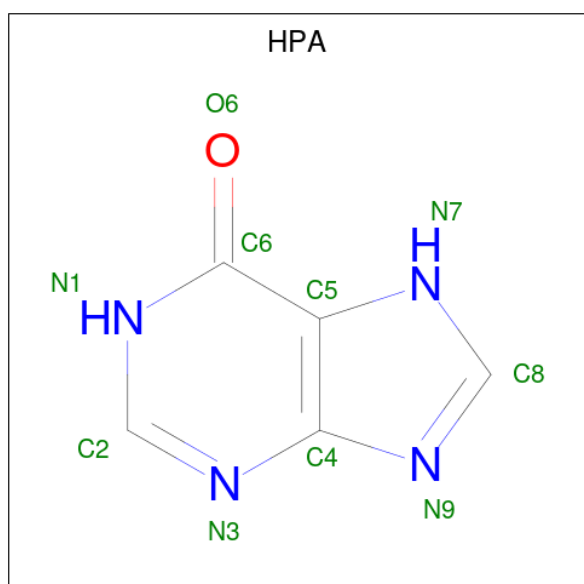
- Molecule 2 is a protein called PROTEIN (PURINE REPRESSOR).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	A	338	Total	C	N	O	S	0	0	0
			2648	1668	468	493	19			

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	55	ALA	LYS	engineered mutation	UNP P0ACP7

- 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	B	6	Total	O	0	0
			6	6		
4	A	47	Total	O	0	0
			47	47		

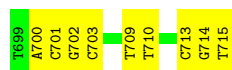
3 Residue-property plots

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.

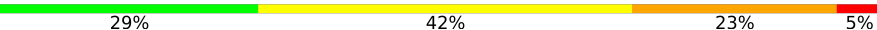
Note EDS was not executed.

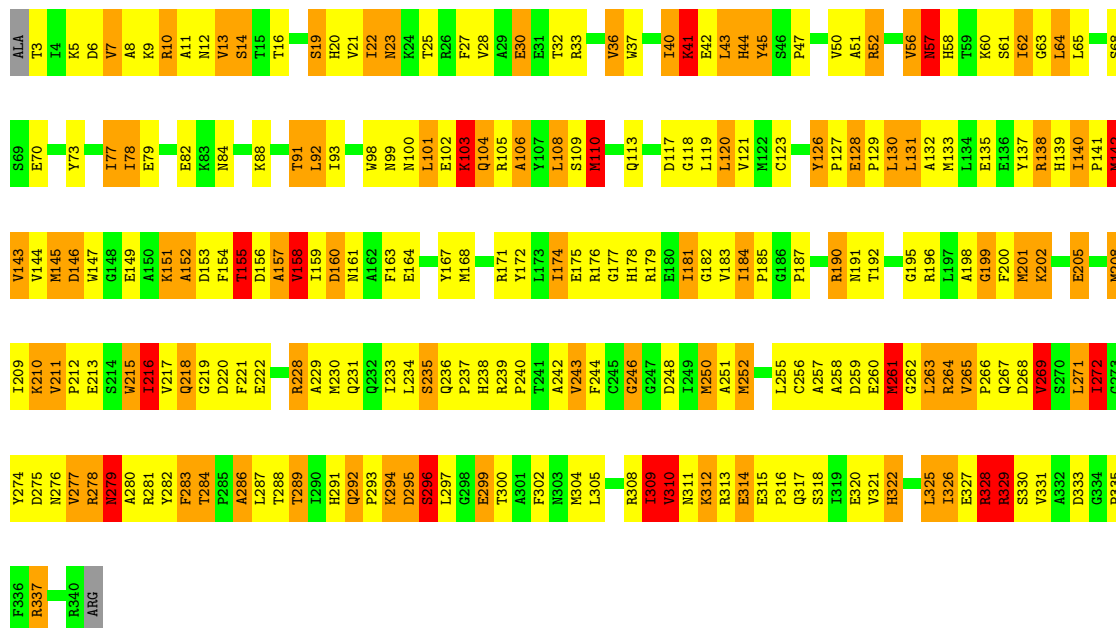
- Molecule 1: DNA (5'-D(*TP*AP*CP*GP*CP*AP*AP*AP*CP*GP*TP*TP*TP*GP*CP*GP*T)-3')

Chain B: 



- Molecule 2: PROTEIN (PURINE 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	176.06Å 95.49Å 80.49Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	10.00 – 2.70	Depositor
% Data completeness (in resolution range)	(Not available) (10.00-2.70)	Depositor
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	TNT	Depositor
R, R_{free}	0.168 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	3056	wwPDB-VP
Average B, all atoms (Å ²)	47.0	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	B	0.62	0/386	1.12	0/594
2	A	1.46	24/2702 (0.9%)	1.65	53/3656 (1.4%)
All	All	1.38	24/3088 (0.8%)	1.58	53/4250 (1.2%)

All (24) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	174	ILE	CA-CB	-7.31	1.46	1.54
2	A	208	MET	SD-CE	7.22	1.97	1.79
2	A	184	ILE	CA-CB	-6.88	1.45	1.54
2	A	265	VAL	CA-CB	-6.84	1.49	1.54
2	A	36	VAL	CA-CB	-6.62	1.46	1.54
2	A	13	VAL	CA-CB	-6.61	1.45	1.55
2	A	291	HIS	CA-CB	-6.43	1.44	1.53
2	A	106	ALA	CA-CB	-6.37	1.43	1.53
2	A	289	THR	CA-CB	6.36	1.63	1.53
2	A	286	ALA	CA-CB	-6.27	1.43	1.53
2	A	56	VAL	CA-CB	-6.20	1.46	1.54
2	A	198	ALA	CA-CB	-6.12	1.43	1.53
2	A	326	ILE	CA-CB	-6.02	1.45	1.54
2	A	93	ILE	CA-CB	-5.96	1.46	1.53
2	A	142	MET	SD-CE	-5.83	1.65	1.79
2	A	110	MET	SD-CE	5.66	1.93	1.79
2	A	272	ILE	CA-CB	-5.54	1.47	1.54
2	A	113	GLN	CA-C	-5.38	1.46	1.52
2	A	329	ARG	CA-C	-5.25	1.46	1.52
2	A	98	TRP	CA-C	-5.24	1.46	1.53
2	A	309	ILE	CA-C	-5.18	1.46	1.52
2	A	152	ALA	CA-C	-5.12	1.46	1.52
2	A	13	VAL	CA-C	-5.06	1.47	1.52
2	A	121	VAL	CA-CB	-5.04	1.48	1.54

All (53) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	296	SER	N-CA-C	-9.29	101.16	111.28
2	A	287	LEU	N-CA-C	9.09	123.59	109.96
2	A	51	ALA	N-CA-C	-8.70	101.77	111.07
2	A	146	ASP	N-CA-C	8.41	123.73	112.30
2	A	155	THR	CB-CA-C	-8.06	95.64	110.62
2	A	160	ASP	N-CA-C	7.85	122.86	113.28
2	A	283	PHE	N-CA-C	-7.77	100.85	110.41
2	A	158	VAL	N-CA-C	-7.74	97.33	108.17
2	A	121	VAL	N-CA-C	7.71	118.90	108.11
2	A	139	HIS	CA-C-N	-7.70	115.96	123.04
2	A	139	HIS	C-N-CA	-7.70	115.96	123.04
2	A	310	VAL	N-CA-C	7.37	117.35	110.42
2	A	326	ILE	CB-CA-C	-7.36	101.97	110.73
2	A	261	MET	N-CA-C	-7.16	104.63	113.15
2	A	10	ARG	N-CA-C	-7.06	103.67	111.36
2	A	103	LYS	N-CA-C	-6.86	103.80	111.28
2	A	322	HIS	N-CA-C	6.70	121.38	108.45
2	A	250	MET	N-CA-C	-6.69	104.02	111.71
2	A	9	LYS	N-CA-C	6.58	119.46	111.82
2	A	294	LYS	N-CA-C	6.52	118.04	111.07
2	A	41	LYS	N-CA-C	6.37	118.02	111.14
2	A	269	VAL	CB-CA-C	-6.34	99.74	110.71
2	A	211	VAL	N-CA-CB	6.31	120.05	111.21
2	A	289	THR	N-CA-C	6.21	116.77	108.38
2	A	328	ARG	CA-C-N	-6.11	111.94	122.14
2	A	328	ARG	C-N-CA	-6.11	111.94	122.14
2	A	211	VAL	CB-CA-C	6.09	122.45	111.36
2	A	142	MET	N-CA-C	6.09	118.55	108.99
2	A	199	GLY	N-CA-C	-6.05	105.48	112.50
2	A	258	ALA	N-CA-C	-5.96	104.69	111.07
2	A	271	LEU	CA-C-N	-5.93	115.37	123.14
2	A	271	LEU	C-N-CA	-5.93	115.37	123.14
2	A	157	ALA	CA-C-N	-5.88	115.90	123.19
2	A	157	ALA	C-N-CA	-5.88	115.90	123.19
2	A	279	ASN	N-CA-C	5.86	119.68	111.30
2	A	181	ILE	N-CA-C	5.80	118.31	108.86
2	A	126	TYR	N-CA-C	5.79	119.51	108.97
2	A	45	TYR	N-CA-C	5.77	119.04	109.46
2	A	278	ARG	CA-C-N	-5.75	113.54	123.25
2	A	278	ARG	C-N-CA	-5.75	113.54	123.25
2	A	123	CYS	N-CA-C	5.71	120.40	113.38
2	A	243	VAL	N-CA-C	5.69	116.32	108.12

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	216	ILE	CB-CA-C	5.63	118.76	110.77
2	A	104	GLN	N-CA-C	5.49	117.34	111.36
2	A	44	HIS	N-CA-C	-5.41	103.97	111.28
2	A	246	GLY	N-CA-C	5.31	125.77	113.18
2	A	57	ASN	N-CA-C	5.27	122.02	110.80
2	A	92	LEU	N-CA-C	5.21	117.01	108.52
2	A	178	HIS	N-CA-C	5.19	118.27	109.76
2	A	280	ALA	N-CA-C	-5.10	105.91	111.82
2	A	215	TRP	CA-C-N	-5.09	116.33	123.10
2	A	215	TRP	C-N-CA	-5.09	116.33	123.10
2	A	209	ILE	N-CA-C	-5.06	101.17	108.71

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	345	0	194	11	0
2	A	2648	0	2628	253	0
3	A	10	0	4	0	0
4	A	47	0	0	4	0
4	B	6	0	0	1	0
All	All	3056	0	2826	264	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 45.

All (264) 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:B:713:DC:H2''	1:B:714:DG:H5''	1.21	1.12
2:A:100:ASN:ND2	2:A:103:LYS:H	1.47	1.11
2:A:140:ILE:HD12	2:A:141:PRO:HD2	1.14	1.11
1:B:713:DC:C2'	1:B:714:DG:H5''	1.91	1.00

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:100:ASN:HD22	2:A:103:LYS:H	1.01	0.99
2:A:236:GLN:HB2	2:A:237:PRO:HD2	1.42	0.98
2:A:20:HIS:ND1	2:A:25:THR:HG23	1.79	0.96
2:A:3:THR:HG23	2:A:45:TYR:HE1	1.36	0.91
2:A:210:LYS:H	2:A:210:LYS:HD3	1.35	0.89
2:A:3:THR:HG23	2:A:45:TYR:CE1	2.06	0.88
1:B:713:DC:H2''	1:B:714:DG:C5'	2.04	0.87
2:A:61:SER:HB2	2:A:91:THR:HG22	1.57	0.86
2:A:159:ILE:HD11	2:A:320:GLU:HG2	1.58	0.86
2:A:160:ASP:HA	2:A:321:VAL:HG12	1.57	0.85
2:A:20:HIS:HA	2:A:25:THR:CG2	2.08	0.84
2:A:164:GLU:O	2:A:168:MET:HG3	1.80	0.81
2:A:20:HIS:HA	2:A:25:THR:HG22	1.62	0.81
2:A:159:ILE:HD11	2:A:320:GLU:CG	2.11	0.81
2:A:234:LEU:HB2	2:A:261:MET:HE2	1.63	0.81
2:A:101:LEU:HA	2:A:104:GLN:HG2	1.62	0.80
2:A:161:ASN:HB3	2:A:164:GLU:HG2	1.64	0.80
2:A:100:ASN:HD22	2:A:103:LYS:N	1.80	0.80
2:A:142:MET:O	2:A:155:THR:HG22	1.83	0.79
2:A:119:LEU:HB3	2:A:142:MET:HB2	1.66	0.78
2:A:236:GLN:CB	2:A:237:PRO:HD2	2.13	0.78
2:A:167:TYR:CD1	2:A:202:LYS:HG2	2.20	0.76
2:A:62:ILE:HD12	2:A:63:GLY:N	2.01	0.75
2:A:264:ARG:HB2	2:A:268:ASP:OD2	1.86	0.75
2:A:310:VAL:HG22	2:A:311:ASN:OD1	1.87	0.74
2:A:100:ASN:HD22	2:A:103:LYS:HB2	1.51	0.74
2:A:100:ASN:ND2	2:A:103:LYS:N	2.32	0.74
2:A:13:VAL:HG23	2:A:14:SER:O	1.86	0.74
2:A:105:ARG:HA	2:A:133:MET:HE3	1.70	0.73
2:A:142:MET:HG2	2:A:155:THR:CG2	2.18	0.73
2:A:140:ILE:CD1	2:A:141:PRO:HD2	2.07	0.72
2:A:210:LYS:HD3	2:A:210:LYS:N	2.06	0.71
2:A:237:PRO:HG2	2:A:238:HIS:H	1.54	0.71
2:A:43:LEU:N	2:A:43:LEU:HD23	2.04	0.70
2:A:218:GLN:HE21	2:A:219:GLY:N	1.88	0.70
2:A:185:PRO:HD2	2:A:217:VAL:O	1.91	0.70
2:A:216:ILE:HD13	2:A:216:ILE:O	1.91	0.70
2:A:130:LEU:HD22	2:A:130:LEU:O	1.92	0.69
2:A:156:ASP:HB3	2:A:304:MET:HE2	1.75	0.69
2:A:200:PHE:HD2	2:A:201:MET:CE	2.05	0.69
2:A:257:ALA:O	2:A:261:MET:HG2	1.92	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:142:MET:HG2	2:A:155:THR:HG23	1.75	0.68
2:A:61:SER:CB	2:A:91:THR:HG22	2.24	0.68
2:A:201:MET:CA	2:A:201:MET:HE2	2.22	0.67
2:A:37:TRP:HA	2:A:37:TRP:CE3	2.30	0.67
2:A:60:LYS:N	2:A:117:ASP:OD2	2.27	0.67
2:A:243:VAL:O	2:A:271:LEU:HD12	1.94	0.66
2:A:105:ARG:HA	2:A:133:MET:CE	2.24	0.66
2:A:286:ALA:HB1	2:A:328:ARG:HG2	1.77	0.66
2:A:309:ILE:HG22	2:A:310:VAL:N	2.09	0.65
2:A:19:SER:O	2:A:23:ASN:ND2	2.29	0.65
2:A:135:GLU:O	2:A:138:ARG:HG2	1.95	0.65
2:A:64:LEU:HD13	2:A:120:LEU:HB3	1.78	0.65
2:A:192:THR:O	2:A:196:ARG:HD2	1.97	0.65
2:A:264:ARG:O	2:A:268:ASP:N	2.30	0.65
2:A:184:ILE:HA	2:A:217:VAL:O	1.98	0.64
2:A:36:VAL:O	2:A:40:ILE:HG13	1.98	0.64
2:A:78:ILE:HG22	2:A:79:GLU:N	2.12	0.64
2:A:187:PRO:HB2	2:A:190:ARG:HD3	1.80	0.64
1:B:700:DA:H2''	1:B:701:DC:OP2	1.98	0.64
2:A:30:GLU:HG2	2:A:33:ARG:HH12	1.62	0.64
2:A:101:LEU:CA	2:A:104:GLN:HG2	2.29	0.63
2:A:159:ILE:CD1	2:A:320:GLU:HG2	2.28	0.63
2:A:167:TYR:HD1	2:A:202:LYS:HG2	1.63	0.63
2:A:159:ILE:HD12	2:A:159:ILE:C	2.24	0.63
2:A:310:VAL:HG22	2:A:311:ASN:N	2.13	0.62
2:A:221:PHE:HA	2:A:250:MET:HG3	1.81	0.62
2:A:30:GLU:HG2	2:A:33:ARG:NH1	2.15	0.62
2:A:171:ARG:O	2:A:175:GLU:HG3	2.00	0.62
2:A:201:MET:O	2:A:205:GLU:HG2	2.00	0.62
2:A:30:GLU:CG	2:A:33:ARG:HH12	2.12	0.62
1:B:713:DC:C3'	1:B:714:DG:H5''	2.25	0.61
2:A:304:MET:CE	2:A:317:GLN:HB3	2.30	0.61
2:A:231:GLN:O	2:A:235:SER:HB2	2.00	0.61
2:A:297:LEU:HD23	2:A:297:LEU:O	2.00	0.61
1:B:714:DG:H2''	1:B:715:DT:H5'	1.82	0.61
2:A:101:LEU:HA	2:A:104:GLN:CG	2.29	0.61
2:A:264:ARG:HB3	2:A:267:GLN:HB2	1.82	0.61
2:A:164:GLU:OE2	2:A:322:HIS:ND1	2.28	0.61
2:A:138:ARG:NH2	2:A:154:PHE:HB3	2.16	0.61
2:A:304:MET:HE3	2:A:317:GLN:HB3	1.83	0.60
2:A:105:ARG:HG3	2:A:106:ALA:N	2.17	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:156:ASP:HB3	2:A:304:MET:CE	2.31	0.60
2:A:7:VAL:HG11	2:A:40:ILE:HG12	1.83	0.60
2:A:64:LEU:HD12	2:A:65:LEU:N	2.17	0.59
2:A:140:ILE:HD12	2:A:141:PRO:CD	2.09	0.59
2:A:325:LEU:HD11	2:A:327:GLU:HG3	1.85	0.59
2:A:337:ARG:HG2	2:A:337:ARG:HH11	1.67	0.59
2:A:200:PHE:HD2	2:A:201:MET:HE2	1.66	0.58
2:A:127:PRO:HB2	2:A:129:PRO:HD2	1.86	0.58
2:A:10:ARG:NH2	2:A:42:GLU:OE1	2.37	0.58
2:A:248:ASP:O	2:A:251:ALA:HB3	2.03	0.58
2:A:88:LYS:HG3	2:A:302:PHE:HE2	1.70	0.57
2:A:277:VAL:HG13	4:A:766:HOH:O	2.04	0.56
2:A:293:PRO:HG2	2:A:321:VAL:HG22	1.86	0.56
2:A:183:VAL:HG13	2:A:216:ILE:HB	1.88	0.56
2:A:63:GLY:O	2:A:119:LEU:HD12	2.05	0.56
2:A:142:MET:CE	2:A:155:THR:HG23	2.36	0.56
2:A:239:ARG:HB2	2:A:240:PRO:HD2	1.88	0.56
2:A:152:ALA:HB1	2:A:154:PHE:CE1	2.41	0.56
2:A:236:GLN:HB2	2:A:237:PRO:CD	2.28	0.56
2:A:325:LEU:HD13	2:A:326:ILE:N	2.22	0.55
2:A:293:PRO:O	2:A:297:LEU:HB2	2.06	0.55
2:A:16:THR:HG22	2:A:20:HIS:HD2	1.72	0.55
2:A:62:ILE:HD12	2:A:62:ILE:C	2.32	0.55
2:A:152:ALA:HB1	2:A:154:PHE:CD1	2.42	0.54
2:A:210:LYS:H	2:A:210:LYS:CD	2.11	0.54
2:A:84:ASN:HB3	2:A:302:PHE:CD2	2.42	0.54
2:A:284:THR:O	2:A:284:THR:HG22	2.07	0.54
2:A:58:HIS:HA	4:A:747:HOH:O	2.08	0.54
2:A:142:MET:HE2	2:A:155:THR:HG23	1.90	0.54
2:A:64:LEU:HD12	2:A:64:LEU:C	2.32	0.54
2:A:105:ARG:HB2	2:A:105:ARG:HH11	1.73	0.54
2:A:159:ILE:HD12	2:A:159:ILE:O	2.07	0.54
2:A:200:PHE:HD2	2:A:201:MET:HE1	1.73	0.54
2:A:295:ASP:OD1	2:A:295:ASP:N	2.37	0.54
2:A:101:LEU:HD13	2:A:104:GLN:HE21	1.73	0.53
2:A:157:ALA:O	2:A:318:SER:HA	2.09	0.53
2:A:61:SER:HB2	2:A:91:THR:CG2	2.35	0.53
2:A:145:MET:HA	2:A:158:VAL:CG1	2.39	0.53
2:A:100:ASN:ND2	2:A:103:LYS:HB2	2.23	0.52
2:A:137:TYR:O	2:A:140:ILE:HG23	2.09	0.52
2:A:201:MET:HE2	2:A:201:MET:HA	1.91	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:297:LEU:HD23	2:A:297:LEU:C	2.34	0.52
2:A:3:THR:HA	2:A:6:ASP:OD2	2.10	0.51
2:A:3:THR:HG23	2:A:45:TYR:CD1	2.46	0.51
2:A:296:SER:O	2:A:300:THR:HB	2.11	0.51
2:A:299:GLU:CG	2:A:300:THR:N	2.74	0.51
2:A:266:PRO:HB3	2:A:330:SER:O	2.11	0.50
2:A:281:ARG:HH11	2:A:281:ARG:HG2	1.76	0.50
2:A:233:ILE:O	2:A:236:GLN:HG2	2.11	0.50
2:A:201:MET:HE2	2:A:201:MET:N	2.26	0.50
2:A:308:ARG:HH21	2:A:316:PRO:HA	1.77	0.49
2:A:118:GLY:HA2	2:A:140:ILE:HD11	1.93	0.49
2:A:153:ASP:OD1	2:A:153:ASP:N	2.41	0.49
2:A:131:LEU:N	2:A:131:LEU:HD22	2.26	0.49
2:A:145:MET:HA	2:A:158:VAL:HG13	1.95	0.49
2:A:126:TYR:O	2:A:131:LEU:HD21	2.12	0.49
2:A:159:ILE:CG1	2:A:320:GLU:HG2	2.42	0.49
2:A:16:THR:HG22	2:A:20:HIS:CD2	2.47	0.48
2:A:100:ASN:O	2:A:104:GLN:N	2.41	0.48
2:A:128:GLU:N	2:A:129:PRO:CD	2.77	0.48
2:A:310:VAL:C	2:A:312:LYS:H	2.21	0.48
2:A:105:ARG:CG	2:A:106:ALA:N	2.77	0.48
2:A:156:ASP:CB	2:A:304:MET:HE2	2.43	0.48
2:A:267:GLN:CD	2:A:267:GLN:H	2.22	0.48
2:A:37:TRP:O	2:A:40:ILE:HB	2.13	0.47
2:A:126:TYR:CD2	2:A:130:LEU:HD13	2.49	0.47
2:A:160:ASP:HA	2:A:321:VAL:CG1	2.36	0.47
2:A:313:ARG:CG	2:A:314:GLU:N	2.77	0.47
2:A:163:PHE:O	2:A:199:GLY:HA3	2.14	0.47
2:A:128:GLU:N	2:A:129:PRO:HD2	2.29	0.47
2:A:131:LEU:HD22	2:A:131:LEU:H	1.78	0.47
2:A:237:PRO:CG	2:A:238:HIS:H	2.22	0.47
2:A:100:ASN:HD22	2:A:103:LYS:CB	2.24	0.47
2:A:277:VAL:HG12	2:A:279:ASN:H	1.78	0.47
2:A:128:GLU:HA	2:A:131:LEU:HD23	1.96	0.47
2:A:105:ARG:N	2:A:133:MET:HE1	2.30	0.47
2:A:219:GLY:HA3	2:A:250:MET:SD	2.54	0.47
2:A:281:ARG:HG2	2:A:281:ARG:NH1	2.30	0.47
2:A:118:GLY:CA	2:A:140:ILE:HD11	2.45	0.47
2:A:126:TYR:HD2	2:A:130:LEU:HD13	1.80	0.47
2:A:218:GLN:NE2	2:A:219:GLY:O	2.48	0.47
2:A:137:TYR:HB3	2:A:140:ILE:HG23	1.95	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:191:ASN:HB3	4:A:729:HOH:O	2.14	0.47
2:A:172:TYR:OH	2:A:327:GLU:HG2	2.15	0.47
2:A:200:PHE:CD2	2:A:201:MET:HE1	2.49	0.46
2:A:210:LYS:O	2:A:210:LYS:HG2	2.15	0.46
2:A:272:ILE:HG13	2:A:288:THR:HG22	1.96	0.46
2:A:159:ILE:HD11	2:A:320:GLU:CD	2.41	0.46
2:A:292:GLN:HG3	2:A:293:PRO:HD2	1.97	0.46
1:B:702:DG:H2''	1:B:703:DC:OP2	2.14	0.46
1:B:714:DG:H2''	1:B:715:DT:C5'	2.45	0.46
2:A:160:ASP:O	2:A:161:ASN:HB2	2.15	0.46
2:A:243:VAL:HB	2:A:271:LEU:CD1	2.45	0.46
2:A:325:LEU:HD13	2:A:325:LEU:C	2.40	0.46
2:A:77:ILE:HG22	2:A:78:ILE:N	2.31	0.46
2:A:161:ASN:HD21	2:A:320:GLU:HB3	1.81	0.46
2:A:260:GLU:C	2:A:262:GLY:H	2.22	0.45
2:A:40:ILE:HG22	2:A:41:LYS:HD3	1.99	0.45
2:A:129:PRO:O	2:A:132:ALA:HB3	2.16	0.45
2:A:218:GLN:HE21	2:A:218:GLN:C	2.23	0.45
2:A:229:ALA:O	2:A:230:MET:C	2.59	0.45
2:A:176:ARG:NH2	2:A:331:VAL:O	2.50	0.45
2:A:70:GLU:HB3	4:A:771:HOH:O	2.16	0.45
2:A:200:PHE:CD2	2:A:201:MET:CE	2.94	0.45
2:A:265:VAL:HG22	2:A:269:VAL:HG23	1.98	0.45
2:A:274:TYR:CD1	2:A:274:TYR:C	2.95	0.45
2:A:221:PHE:CA	2:A:250:MET:HG3	2.46	0.44
2:A:266:PRO:HA	2:A:269:VAL:O	2.18	0.44
2:A:163:PHE:HA	2:A:195:GLY:O	2.18	0.44
1:B:701:DC:H2''	1:B:702:DG:C8	2.52	0.44
2:A:163:PHE:CD1	2:A:163:PHE:C	2.95	0.44
2:A:176:ARG:NH1	2:A:333:ASP:OD1	2.49	0.44
2:A:101:LEU:HD21	2:A:129:PRO:HB2	2.00	0.44
2:A:218:GLN:HE21	2:A:219:GLY:H	1.63	0.44
2:A:263:LEU:N	2:A:263:LEU:HD13	2.32	0.44
2:A:22:ILE:HG22	2:A:23:ASN:CG	2.42	0.44
1:B:709:DT:H2''	1:B:710:DT:O5'	2.18	0.43
2:A:228:ARG:O	2:A:231:GLN:HB3	2.19	0.43
2:A:265:VAL:HG13	2:A:266:PRO:HA	2.00	0.43
2:A:130:LEU:HD22	2:A:130:LEU:C	2.43	0.43
2:A:205:GLU:HG2	2:A:205:GLU:H	1.61	0.43
2:A:234:LEU:C	2:A:236:GLN:H	2.26	0.43
2:A:276:ASN:HA	2:A:289:THR:HG21	2.00	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:105:ARG:CA	2:A:133:MET:CE	2.96	0.43
2:A:120:LEU:HD11	2:A:143:VAL:HG13	2.00	0.43
1:B:715:DT:OP2	4:B:755:HOH:O	2.21	0.43
2:A:181:ILE:HG22	2:A:182:GLY:N	2.33	0.43
2:A:212:PRO:HG2	2:A:215:TRP:CD2	2.54	0.43
2:A:220:ASP:OD1	2:A:222:GLU:HB2	2.18	0.43
2:A:143:VAL:HB	2:A:156:ASP:HB2	2.01	0.43
2:A:313:ARG:HG3	2:A:314:GLU:H	1.83	0.43
2:A:181:ILE:HA	2:A:242:ALA:O	2.19	0.42
2:A:56:VAL:HG23	2:A:57:ASN:N	2.33	0.42
2:A:252:MET:HE2	2:A:283:PHE:CE1	2.54	0.42
2:A:265:VAL:HA	2:A:266:PRO:HA	1.79	0.42
2:A:281:ARG:HD3	2:A:282:TYR:CE1	2.54	0.42
2:A:28:VAL:HG12	2:A:32:THR:HB	2.00	0.42
2:A:100:ASN:ND2	2:A:100:ASN:C	2.77	0.42
2:A:256:CYS:O	2:A:259:ASP:HB3	2.20	0.42
2:A:30:GLU:HG3	2:A:33:ARG:HH12	1.85	0.42
2:A:73:TYR:O	2:A:77:ILE:HD12	2.20	0.42
2:A:119:LEU:O	2:A:142:MET:HB2	2.18	0.42
2:A:128:GLU:O	2:A:129:PRO:C	2.61	0.42
2:A:218:GLN:HE21	2:A:218:GLN:CA	2.33	0.42
2:A:329:ARG:HG3	2:A:329:ARG:HH11	1.83	0.42
2:A:177:GLY:O	2:A:335:PRO:HD2	2.20	0.42
2:A:181:ILE:CG2	2:A:182:GLY:N	2.82	0.42
2:A:61:SER:CB	2:A:91:THR:CG2	2.95	0.42
2:A:174:ILE:HG22	2:A:175:GLU:N	2.31	0.42
2:A:45:TYR:CZ	2:A:47:PRO:HA	2.55	0.41
2:A:101:LEU:O	2:A:105:ARG:N	2.45	0.41
2:A:305:LEU:HG	2:A:309:ILE:HD12	2.01	0.41
2:A:22:ILE:HG22	2:A:23:ASN:N	2.34	0.41
2:A:104:GLN:O	2:A:108:LEU:HB2	2.20	0.41
2:A:156:ASP:CG	2:A:304:MET:HE2	2.46	0.41
2:A:101:LEU:C	2:A:104:GLN:HG2	2.45	0.41
2:A:126:TYR:CD2	2:A:130:LEU:CD1	3.03	0.41
2:A:135:GLU:C	2:A:137:TYR:N	2.78	0.41
2:A:271:LEU:HD12	2:A:271:LEU:HA	1.84	0.41
2:A:131:LEU:HA	2:A:131:LEU:HD13	1.61	0.41
2:A:11:ALA:O	2:A:13:VAL:HG13	2.20	0.41
2:A:27:PHE:CD1	2:A:27:PHE:C	2.98	0.41
2:A:127:PRO:O	2:A:131:LEU:HD22	2.21	0.41
2:A:167:TYR:CE1	2:A:202:LYS:HG2	2.54	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:260:GLU:C	2:A:262:GLY:N	2.78	0.41
2:A:32:THR:O	2:A:36:VAL:HG23	2.21	0.41
2:A:61:SER:HA	2:A:91:THR:H	1.86	0.41
2:A:101:LEU:O	2:A:104:GLN:HG2	2.20	0.41
2:A:218:GLN:NE2	2:A:219:GLY:N	2.65	0.41
2:A:244:PHE:CD1	2:A:244:PHE:C	2.96	0.41
2:A:142:MET:HG2	2:A:155:THR:HG22	2.01	0.41
2:A:147:TRP:CD2	2:A:151:LYS:HD3	2.56	0.41
2:A:8:ALA:HB1	2:A:13:VAL:O	2.21	0.40
2:A:128:GLU:O	2:A:131:LEU:N	2.54	0.40
2:A:144:VAL:HG12	2:A:146:ASP:H	1.86	0.40
2:A:147:TRP:HB3	2:A:149:GLU:O	2.21	0.40
2:A:52:ARG:O	2:A:56:VAL:HG22	2.21	0.40
2:A:110:MET:HB3	2:A:110:MET:HE2	1.42	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	
2	A	336/340 (99%)	307 (91%)	27 (8%)	2 (1%)	21	44

All (2) Ramachandran outliers are listed below:

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

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
2	A	278/279 (100%)	197 (71%)	81 (29%)	0 1

All (81) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	A	5	LYS
2	A	7	VAL
2	A	12	ASN
2	A	14	SER
2	A	19	SER
2	A	21	VAL
2	A	22	ILE
2	A	23	ASN
2	A	30	GLU
2	A	40	ILE
2	A	41	LYS
2	A	43	LEU
2	A	44	HIS
2	A	50	VAL
2	A	52	ARG
2	A	57	ASN
2	A	62	ILE
2	A	64	LEU
2	A	68	SER
2	A	77	ILE
2	A	78	ILE
2	A	82	GLU
2	A	91	THR
2	A	92	LEU
2	A	99	ASN
2	A	101	LEU
2	A	102	GLU
2	A	103	LYS
2	A	108	LEU
2	A	109	SER

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Mol	Chain	Res	Type
2	A	110	MET
2	A	120	LEU
2	A	128	GLU
2	A	130	LEU
2	A	131	LEU
2	A	138	ARG
2	A	140	ILE
2	A	142	MET
2	A	143	VAL
2	A	145	MET
2	A	151	LYS
2	A	155	THR
2	A	158	VAL
2	A	179	ARG
2	A	190	ARG
2	A	201	MET
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	218	GLN
2	A	228	ARG
2	A	235	SER
2	A	252	MET
2	A	255	LEU
2	A	261	MET
2	A	263	LEU
2	A	264	ARG
2	A	269	VAL
2	A	272	ILE
2	A	277	VAL
2	A	278	ARG
2	A	279	ASN
2	A	284	THR
2	A	292	GLN
2	A	294	LYS
2	A	295	ASP
2	A	296	SER
2	A	299	GLU

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Mol	Chain	Res	Type
2	A	309	ILE
2	A	310	VAL
2	A	312	LYS
2	A	314	GLU
2	A	315	GLU
2	A	325	LEU
2	A	328	ARG
2	A	329	ARG
2	A	337	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
2	A	23	ASN
2	A	34	ASN
2	A	99	ASN
2	A	100	ASN
2	A	113	GLN
2	A	161	ASN
2	A	218	GLN
2	A	279	ASN
2	A	292	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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

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	1.29	2 (20%)	11,15,15	1.33	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	-2.88	1.30	1.35
3	A	599	HPA	C8-N9	2.03	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	-2.83	119.67	121.61

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 ⓘ

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.