



Full wwPDB X-ray Structure Validation Report ⓘ

Nov 21, 2017 – 09:07 AM EST

PDB ID : 1HOO
Title : STRUCTURE OF GUANINE NUCLEOTIDE (GPPCP) COMPLEX OF
ADENYLOSUCCINATE SYNTHETASE FROM E. COLI AT PH 6.5 AND
25 DEGREES CELSIUS
Authors : Poland, B.W.; Hou, Z.; Bruns, C.; Fromm, H.J.; Honzatko, R.B.
Deposited on : unknown
Resolution : 2.30 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

<http://wwpdb.org/validation/2016/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467
Mogul : 1.7.2 (RC1), CSD as538be (2017)
Xtriage (Phenix) : 1.9-1692
EDS : rb-20030345
Percentile statistics : 20161228.v01 (using entries in the PDB archive December 28th 2016)
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) : rb-20030345

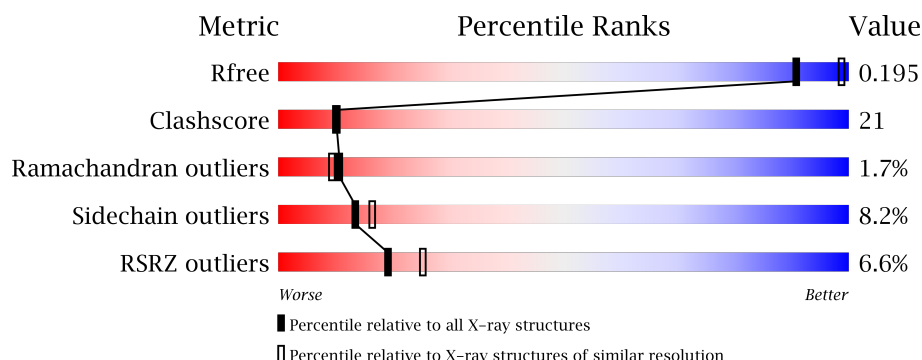
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.30 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}	100719	4130 (2.30-2.30)
Clashscore	112137	4751 (2.30-2.30)
Ramachandran outliers	110173	4705 (2.30-2.30)
Sidechain outliers	110143	4704 (2.30-2.30)
RSRZ outliers	101464	4156 (2.30-2.30)

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 ≥ 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	431	<div> <div>6%</div> <div>59%</div> <div>35%</div> <div>5%</div> </div>
1	B	431	<div> <div>7%</div> <div>65%</div> <div>32%</div> <div>.</div> </div>

2 Entry composition [i](#)

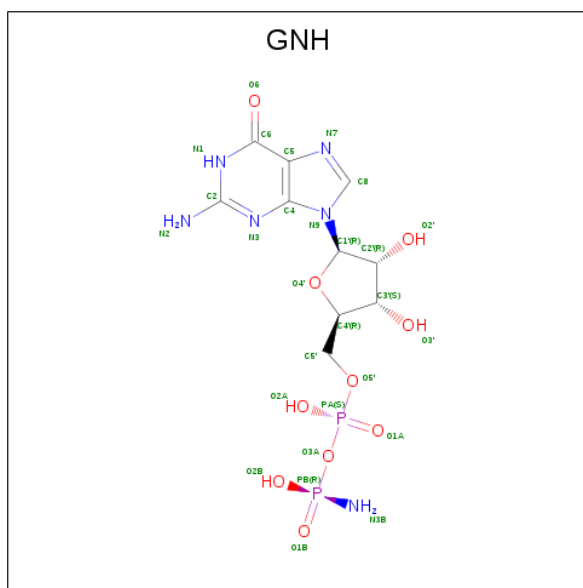
There are 4 unique types of molecules in this entry. The entry contains 9436 atoms, of which 2330 are hydrogens and 0 are deuteriums.

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 ADENYLOSUCCINATE SYNTHETASE.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	431	Total	C	H	N	O	S	0	0	0
			4069	2092	748	576	640	13			
1	B	431	Total	C	H	N	O	S	0	0	0
			4069	2092	748	576	640	13			

- Molecule 2 is AMINOPHOSPHONIC ACID-GUANYLATE ESTER (three-letter code: GNH) (formula: $C_{10}H_{16}N_6O_{10}P_2$).



Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
2	A	1	Total	C	H	N	O	P	0	1
			42	10	14	6	10	2		

- Molecule 3 is PHOSPHOAMINOPHOSPHONIC ACID-GUANYLATE ESTER (three-letter code: GNP) (formula: $C_{10}H_{17}N_6O_{13}P_3$).



Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
3	A	1	Total	C	H	N	O	P	0	1
			44	10	12	6	13	3		

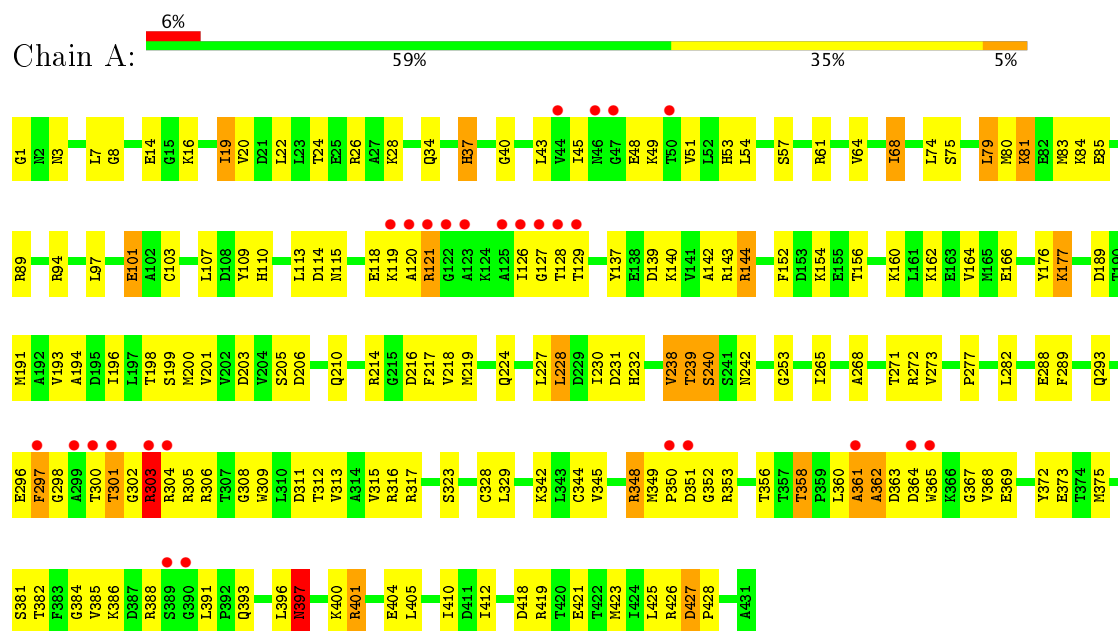
- Molecule 4 is water.

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	184	Total	H	O	0	0
			552	368	184		
4	B	220	Total	H	O	0	0
			660	440	220		

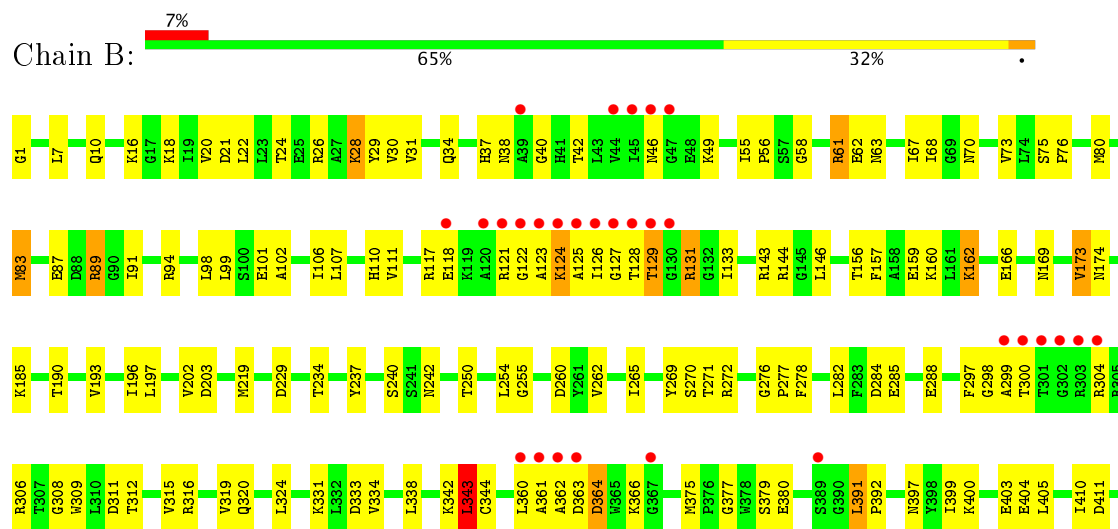
3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

• Molecule 1: ADENYLOSUCCINATE SYNTHETASE



• Molecule 1: ADENYLOSUCCINATE SYNTHETASE





4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	72.60 Å 92.91 Å 119.00 Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	5.00 – 2.30 5.00 – 2.30	Depositor EDS
% Data completeness (in resolution range)	89.0 (5.00-2.30) 90.5 (5.00-2.30)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.51 (at 2.29 Å)	Xtriage
Refinement program	X-PLOR 3.1	Depositor
R, R_{free}	0.185 , 0.210 0.186 , 0.195	Depositor DCC
R_{free} test set	No test flags present.	DCC
Wilson B-factor (Å ²)	20.4	Xtriage
Anisotropy	0.280	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.21 , 55.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.46$, $\langle L^2 \rangle = 0.29$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	9436	wwPDB-VP
Average B, all atoms (Å ²)	21.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows:

¹Intensities estimated from amplitudes.

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

5 Model quality

5.1 Standard geometry

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

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	0.74	1/3379 (0.0%)	0.89	2/4577 (0.0%)
1	B	0.50	0/3379	0.73	1/4577 (0.0%)
All	All	0.63	1/6758 (0.0%)	0.81	3/9154 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	103	CYS	CB-SG	-8.33	1.68	1.82

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	227	LEU	CA-CB-CG	-6.20	101.04	115.30
1	A	228	LEU	CB-CG-CD1	-6.08	100.66	111.00
1	B	343	LEU	CA-CB-CG	5.93	128.94	115.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	372	TYR	Sidechain

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	3321	748	3326	157	0
1	B	3321	748	3326	134	0
2	A	28	14	12	3	0
3	A	32	12	11	4	0
4	A	184	368	0	12	0
4	B	220	440	0	14	1
All	All	7106	2330	6675	280	1

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 21.

All (280) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:418:ASP:HB3	1:A:421:GLU:HG3	1.43	1.01
1:B:28:LYS:O	1:B:28:LYS:HD3	1.71	0.91
1:A:115:ASN:HA	1:A:129:THR:HA	1.52	0.88
1:A:118:GLU:HB2	1:A:128:THR:H	1.39	0.87
1:B:107:LEU:H	1:B:110:HIS:HD2	1.23	0.86
1:B:297:PHE:CD1	1:B:304:ARG:HG2	2.12	0.84
1:B:312:THR:HB	1:B:344:CYS:O	1.80	0.82
1:B:42:THR:HG21	1:B:49:LYS:HE2	1.63	0.81
1:A:118:GLU:HB3	1:A:129:THR:OG1	1.82	0.79
1:A:107:LEU:H	1:A:110:HIS:HD2	1.29	0.77
1:A:80:MET:O	1:A:84:LYS:HE2	1.85	0.77
1:A:301:THR:H	1:A:305:ARG:NH2	1.84	0.76
1:A:301:THR:H	1:A:305:ARG:HH22	1.34	0.76
1:B:1:GLY:HA3	1:B:260:ASP:HB3	1.68	0.75
1:A:203:ASP:HB2	1:B:360:LEU:HD13	1.71	0.73
1:B:297:PHE:HD1	1:B:304:ARG:HG2	1.54	0.70
1:A:54:LEU:HD21	1:A:74:LEU:HD12	1.75	0.69
1:B:129:THR:O	1:B:131:ARG:HG2	1.92	0.68
1:A:94:ARG:HA	1:A:200:MET:CE	2.23	0.68
1:B:107:LEU:H	1:B:110:HIS:CD2	2.11	0.67
1:B:297:PHE:HE1	1:B:304:ARG:NE	1.93	0.67

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:68:ILE:HB	1:B:99:LEU:HD23	1.77	0.66
1:B:21:ASP:HB3	1:B:419:ARG:NH2	2.11	0.66
1:A:101:GLU:HG2	1:B:361:ALA:HA	1.77	0.65
1:A:16:LYS:HE3	3:A:432(B)[B]:GNP:O3G	1.97	0.65
1:B:143:ARG:HG2	1:B:143:ARG:HH11	1.59	0.65
1:B:28:LYS:C	1:B:28:LYS:HD3	2.13	0.65
1:A:26:ARG:O	1:A:217:PHE:HD2	1.80	0.65
1:B:118:GLU:HG2	1:B:127:GLY:O	1.97	0.65
1:A:311:ASP:O	1:A:315:VAL:HG23	1.96	0.65
1:B:297:PHE:CE1	1:B:304:ARG:NE	2.66	0.64
1:A:79:LEU:HD13	1:A:83:MET:HE3	1.79	0.64
1:B:117:ARG:HB3	1:B:121:ARG:HD2	1.78	0.63
1:B:129:THR:HA	1:B:131:ARG:NH2	2.13	0.63
1:A:144:ARG:O	1:A:164:VAL:HG21	1.98	0.63
1:B:129:THR:HA	1:B:131:ARG:CZ	2.28	0.63
1:B:360:LEU:HD22	4:B:433:HOH:O	1.97	0.63
1:A:154:LYS:HE3	1:A:191:MET:HE3	1.80	0.63
1:A:301:THR:C	1:A:305:ARG:HH21	2.02	0.62
1:A:400:LYS:O	1:A:404:GLU:HG3	2.00	0.61
1:A:317:ARG:HE	1:A:358:THR:HB	1.66	0.61
1:A:107:LEU:H	1:A:110:HIS:CD2	2.16	0.61
1:A:364:ASP:O	1:A:368:VAL:HG13	2.01	0.61
1:A:230:ILE:HD12	1:A:240:SER:O	2.01	0.60
1:B:24:THR:HG21	1:B:58:GLY:HA2	1.82	0.60
1:B:400:LYS:HE2	1:B:404:GLU:OE2	2.02	0.59
1:A:19:ILE:N	1:A:19:ILE:HD12	2.17	0.59
1:A:206:ASP:O	1:A:210:GLN:HG3	2.02	0.59
1:B:21:ASP:HB3	1:B:419:ARG:HH21	1.68	0.59
1:B:430:ASP:O	1:B:431:ALA:HB2	2.03	0.59
1:A:121:ARG:HB3	4:A:530:HOH:O	2.02	0.59
1:B:237:TYR:CD2	1:B:276:GLY:HA2	2.38	0.59
1:A:397:ASN:HA	1:A:400:LYS:HE2	1.85	0.58
3:A:432(B)[B]:GNP:H5'2	3:A:432(B)[B]:GNP:H8	1.84	0.58
1:B:297:PHE:CE1	1:B:304:ARG:CZ	2.86	0.58
1:A:224:GLN:HE21	1:A:239:THR:HG21	1.68	0.58
1:A:375:MET:CE	1:A:401:ARG:HG3	2.33	0.58
1:B:399:ILE:HG23	1:B:410:ILE:HD12	1.86	0.58
1:A:289:PHE:CZ	1:A:293:GLN:HG3	2.37	0.58
1:B:397:ASN:O	1:B:400:LYS:HB3	2.03	0.58
1:A:19:ILE:N	1:A:19:ILE:CD1	2.66	0.57
1:A:296:GLU:HB3	1:A:305:ARG:HD2	1.86	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:419:ARG:HD3	4:B:532:HOH:O	2.04	0.57
1:B:254:LEU:HA	4:B:503:HOH:O	2.04	0.57
1:A:156:THR:HG22	1:A:160:LYS:HE3	1.86	0.57
1:A:177:LYS:HD3	1:A:177:LYS:N	2.19	0.57
1:A:193:VAL:HG12	1:A:196:ILE:HD12	1.87	0.57
1:B:297:PHE:CZ	1:B:304:ARG:NH2	2.73	0.57
1:B:426:ARG:O	1:B:427:ASP:HB3	2.05	0.57
1:A:80:MET:O	1:A:84:LYS:HG3	2.05	0.57
1:A:205:SER:HB3	1:A:253:GLY:HA3	1.86	0.56
1:B:31:VAL:HG22	1:B:67:ILE:HB	1.88	0.56
1:B:22:LEU:HD13	1:B:419:ARG:HB2	1.87	0.56
1:A:385:VAL:HG12	1:A:423:MET:HE1	1.87	0.56
1:A:118:GLU:HB2	1:A:128:THR:N	2.15	0.56
1:A:410:ILE:O	1:A:425:LEU:HD12	2.06	0.56
1:A:94:ARG:HA	1:A:200:MET:HE3	1.87	0.55
1:B:73:VAL:HG23	1:B:106:ILE:HD11	1.87	0.55
1:A:351:ASP:OD1	1:A:353:ARG:HG2	2.05	0.55
1:B:117:ARG:HG2	1:B:121:ARG:NH1	2.21	0.55
1:B:18:LYS:HB3	4:B:465:HOH:O	2.05	0.55
1:A:242:ASN:ND2	1:B:250:THR:HG23	2.21	0.55
1:B:26:ARG:HH22	1:B:430:ASP:CG	2.08	0.55
1:A:120:ALA:O	1:A:121:ARG:C	2.44	0.55
1:A:37:HIS:CD2	1:A:37:HIS:H	2.24	0.55
1:A:238:VAL:HG12	1:B:143:ARG:NH1	2.22	0.55
1:A:391:LEU:HB2	1:A:396:LEU:HD21	1.87	0.55
1:A:152:PHE:CZ	1:B:361:ALA:HB1	2.42	0.55
1:A:418:ASP:HB3	1:A:421:GLU:CG	2.29	0.54
1:A:1:GLY:HA2	4:A:529:HOH:O	2.08	0.54
1:A:79:LEU:HD13	1:A:83:MET:CE	2.37	0.54
1:A:384:GLY:O	1:A:386:LYS:HG3	2.08	0.53
1:A:393:GLN:HG2	4:A:598:HOH:O	2.08	0.53
1:A:345:VAL:HG12	1:A:405:LEU:HD13	1.89	0.53
2:A:432(A)[A]:GNH:H5'2	2:A:432(A)[A]:GNH:H8	1.89	0.53
1:B:146:LEU:HD21	1:B:160:LYS:HB3	1.90	0.53
1:A:129:THR:HG22	1:A:129:THR:O	2.08	0.53
1:A:20:VAL:HG13	1:A:219:MET:CE	2.39	0.53
1:A:22:LEU:HD13	1:A:419:ARG:HG3	1.90	0.53
1:B:297:PHE:CE1	1:B:304:ARG:HG2	2.43	0.53
1:A:426:ARG:HA	4:A:455:HOH:O	2.08	0.53
1:A:277:PRO:HB3	1:A:365:TRP:HB3	1.90	0.53
1:B:124:LYS:NZ	1:B:124:LYS:HB3	2.24	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:426:ARG:O	1:A:427:ASP:CB	2.57	0.52
1:A:81:LYS:HA	1:A:84:LYS:HE2	1.92	0.52
1:A:268:ALA:HA	1:A:329:LEU:HD11	1.90	0.52
1:B:62:GLU:HG2	1:B:63:ASN:N	2.24	0.52
1:A:80:MET:C	1:A:84:LYS:HE2	2.30	0.52
1:B:111:VAL:HG22	1:B:131:ARG:O	2.10	0.52
1:A:360:LEU:C	1:A:362:ALA:H	2.14	0.52
1:B:285:GLU:H	1:B:285:GLU:CD	2.13	0.52
1:B:343:LEU:O	1:B:343:LEU:HD12	2.10	0.52
1:A:85:GLU:O	1:A:89:ARG:HG2	2.09	0.52
1:A:16:LYS:HE3	3:A:432(B)[B]:GNP:PG	2.50	0.51
1:A:289:PHE:CE2	1:A:293:GLN:HG3	2.44	0.51
1:B:312:THR:HG22	1:B:316:ARG:HH21	1.75	0.51
1:B:73:VAL:HG21	1:B:133:ILE:HG23	1.93	0.51
1:B:24:THR:HB	1:B:61:ARG:HH11	1.75	0.51
1:A:24:THR:HG22	1:A:61:ARG:HD3	1.92	0.51
1:A:143:ARG:NH2	1:B:240:SER:HB3	2.25	0.51
1:A:214:ARG:HD2	1:A:216:ASP:OD2	2.11	0.50
1:B:338:LEU:O	1:B:377:GLY:HA3	2.10	0.50
1:A:19:ILE:H	1:A:19:ILE:CD1	2.24	0.50
1:B:331:LYS:HD3	1:B:334:VAL:HG21	1.93	0.50
1:A:119:LYS:HG2	1:A:129:THR:CG2	2.42	0.50
1:A:115:ASN:O	1:A:119:LYS:HB2	2.12	0.49
1:A:375:MET:HE1	1:A:401:ARG:HG3	1.93	0.49
1:A:110:HIS:HE1	1:A:139:ASP:OD2	1.95	0.49
1:A:201:VAL:HG11	1:B:361:ALA:HB2	1.94	0.49
1:B:362:ALA:O	1:B:363:ASP:C	2.49	0.49
1:B:76:PRO:O	1:B:80:MET:HG2	2.12	0.49
1:A:137:TYR:O	1:A:140:LYS:HB3	2.13	0.49
1:B:271:THR:HA	1:B:306:ARG:O	2.13	0.49
1:B:193:VAL:HG12	1:B:193:VAL:O	2.13	0.49
1:B:380:GLU:HG3	1:B:392:PRO:HB3	1.94	0.49
1:A:323:SER:HB3	1:B:255:GLY:HA3	1.95	0.49
1:A:385:VAL:HG12	1:A:423:MET:CE	2.42	0.49
1:B:16:LYS:HE2	4:B:508:HOH:O	2.12	0.49
1:A:194:ALA:HB3	4:A:456:HOH:O	2.11	0.49
3:A:432(B)[B]:GNP:C8	3:A:432(B)[B]:GNP:H5'2	2.42	0.49
1:B:73:VAL:CG2	1:B:106:ILE:HD11	2.42	0.49
1:B:91:ILE:HD12	1:B:91:ILE:H	1.78	0.49
1:B:30:VAL:HG11	4:B:524:HOH:O	2.14	0.48
1:A:316:ARG:NH1	1:A:356:THR:HB	2.28	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:262:VAL:HG12	1:B:324:LEU:HD23	1.95	0.48
1:A:304:ARG:HG3	1:A:304:ARG:O	2.14	0.48
1:B:156:THR:O	1:B:159:GLU:HG2	2.13	0.48
1:B:70:ASN:HB3	1:B:102:ALA:HB3	1.95	0.48
1:A:176:TYR:HD1	4:A:548:HOH:O	1.96	0.48
1:A:89:ARG:HA	4:A:556:HOH:O	2.12	0.48
1:A:426:ARG:O	1:A:427:ASP:HB3	2.13	0.48
1:A:20:VAL:HG13	1:A:219:MET:HE3	1.95	0.48
1:A:348:ARG:HG2	1:A:348:ARG:HH11	1.79	0.48
1:B:159:GLU:HG3	1:B:160:LYS:N	2.29	0.48
1:B:298:GLY:O	1:B:299:ALA:HB3	2.13	0.48
1:B:20:VAL:HG22	1:B:219:MET:HE1	1.96	0.47
1:A:351:ASP:CG	1:A:352:GLY:N	2.68	0.47
1:B:272:ARG:HD3	1:B:306:ARG:NH2	2.29	0.47
1:B:83:MET:O	1:B:87:GLU:HG3	2.14	0.47
1:B:1:GLY:O	1:B:429:PHE:HA	2.14	0.47
1:B:202:VAL:HB	4:B:576:HOH:O	2.14	0.47
1:B:426:ARG:O	1:B:427:ASP:CB	2.63	0.47
1:A:232:HIS:HD2	4:B:442:HOH:O	1.97	0.46
1:B:360:LEU:HG	1:B:361:ALA:N	2.27	0.46
1:A:61:ARG:HB3	1:A:64:VAL:HG23	1.96	0.46
1:A:309:TRP:NE1	1:A:342:LYS:HD2	2.30	0.46
1:B:80:MET:SD	1:B:193:VAL:HG11	2.55	0.46
1:A:228:LEU:HB3	1:A:239:THR:OG1	2.15	0.46
1:B:282:LEU:HG	1:B:308:GLY:HA2	1.98	0.46
1:A:37:HIS:CD2	1:A:37:HIS:N	2.84	0.46
1:A:388:ARG:HD3	4:A:555:HOH:O	2.16	0.46
1:A:68:ILE:HD12	1:A:97:LEU:HD11	1.98	0.46
1:A:350:PRO:HG3	1:A:364:ASP:CB	2.46	0.45
1:A:40:GLY:O	2:A:432(A)[A]:GNH:N3B	2.49	0.45
1:B:185:LYS:HD3	4:B:631:HOH:O	2.16	0.45
1:A:303:ARG:HG2	1:A:304:ARG:N	2.32	0.45
1:A:51:VAL:HG12	1:A:53:HIS:CE1	2.51	0.45
1:B:311:ASP:O	1:B:315:VAL:HG23	2.15	0.45
1:A:375:MET:HE3	1:A:401:ARG:HG3	1.97	0.45
1:A:48:GLU:HG2	1:A:49:LYS:N	2.30	0.45
1:A:391:LEU:HD12	1:A:396:LEU:HD21	1.97	0.45
1:B:309:TRP:CD2	1:B:342:LYS:HB2	2.52	0.45
1:A:297:PHE:O	1:A:298:GLY:C	2.54	0.45
1:A:365:TRP:O	1:A:368:VAL:HG22	2.16	0.45
2:A:432(A)[A]:GNH:C8	2:A:432(A)[A]:GNH:H5'2	2.46	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:169:ASN:O	1:B:173:VAL:HG13	2.16	0.45
1:B:411:ASP:CG	1:B:426:ARG:HB3	2.37	0.45
1:A:271:THR:HA	1:A:306:ARG:O	2.17	0.45
1:B:282:LEU:HD21	1:B:309:TRP:NE1	2.32	0.45
1:A:162:LYS:O	1:A:166:GLU:HG3	2.17	0.45
1:A:119:LYS:HG2	1:A:129:THR:HG21	1.99	0.45
1:A:206:ASP:HA	1:B:320:GLN:HE22	1.82	0.44
1:A:110:HIS:CE1	1:A:139:ASP:OD2	2.71	0.44
1:A:152:PHE:CD2	1:B:362:ALA:HB2	2.52	0.44
1:A:364:ASP:O	1:A:367:GLY:N	2.46	0.44
1:B:107:LEU:O	1:B:110:HIS:HB2	2.17	0.44
1:A:101:GLU:HG2	1:B:361:ALA:CA	2.48	0.44
1:A:152:PHE:CE1	1:A:198:THR:HB	2.53	0.44
1:B:229:ASP:OD1	1:B:242:ASN:HA	2.17	0.44
1:A:142:ALA:O	1:A:143:ARG:HB2	2.17	0.43
1:B:143:ARG:NH1	1:B:143:ARG:HG2	2.31	0.43
1:B:312:THR:HG22	1:B:316:ARG:NH2	2.33	0.43
1:A:152:PHE:CD2	1:B:362:ALA:CB	3.02	0.43
1:A:16:LYS:CB	1:A:265:ILE:HG13	2.47	0.43
1:A:311:ASP:HA	1:A:344:CYS:HB3	2.00	0.43
1:A:313:VAL:HG13	1:A:356:THR:O	2.19	0.43
1:B:26:ARG:NH2	4:B:590:HOH:O	2.51	0.43
1:B:28:LYS:HD2	1:B:29:TYR:CZ	2.53	0.43
1:A:232:HIS:HE1	1:B:250:THR:O	2.01	0.43
1:A:109:TYR:O	1:A:113:LEU:HD23	2.19	0.43
1:A:361:ALA:HB2	4:A:586:HOH:O	2.17	0.43
1:B:16:LYS:HB2	1:B:265:ILE:HG13	1.99	0.43
1:B:1:GLY:HA3	1:B:260:ASP:CB	2.44	0.43
1:B:98:LEU:HD22	1:B:202:VAL:HB	2.00	0.43
1:B:68:ILE:HD12	1:B:99:LEU:HD21	2.01	0.43
1:A:363:ASP:OD1	1:A:364:ASP:N	2.50	0.43
1:B:360:LEU:HD23	1:B:360:LEU:H	1.84	0.43
1:B:55:ILE:HA	1:B:56:PRO:HD3	1.83	0.43
1:A:348:ARG:HG2	1:A:369:GLU:OE2	2.19	0.43
1:B:162:LYS:HE3	4:B:455:HOH:O	2.19	0.43
1:B:28:LYS:HE2	4:B:571:HOH:O	2.17	0.43
1:B:430:ASP:O	1:B:431:ALA:CB	2.65	0.43
1:A:144:ARG:HH11	1:A:144:ARG:HD3	1.70	0.43
1:A:8:GLY:HA3	1:A:14:GLU:CD	2.39	0.43
1:A:119:LYS:HD3	1:A:119:LYS:HA	1.64	0.43
1:A:37:HIS:HD2	1:A:37:HIS:H	1.67	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:201:VAL:CG1	1:B:361:ALA:HB2	2.49	0.43
1:B:400:LYS:O	1:B:404:GLU:HG3	2.19	0.43
1:A:81:LYS:NZ	1:A:84:LYS:NZ	2.67	0.42
1:A:1:GLY:N	1:A:428:PRO:O	2.52	0.42
1:B:173:VAL:CG2	1:B:174:ASN:N	2.82	0.42
1:A:61:ARG:HB3	1:A:64:VAL:CG2	2.49	0.42
1:B:117:ARG:O	1:B:121:ARG:HB2	2.20	0.42
1:B:202:VAL:HG22	1:B:203:ASP:N	2.34	0.42
1:A:3:ASN:OD1	1:A:218:VAL:HB	2.19	0.42
1:B:272:ARG:NH1	1:B:277:PRO:O	2.51	0.42
1:B:91:ILE:HD12	1:B:91:ILE:N	2.33	0.42
1:A:349:MET:O	1:A:352:GLY:N	2.52	0.42
1:A:373:GLU:OE2	1:A:401:ARG:NH1	2.52	0.42
1:B:70:ASN:CB	1:B:102:ALA:HB3	2.49	0.42
1:A:101:GLU:HG3	4:A:484:HOH:O	2.20	0.42
1:B:125:ALA:O	1:B:127:GLY:N	2.53	0.42
1:B:399:ILE:O	1:B:403:GLU:HG3	2.19	0.42
1:B:391:LEU:HA	1:B:392:PRO:HD2	1.96	0.42
1:A:302:GLY:O	1:A:303:ARG:HB3	2.19	0.42
1:A:397:ASN:ND2	1:A:400:LYS:NZ	2.68	0.42
1:B:101:GLU:HG2	4:B:485:HOH:O	2.20	0.42
1:B:269:TYR:CD1	1:B:269:TYR:N	2.88	0.42
1:B:319:VAL:HG22	1:B:324:LEU:HD12	2.02	0.42
1:A:16:LYS:HB2	1:A:265:ILE:HG13	2.02	0.41
1:A:54:LEU:HD21	1:A:74:LEU:CD1	2.47	0.41
1:B:128:THR:O	1:B:128:THR:HG23	2.20	0.41
1:B:312:THR:HG21	1:B:405:LEU:HB3	2.02	0.41
1:A:282:LEU:HG	1:A:308:GLY:HA2	2.02	0.41
1:A:273:VAL:HG22	4:A:505:HOH:O	2.20	0.41
1:A:297:PHE:HD1	1:A:297:PHE:O	2.03	0.41
1:A:201:VAL:HG11	1:B:361:ALA:CB	2.50	0.41
1:B:37:HIS:H	1:B:37:HIS:CD2	2.38	0.41
1:B:89:ARG:O	1:B:91:ILE:HD12	2.20	0.41
1:A:81:LYS:HE2	1:A:84:LYS:HZ1	1.85	0.41
1:B:157:PHE:CZ	1:B:190:THR:HG21	2.56	0.41
1:B:270:SER:HB2	1:B:278:PHE:CZ	2.55	0.41
1:A:419:ARG:HG2	1:A:419:ARG:HH11	1.86	0.41
1:B:193:VAL:CG1	1:B:196:ILE:HB	2.51	0.41
1:A:301:THR:O	1:A:305:ARG:NH2	2.52	0.41
1:B:284:ASP:O	1:B:288:GLU:HG3	2.21	0.41
1:A:328:CYS:HA	1:A:412:ILE:O	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:122:GLY:O	1:B:123:ALA:HB2	2.20	0.41
1:B:300:THR:HG23	1:B:300:THR:O	2.21	0.41
1:A:154:LYS:HE3	1:A:191:MET:CE	2.47	0.41
1:A:238:VAL:HG13	1:A:239:THR:O	2.21	0.41
1:A:312:THR:OG1	1:A:316:ARG:NH2	2.54	0.41
1:A:348:ARG:HB3	1:A:369:GLU:CG	2.51	0.40
1:B:10:GLN:HG2	4:B:491:HOH:O	2.21	0.40
1:A:277:PRO:HG3	4:A:442:HOH:O	2.20	0.40
1:B:427:ASP:HA	1:B:428:PRO:HD3	1.84	0.40
1:A:156:THR:CG2	1:A:160:LYS:HE3	2.51	0.40
1:A:230:ILE:HG23	1:A:231:ASP:N	2.36	0.40
1:A:24:THR:CG2	1:A:24:THR:O	2.70	0.40
1:A:230:ILE:HG23	1:A:231:ASP:OD1	2.22	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:B:518:HOH:O	4:B:592:HOH:H2[4_455]	1.57	0.03

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	429/431 (100%)	383 (89%)	37 (9%)	9 (2%)	8	6
1	B	429/431 (100%)	389 (91%)	34 (8%)	6 (1%)	13	13
All	All	858/862 (100%)	772 (90%)	71 (8%)	15 (2%)	11	9

All (15) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	303	ARG
1	A	361	ALA
1	A	362	ALA
1	B	364	ASP
1	A	397	ASN
1	A	121	ARG
1	A	127	GLY
1	A	427	ASP
1	B	427	ASP
1	B	94	ARG
1	B	131	ARG
1	A	301	THR
1	B	40	GLY
1	B	126	ILE
1	A	45	ILE

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	353/353 (100%)	321 (91%)	32 (9%)	11	13
1	B	353/353 (100%)	327 (93%)	26 (7%)	16	20
All	All	706/706 (100%)	648 (92%)	58 (8%)	13	16

All (58) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	7	LEU
1	A	19	ILE
1	A	28	LYS
1	A	34	GLN
1	A	37	HIS
1	A	43	LEU
1	A	57	SER
1	A	68	ILE
1	A	75	SER

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Mol	Chain	Res	Type
1	A	79	LEU
1	A	81	LYS
1	A	101	GLU
1	A	114	ASP
1	A	126	ILE
1	A	144	ARG
1	A	177	LYS
1	A	189	ASP
1	A	199	SER
1	A	238	VAL
1	A	239	THR
1	A	240	SER
1	A	272	ARG
1	A	288	GLU
1	A	297	PHE
1	A	300	THR
1	A	303	ARG
1	A	348	ARG
1	A	358	THR
1	A	381	SER
1	A	382	THR
1	A	397	ASN
1	A	401	ARG
1	B	7	LEU
1	B	28	LYS
1	B	34	GLN
1	B	38	ASN
1	B	46	ASN
1	B	61	ARG
1	B	75	SER
1	B	83	MET
1	B	89	ARG
1	B	124	LYS
1	B	129	THR
1	B	144	ARG
1	B	162	LYS
1	B	166	GLU
1	B	173	VAL
1	B	197	LEU
1	B	234	THR
1	B	333	ASP
1	B	343	LEU

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Mol	Chain	Res	Type
1	B	364	ASP
1	B	366	LYS
1	B	375	MET
1	B	379	SER
1	B	391	LEU
1	B	415	THR
1	B	420	THR

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (16) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	37	HIS
1	A	46	ASN
1	A	110	HIS
1	A	210	GLN
1	A	213	GLN
1	A	232	HIS
1	A	242	ASN
1	A	320	GLN
1	A	397	ASN
1	B	2	ASN
1	B	37	HIS
1	B	38	ASN
1	B	110	HIS
1	B	174	ASN
1	B	393	GLN
1	B	397	ASN

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

2 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	GNH	A	432(A)[A]	-	24,30,30	1.63	5 (20%)	21,47,47	2.41	8 (38%)
3	GNP	A	432(B)[B]	-	29,34,34	1.81	9 (31%)	27,54,54	2.56	9 (33%)

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	GNH	A	432(A)[A]	-	-	0/9/32/32	0/3/3/3
3	GNP	A	432(B)[B]	-	-	0/13/38/38	0/3/3/3

All (14) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	432(B)[B]	GNP	PB-O2B	-3.32	1.47	1.56
2	A	432(A)[A]	GNH	PB-O2B	-3.30	1.47	1.56
3	A	432(B)[B]	GNP	PG-O2G	-2.91	1.48	1.56
3	A	432(B)[B]	GNP	PG-O3G	-2.41	1.50	1.56
2	A	432(A)[A]	GNH	C8-N7	-2.38	1.30	1.34
3	A	432(B)[B]	GNP	C8-N7	-2.24	1.30	1.34
2	A	432(A)[A]	GNH	C2'-C3'	2.01	1.58	1.53
3	A	432(B)[B]	GNP	PB-N3B	2.15	1.69	1.63
2	A	432(A)[A]	GNH	C6-C5	2.29	1.45	1.41
3	A	432(B)[B]	GNP	PG-N3B	2.44	1.69	1.63
3	A	432(B)[B]	GNP	C6-C5	2.65	1.45	1.41
3	A	432(B)[B]	GNP	PB-O3A	2.99	1.62	1.59
3	A	432(B)[B]	GNP	PG-O1G	3.55	1.50	1.46
2	A	432(A)[A]	GNH	PB-O1B	3.92	1.50	1.46

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	432(B)[B]	GNP	O1G-PG-N3B	-6.20	102.52	111.79
2	A	432(A)[A]	GNH	C2-N3-C4	-5.55	108.68	115.16
3	A	432(B)[B]	GNP	C2-N3-C4	-5.48	108.77	115.16
3	A	432(B)[B]	GNP	O3A-PB-N3B	-3.61	96.58	106.59
3	A	432(B)[B]	GNP	N2-C2-N3	-3.24	116.28	120.26
2	A	432(A)[A]	GNH	N2-C2-N3	-3.23	116.30	120.26
2	A	432(A)[A]	GNH	PA-O3A-PB	-2.94	122.92	132.39
3	A	432(B)[B]	GNP	N2-C2-N1	-2.56	115.11	117.84
2	A	432(A)[A]	GNH	N2-C2-N1	-2.31	115.37	117.84
3	A	432(B)[B]	GNP	C4'-O4'-C1'	2.14	112.05	109.77
2	A	432(A)[A]	GNH	O3'-C3'-C2'	2.40	119.52	111.83
3	A	432(B)[B]	GNP	O3G-PG-O2G	2.40	114.41	107.69
2	A	432(A)[A]	GNH	C4'-O4'-C1'	2.70	112.64	109.77
2	A	432(A)[A]	GNH	O2B-PB-O1B	3.60	119.65	110.17
3	A	432(B)[B]	GNP	O2B-PB-O1B	4.18	118.57	109.87
2	A	432(A)[A]	GNH	N1-C2-N3	5.15	128.33	121.79
3	A	432(B)[B]	GNP	N1-C2-N3	5.37	128.61	121.79

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

2 monomers are involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	432(A)[A]	GNH	3	0
3	A	432(B)[B]	GNP	4	0

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	431/431 (100%)	0.10	27 (6%) 21 27	9, 27, 57, 79	0
1	B	431/431 (100%)	0.00	30 (6%) 17 23	8, 22, 56, 80	0
All	All	862/862 (100%)	0.05	57 (6%) 19 25	8, 24, 56, 80	0

All (57) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	301	THR	6.6
1	B	46	ASN	5.9
1	B	304	ARG	5.8
1	B	126	ILE	5.6
1	B	128	THR	5.4
1	A	125	ALA	5.3
1	A	47	GLY	5.1
1	B	361	ALA	5.1
1	A	301	THR	5.0
1	A	126	ILE	5.0
1	B	127	GLY	4.8
1	A	122	GLY	4.5
1	B	125	ALA	4.3
1	A	120	ALA	4.3
1	A	128	THR	4.2
1	B	124	LYS	4.0
1	B	303	ARG	3.9
1	B	300	THR	3.9
1	A	300	THR	3.8
1	B	122	GLY	3.8
1	B	360	LEU	3.7
1	A	129	THR	3.6
1	B	130	GLY	3.5
1	B	47	GLY	3.4

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Mol	Chain	Res	Type	RSRZ
1	B	121	ARG	3.4
1	A	123	ALA	3.3
1	B	129	THR	3.3
1	A	127	GLY	3.2
1	B	389	SER	3.0
1	B	363	ASP	3.0
1	A	361	ALA	2.9
1	B	45	ILE	2.8
1	A	299	ALA	2.8
1	A	389	SER	2.7
1	B	362	ALA	2.7
1	A	121	ARG	2.7
1	A	119	LYS	2.6
1	B	44	VAL	2.6
1	A	304	ARG	2.5
1	A	350	PRO	2.5
1	A	46	ASN	2.5
1	B	118	GLU	2.4
1	B	39	ALA	2.4
1	A	303	ARG	2.4
1	A	297	PHE	2.4
1	B	123	ALA	2.3
1	A	365	TRP	2.3
1	A	351	ASP	2.3
1	B	302	GLY	2.3
1	A	390	GLY	2.2
1	A	44	VAL	2.2
1	B	417	PRO	2.2
1	B	367	GLY	2.2
1	A	50	THR	2.1
1	B	299	ALA	2.1
1	B	120	ALA	2.0
1	A	364	ASP	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, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors(Å ²)	Q<0.9
3	GNP	A	432(B)[B]	32/32	0.91	0.18	0.47	0,31,39,41	44
2	GNH	A	432(A)[A]	28/28	0.92	0.17	0.28	0,33,43,44	42

6.5 Other polymers [i](#)

There are no such residues in this entry.