Full wwPDB X-ray Structure Validation Report ⓘ

Nov 1, 2023 – 09:55 PM EDT

PDB ID	:	3QSY
Title	:	Recognition of the methionylated initiator tRNA by the translation initiation factor 2 in Archaea
Authors	:	Nikonov, O.S.; Stolboushkina, E.A.; Zelinskaya, N.V.; Nikulin, A.D.; Garber, M.B.; Nikonov, S.V.
Deposited on	:	2011-02-22
Resolution	:	3.20 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	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

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 3.20 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	Percentile Ranks	Value
Rfree		0.315
Clashscore		29
Ramachandran outliers		1.0%
Sidechain outliers		14.4%
RSRZ outliers		1.5%
RNA backbone		0.13

Worse   Better

■ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution
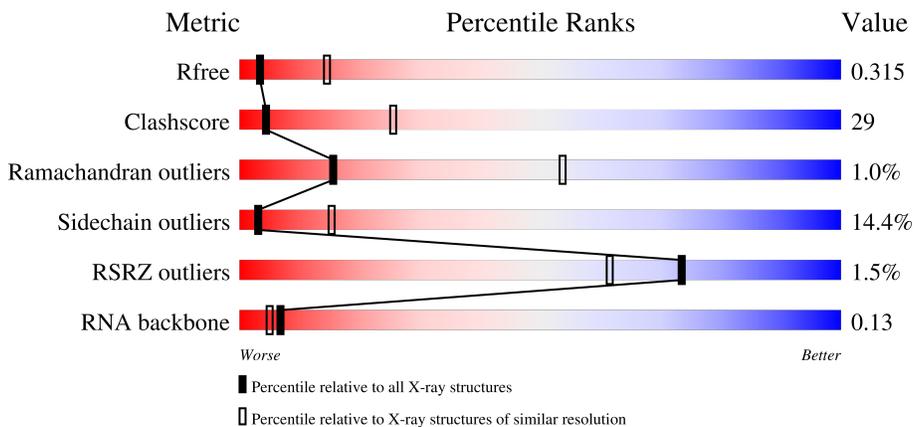
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1133 (3.20-3.20)
Clashscore	141614	1253 (3.20-3.20)
Ramachandran outliers	138981	1234 (3.20-3.20)
Sidechain outliers	138945	1233 (3.20-3.20)
RSRZ outliers	127900	1095 (3.20-3.20)
RNA backbone	3102	1010 (3.50-2.90)

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 <=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	415	% 42% 51% 7%
2	B	89	3% 52% 37% 11%
3	D	77	8% 42% 45% 5%

2 Entry composition ⓘ

There are 5 unique types of molecules in this entry. The entry contains 5593 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 Translation initiation factor 2 subunit gamma.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	415	Total	C	N	O	S	0	0	0
			3220	2063	549	595	13			

- Molecule 2 is a protein called Translation initiation factor 2 subunit alpha.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	89	Total	C	N	O	S	0	0	0
			694	439	116	138	1			

- Molecule 3 is a RNA chain called tRNA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	D	77	Total	C	N	O	P	0	0	0
			1639	732	297	534	76			

- Molecule 4 is PHOSPHOAMINOPHOSPHONIC ACID-GUANYLATE ESTER (three-letter code: GNP) (formula: $C_{10}H_{17}N_6O_{13}P_3$).
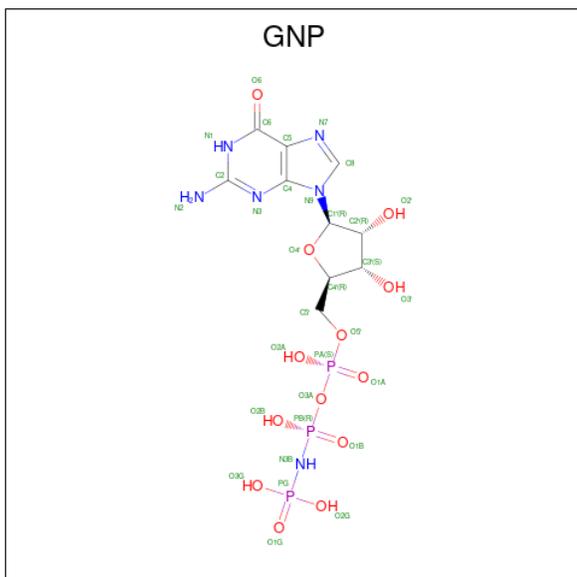
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total 32	C 10	N 6	O 13	P 3	0	0

- Molecule 5 is METHIONINE (three-letter code: MET) (formula: $C_5H_{11}NO_2S$).
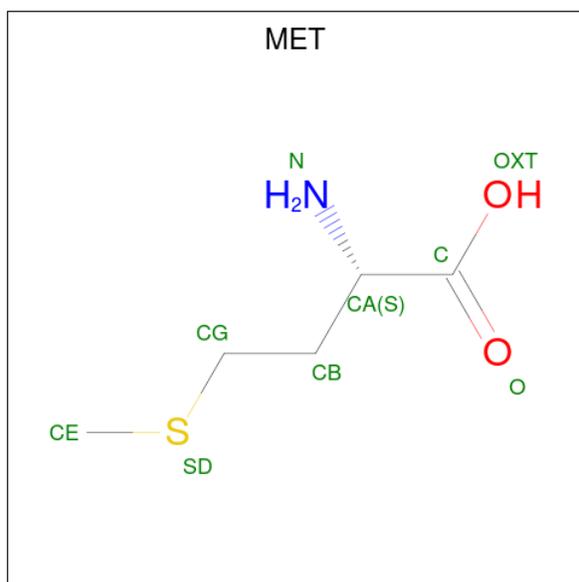
| Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	D	1	Total 8	C 5	N 1	O 1	S 1	0	0

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 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: Translation initiation factor 2 subunit gamma

Chain A:
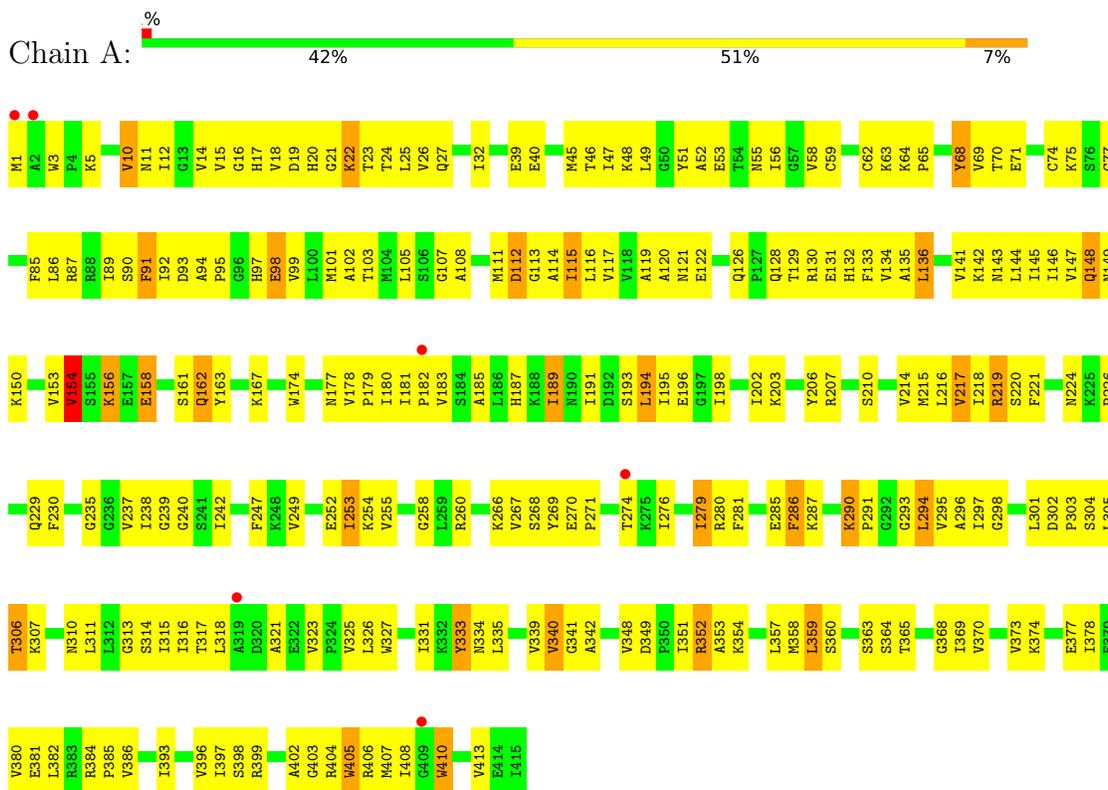
- Molecule 2: Translation initiation factor 2 subunit alpha

Chain B:

- Molecule 3: tRNA

Chain D:

C1 G2 C3 G4 G5 G6 G7 U8 G9 G10 A11 G12 C13 A14 G15 C16 C17 U17A G18 G19 U20 A21 G22 C23 U24 C25 G26 U27 C28 G29 G30 G31 C32 U33 C34 A35 U36 A37 A38 C39 C40 C41 G42 A43 A44 G45 A46 U47 C48 G49 U50 C51 G52 G53 U54 U55 C56 A57 A58 A59

U60 C61 C62 G63 G64 C65 C66 C67 C68 C69 G70 C71 A72 A73 C74 C75 A76
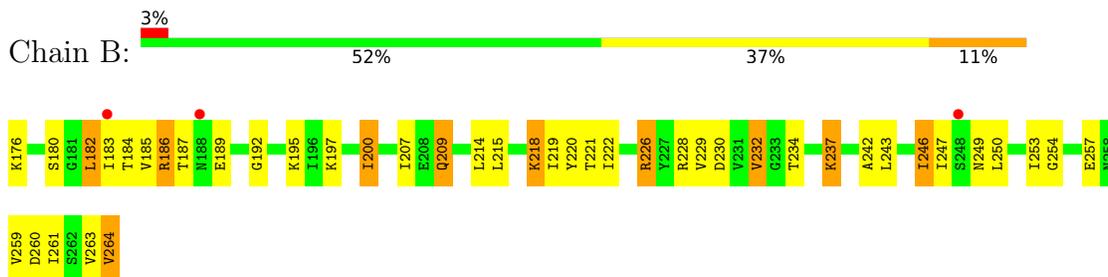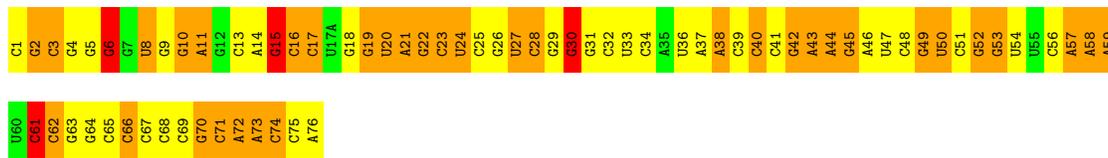
4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 31 2 1	Depositor
Cell constants	93.68Å 93.68Å 220.03Å	Depositor
a, b, c, α, β, γ	90.00° 90.00° 120.00°	
Resolution (Å)	14.95 – 3.20	Depositor
	14.95 – 3.20	EDS
% Data completeness	93.3 (14.95-3.20)	Depositor
(in resolution range)	100.0 (14.95-3.20)	EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	4.97 (at 3.19Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.7.3_928)	Depositor
R, R_{free}	0.278 , 0.302	Depositor
	0.288 , 0.315	DCC
R_{free} test set	974 reflections (5.14%)	wwPDB-VP
Wilson B-factor (Å^2)	74.2	Xtriage
Anisotropy	1.113	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.07 , 131.1	EDS
L-test for twinning[2]	$< |L| > = 0.47, < L^2 > = 0.30$	Xtriage
Estimated twinning fraction	0.470 for -h,-k,l	Xtriage
Reported twinning fraction	0.500 for -h,-k,l	Depositor
Outliers	0 of 18940 reflections	Xtriage
F_o,F_c correlation	0.91	EDS
Total number of atoms	5593	wwPDB-VP
Average B, all atoms (Å^2)	129.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.02% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.
[2]Theoretical values of $< |L| >$, $< L^2 >$ 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

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	0.36	0/3279	0.68	0/4440
2	B	0.32	0/699	0.63	0/942
3	D	0.54	0/1831	1.08	7/2853 (0.2%)
All	All	0.42	0/5809	0.84	7/8235 (0.1%)

There are no bond length outliers.

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	61	C	N1-C2-O2	5.65	122.29	118.90
3	D	68	C	N1-C2-O2	5.63	122.28	118.90
3	D	30	G	N3-C4-C5	-5.62	125.79	128.60
3	D	61	C	C5-C6-N1	5.42	123.71	121.00
3	D	30	G	N3-C4-N9	5.12	129.07	126.00
3	D	6	G	N3-C4-N9	5.09	129.06	126.00
3	D	15	G	C4-N9-C1'	5.07	133.09	126.50

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	3220	0	3344	224	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	694	0	734	33	0
3	D	1639	0	836	61	0
4	A	32	0	13	6	0
5	D	8	0	8	5	0
All	All	5593	0	4935	302	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 29.

All (302) 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:281:PHE:HB2	1:A:286:PHE:HB2	1.56	0.88
1:A:128:GLN:HA	1:A:131:GLU:HB3	1.56	0.85
1:A:130:ARG:HH22	1:A:340:VAL:HB	1.40	0.85
1:A:146:ILE:O	1:A:180:ILE:HA	1.75	0.85
1:A:99:VAL:HG11	3:D:71:C:H5'	1.59	0.84
1:A:215:MET:HB2	1:A:242:ILE:HG13	1.61	0.83
1:A:183:VAL:HG11	1:A:194:LEU:HB3	1.60	0.81
2:B:254:GLY:HA2	2:B:259:VAL:H	1.47	0.79
1:A:249:VAL:HG22	1:A:287:LYS:HB3	1.64	0.79
1:A:237:VAL:HG12	1:A:298:GLY:HA2	1.65	0.78
1:A:370:VAL:HG13	1:A:378:ILE:HG21	1.66	0.78
1:A:307:LYS:HG3	1:A:310:ASN:HB3	1.67	0.77
2:B:207:ILE:HD12	2:B:249:ASN:HD21	1.49	0.77
1:A:226:PRO:HB2	2:B:220:TYR:HA	1.67	0.76
1:A:55:ASN:HB3	1:A:70:THR:HG23	1.68	0.74
1:A:219:ARG:HH21	1:A:220:SER:HA	1.54	0.73
1:A:181:ILE:HG21	1:A:194:LEU:HA	1.71	0.73
1:A:352:ARG:HD3	1:A:353:ALA:H	1.54	0.72
1:A:224:ASN:HD21	3:D:2:G:H4'	1.55	0.72
2:B:184:THR:HB	2:B:263:VAL:HA	1.71	0.72
1:A:281:PHE:H	1:A:285:GLU:HA	1.52	0.72
1:A:230:PHE:HB3	2:B:219:ILE:HB	1.73	0.71
1:A:365:THR:HG22	3:D:73:A:H61	1.58	0.69
1:A:217:VAL:HA	1:A:240:GLY:HA3	1.73	0.69
3:D:19:G:H22	3:D:56:C:H2'	1.58	0.69
2:B:226:ARG:NH1	3:D:17:C:OP2	2.26	0.68
1:A:147:VAL:HG22	1:A:181:ILE:HD12	1.75	0.68
3:D:22:G:O2'	3:D:23:C:H5'	1.94	0.68
1:A:357:LEU:CD2	1:A:408:ILE:HD11	2.23	0.68

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:352:ARG:HH11	1:A:353:ALA:H	1.41	0.68
1:A:26:VAL:HG11	1:A:93:ASP:HB2	1.74	0.67
1:A:25:LEU:HD21	1:A:115:ILE:HD13	1.77	0.67
3:D:23:C:H2'	3:D:24:U:C6	2.30	0.67
1:A:108:ALA:HA	1:A:111:MET:HB3	1.77	0.66
1:A:94:ALA:HB2	1:A:107:GLY:HA3	1.76	0.66
1:A:229:GLN:HG2	2:B:218:LYS:HB3	1.76	0.66
1:A:194:LEU:HD12	1:A:194:LEU:C	2.16	0.66
2:B:187:THR:HG22	2:B:259:VAL:HG22	1.78	0.66
2:B:192:GLY:HA2	2:B:195:LYS:HB2	1.76	0.66
3:D:69:C:H2'	3:D:70:G:H4'	1.77	0.65
1:A:97:HIS:N	1:A:128:GLN:HE22	1.95	0.65
3:D:40:C:C6	3:D:40:C:H5"	2.31	0.65
1:A:276:ILE:HG21	1:A:279:ILE:HD11	1.78	0.65
1:A:14:VAL:HG22	1:A:22:LYS:HG3	1.79	0.64
1:A:113:GLY:HA3	1:A:143:ASN:HD22	1.62	0.64
3:D:27:U:H3	3:D:43:A:N6	1.95	0.64
1:A:130:ARG:HH12	1:A:340:VAL:HG21	1.60	0.64
2:B:250:LEU:HB2	2:B:261:ILE:HD12	1.80	0.64
3:D:27:U:H3	3:D:43:A:H61	1.47	0.63
1:A:269:TYR:H	1:A:385:PRO:HG2	1.63	0.63
1:A:195:ILE:HA	1:A:198:ILE:CG1	2.28	0.63
1:A:191:ILE:HG23	1:A:194:LEU:CD2	2.29	0.63
2:B:263:VAL:HG22	2:B:264:VAL:HG22	1.81	0.62
1:A:191:ILE:HG23	1:A:194:LEU:HD23	1.81	0.62
1:A:280:ARG:HB3	1:A:296:ALA:H	1.64	0.62
1:A:17:HIS:HB3	1:A:20:HIS:CE1	2.34	0.62
1:A:12:ILE:HG23	1:A:114:ALA:HA	1.80	0.62
1:A:220:SER:HB2	1:A:238:ILE:HG23	1.81	0.62
1:A:218:ILE:HD12	1:A:219:ARG:HG3	1.82	0.62
2:B:207:ILE:HD11	2:B:246:ILE:HG22	1.82	0.61
3:D:63:G:H2'	3:D:64:G:C8	2.34	0.61
1:A:237:VAL:HG23	1:A:296:ALA:HB1	1.83	0.60
1:A:269:TYR:CE2	1:A:384:ARG:HD3	2.36	0.60
1:A:45:MET:HE1	3:D:71:C:C5	2.35	0.60
1:A:145:ILE:HG12	1:A:179:PRO:HD2	1.83	0.60
1:A:135:ALA:HA	3:D:74:C:C4	2.36	0.60
3:D:16:C:O2'	3:D:61:C:H5'	2.01	0.60
1:A:352:ARG:HH11	1:A:353:ALA:N	1.99	0.60
2:B:253:ILE:O	2:B:257:GLU:N	2.29	0.60
1:A:269:TYR:OH	1:A:384:ARG:NH1	2.34	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:307:LYS:HG2	1:A:311:LEU:HG	1.84	0.59
1:A:360:SER:OG	1:A:396:VAL:HB	2.03	0.59
1:A:260:ARG:HH21	1:A:267:VAL:HG11	1.65	0.59
1:A:145:ILE:HG23	1:A:179:PRO:HB2	1.85	0.58
3:D:40:C:H5"	3:D:40:C:H6	1.68	0.58
2:B:250:LEU:O	2:B:254:GLY:N	2.33	0.58
3:D:10:G:N2	3:D:26:G:H1'	2.18	0.58
1:A:218:ILE:H	1:A:240:GLY:HA2	1.69	0.58
1:A:368:GLY:HA2	1:A:381:GLU:O	2.04	0.57
1:A:403:GLY:HA3	3:D:11:A:H2	1.68	0.57
1:A:342:ALA:N	1:A:406:ARG:HE	2.02	0.57
1:A:10:VAL:HG13	1:A:112:ASP:HB2	1.87	0.57
3:D:5:G:H2'	3:D:6:G:H4'	1.86	0.57
1:A:194:LEU:O	1:A:198:ILE:HG23	2.05	0.57
1:A:113:GLY:HA2	1:A:143:ASN:HB3	1.86	0.56
2:B:197:LYS:HA	2:B:200:ILE:HB	1.86	0.56
1:A:11:ASN:HD22	1:A:89:ILE:HG23	1.71	0.56
3:D:15:G:N2	3:D:16:C:H1'	2.20	0.56
1:A:323:VAL:H	1:A:326:LEU:HD11	1.71	0.56
1:A:95:PRO:O	1:A:103:THR:OG1	2.24	0.56
1:A:214:VAL:HG22	1:A:318:LEU:HD23	1.86	0.56
2:B:263:VAL:HG13	2:B:264:VAL:H	1.70	0.56
3:D:30:G:H2'	3:D:31:G:H4'	1.87	0.56
3:D:23:C:OP1	3:D:42:G:N1	2.38	0.55
1:A:117:VAL:HG22	1:A:147:VAL:HB	1.87	0.55
1:A:219:ARG:CZ	1:A:294:LEU:HB2	2.36	0.55
1:A:193:SER:HA	1:A:196:GLU:HG2	1.88	0.55
1:A:132:HIS:CE1	1:A:136:LEU:HD22	2.42	0.55
1:A:369:ILE:O	1:A:380:VAL:HA	2.07	0.55
1:A:147:VAL:HG13	1:A:181:ILE:HB	1.88	0.55
2:B:247:ILE:HG23	2:B:261:ILE:HD13	1.89	0.55
1:A:130:ARG:HG3	5:D:77:MET:CG	2.37	0.55
1:A:352:ARG:HD3	1:A:353:ALA:N	2.20	0.55
1:A:15:VAL:HG12	1:A:16:GLY:H	1.72	0.55
1:A:27:GLN:HG2	1:A:39:GLU:HB2	1.89	0.55
1:A:210:SER:HA	1:A:247:PHE:CZ	2.41	0.54
1:A:359:LEU:HD23	1:A:380:VAL:HG11	1.89	0.54
1:A:221:PHE:HE1	3:D:4:G:H5'	1.72	0.54
1:A:354:LYS:HB2	1:A:354:LYS:NZ	2.23	0.54
3:D:49:G:H2'	3:D:50:U:H5"	1.89	0.54
3:D:51:C:H2'	3:D:52:G:C8	2.43	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:214:VAL:HG11	1:A:317:THR:HA	1.89	0.54
1:A:302:ASP:O	1:A:304:SER:N	2.37	0.54
2:B:249:ASN:O	2:B:253:ILE:HG12	2.08	0.54
1:A:146:ILE:HG22	1:A:180:ILE:HG23	1.88	0.53
1:A:404:ARG:HG3	1:A:405:TRP:H	1.73	0.53
2:B:220:TYR:CE2	2:B:228:ARG:HB3	2.43	0.53
3:D:6:G:H1	3:D:67:C:H42	1.56	0.53
3:D:58:A:H2'	3:D:59:A:H5'	1.90	0.53
1:A:153:VAL:HG13	1:A:156:LYS:HE3	1.89	0.53
1:A:252:GLU:HB2	1:A:276:ILE:HD11	1.89	0.53
1:A:339:VAL:HG21	1:A:348:VAL:HG23	1.90	0.53
2:B:218:LYS:CG	2:B:230:ASP:HB3	2.39	0.53
1:A:116:LEU:HD22	1:A:144:LEU:HD12	1.90	0.53
1:A:280:ARG:HA	1:A:285:GLU:HB2	1.90	0.53
2:B:219:ILE:HG12	2:B:229:VAL:HG12	1.91	0.53
1:A:101:MET:HB2	1:A:128:GLN:NE2	2.24	0.52
1:A:195:ILE:HA	1:A:198:ILE:HG12	1.91	0.52
1:A:52:ALA:O	1:A:90:SER:HA	2.10	0.52
1:A:163:TYR:OH	1:A:182:PRO:HD3	2.09	0.52
3:D:10:G:N3	3:D:10:G:H2'	2.24	0.52
1:A:294:LEU:HD22	1:A:295:VAL:N	2.25	0.52
1:A:56:ILE:HG22	1:A:68:TYR:HE2	1.75	0.52
1:A:226:PRO:HD3	1:A:303:PRO:HB2	1.91	0.52
1:A:21:GLY:HA3	1:A:149:ASN:HD22	1.75	0.52
1:A:187:HIS:C	1:A:189:ILE:H	2.13	0.52
1:A:130:ARG:NH1	1:A:340:VAL:HG21	2.25	0.52
1:A:358:MET:HB3	1:A:398:SER:HB3	1.92	0.52
1:A:253:ILE:HA	1:A:274:THR:O	2.10	0.52
1:A:402:ALA:HB1	3:D:25:C:H4'	1.92	0.51
1:A:359:LEU:HB3	1:A:382:LEU:HD11	1.91	0.51
3:D:8:U:C2	3:D:15:G:H8	2.28	0.51
1:A:133:PHE:HE1	1:A:174:TRP:HE1	1.58	0.51
3:D:28:C:N4	3:D:29:G:O6	2.43	0.51
1:A:301:LEU:HD22	1:A:305:LEU:HB2	1.92	0.51
1:A:335:LEU:HA	1:A:410:TRP:H	1.76	0.51
1:A:358:MET:O	1:A:397:ILE:HA	2.11	0.51
2:B:185:VAL:HG22	2:B:261:ILE:HG13	1.93	0.51
1:A:22:LYS:HD2	4:A:501:GNP:HNB3	1.76	0.51
2:B:186:ARG:HD3	2:B:187:THR:N	2.26	0.50
1:A:149:ASN:HD21	1:A:185:ALA:HB3	1.76	0.50
1:A:14:VAL:HG11	1:A:25:LEU:HB3	1.93	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:D:4:G:H2'	3:D:4:G:N3	2.26	0.50
2:B:243:LEU:O	2:B:246:ILE:HG12	2.12	0.50
1:A:23:THR:HG21	1:A:40:GLU:HB3	1.93	0.50
1:A:56:ILE:HG22	1:A:68:TYR:CE2	2.46	0.50
1:A:216:LEU:HD11	1:A:314:SER:O	2.12	0.50
1:A:102:ALA:HA	3:D:74:C:OP1	2.12	0.50
1:A:26:VAL:HG12	1:A:91:PHE:CD1	2.47	0.49
1:A:255:VAL:O	1:A:271:PRO:HB3	2.12	0.49
3:D:36:U:N3	3:D:38:A:N1	2.60	0.49
1:A:130:ARG:HG3	5:D:77:MET:HG3	1.94	0.49
2:B:218:LYS:HG3	2:B:230:ASP:HB3	1.93	0.49
1:A:132:HIS:O	1:A:136:LEU:HB3	2.12	0.49
1:A:195:ILE:HA	1:A:198:ILE:HG13	1.94	0.49
1:A:258:GLY:O	1:A:269:TYR:HB3	2.12	0.49
1:A:142:LYS:HB2	1:A:202:ILE:HG12	1.93	0.49
1:A:58:VAL:HG22	1:A:59:CYS:H	1.78	0.49
1:A:239:GLY:CA	1:A:297:ILE:HG12	2.43	0.49
1:A:113:GLY:HA2	1:A:141:VAL:HG13	1.94	0.48
1:A:130:ARG:CZ	5:D:77:MET:HG2	2.43	0.48
1:A:235:GLY:O	1:A:301:LEU:N	2.45	0.48
1:A:129:THR:O	1:A:132:HIS:HB3	2.13	0.48
1:A:115:ILE:HD12	1:A:198:ILE:HG21	1.96	0.48
1:A:92:ILE:HG22	1:A:93:ASP:H	1.79	0.48
1:A:19:ASP:HA	4:A:501:GNP:PB	2.54	0.47
2:B:220:TYR:OH	2:B:230:ASP:HB2	2.14	0.47
1:A:71:GLU:CD	1:A:71:GLU:H	2.17	0.47
1:A:334:ASN:HB2	1:A:410:TRP:CE2	2.48	0.47
1:A:22:LYS:H	4:A:501:GNP:PB	2.36	0.47
1:A:24:THR:HA	1:A:27:GLN:HE21	1.79	0.47
1:A:150:LYS:HD2	4:A:501:GNP:C6	2.44	0.47
1:A:365:THR:HG22	3:D:73:A:N6	2.27	0.47
1:A:187:HIS:HB2	1:A:189:ILE:HG22	1.96	0.47
1:A:301:LEU:HD13	1:A:306:THR:HG22	1.96	0.47
1:A:325:VAL:HG23	1:A:327:TRP:CD1	2.49	0.47
1:A:154:VAL:HG21	1:A:158:GLU:HG3	1.97	0.47
2:B:215:LEU:HB2	2:B:232:VAL:HG23	1.96	0.47
1:A:99:VAL:HG22	3:D:72:A:H1'	1.97	0.47
1:A:101:MET:HG2	1:A:131:GLU:OE2	2.15	0.47
1:A:260:ARG:HE	1:A:267:VAL:HG21	1.78	0.47
1:A:323:VAL:H	1:A:326:LEU:CD1	2.28	0.47
3:D:62:C:H2'	3:D:63:G:C8	2.50	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:216:LEU:HD12	1:A:217:VAL:H	1.80	0.47
2:B:182:LEU:HB2	2:B:222:ILE:HD11	1.95	0.47
1:A:280:ARG:HB3	1:A:296:ALA:N	2.29	0.47
3:D:6:G:O6	3:D:66:C:N4	2.48	0.47
3:D:44:A:H4'	3:D:45:G:OP1	2.15	0.46
1:A:115:ILE:HD11	1:A:147:VAL:HG21	1.97	0.46
3:D:3:C:H2'	3:D:4:G:C8	2.49	0.46
1:A:167:LYS:HA	1:A:167:LYS:HD3	1.54	0.46
1:A:315:ILE:HD11	1:A:364:SER:HB3	1.97	0.46
3:D:8:U:H5'	3:D:13:C:H41	1.80	0.46
1:A:341:GLY:HA2	1:A:406:ARG:HD2	1.98	0.46
1:A:113:GLY:CA	1:A:143:ASN:HB3	2.46	0.46
1:A:313:GLY:C	1:A:363:SER:HB3	2.37	0.46
1:A:126:GLN:HB2	1:A:129:THR:OG1	2.16	0.45
1:A:86:LEU:HG	1:A:87:ARG:HG2	1.98	0.45
1:A:148:GLN:NE2	1:A:162:GLN:HE21	2.15	0.45
2:B:176:LYS:N	2:B:234:THR:O	2.49	0.45
1:A:260:ARG:NH2	1:A:267:VAL:HG11	2.31	0.45
1:A:321:ALA:HB3	1:A:326:LEU:HD13	1.98	0.45
1:A:406:ARG:HA	1:A:406:ARG:HD3	1.75	0.45
1:A:17:HIS:NE2	1:A:122:GLU:OE2	2.48	0.45
1:A:49:LEU:HD12	1:A:49:LEU:H	1.82	0.45
1:A:398:SER:OG	1:A:399:ARG:N	2.50	0.45
1:A:26:VAL:HG12	1:A:91:PHE:CE1	2.52	0.45
1:A:218:ILE:N	1:A:240:GLY:HA2	2.31	0.45
1:A:331:ILE:HG12	1:A:413:VAL:HG22	1.97	0.45
1:A:407:MET:H	1:A:407:MET:HG3	1.61	0.45
3:D:57:A:H2'	3:D:58:A:H4'	1.98	0.45
1:A:12:ILE:HG13	1:A:112:ASP:O	2.17	0.44
1:A:351:ILE:HG21	1:A:373:VAL:HG13	1.98	0.44
1:A:146:ILE:HG13	1:A:178:VAL:HG11	2.00	0.44
1:A:202:ILE:HD12	1:A:202:ILE:HA	1.81	0.44
1:A:370:VAL:HA	1:A:380:VAL:HG22	1.99	0.44
1:A:3:TRP:HE1	1:A:5:LYS:HE2	1.83	0.44
1:A:128:GLN:O	1:A:132:HIS:HB2	2.16	0.44
1:A:287:LYS:HD3	1:A:287:LYS:HA	1.78	0.44
3:D:52:G:H2'	3:D:53:G:O4'	2.17	0.44
1:A:97:HIS:CD2	1:A:98:GLU:H	2.35	0.44
3:D:20:U:H2'	3:D:21:A:O5'	2.18	0.44
1:A:130:ARG:O	1:A:134:VAL:HG22	2.17	0.44
1:A:374:LYS:HD3	1:A:374:LYS:HA	1.81	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:250:LEU:HD22	2:B:259:VAL:HG11	2.00	0.44
3:D:4:G:N2	3:D:5:G:C5	2.86	0.44
1:A:130:ARG:NH1	5:D:77:MET:HG2	2.32	0.44
2:B:242:ALA:O	2:B:246:ILE:HG23	2.17	0.44
1:A:55:ASN:HA	1:A:85:PHE:CZ	2.53	0.44
1:A:268:SER:HA	1:A:385:PRO:HG2	2.00	0.44
2:B:209:GLN:HE21	2:B:209:GLN:HB2	1.61	0.44
1:A:75:LYS:HD2	1:A:75:LYS:HA	1.68	0.44
1:A:305:LEU:HD12	1:A:305:LEU:H	1.83	0.44
1:A:217:VAL:HG22	1:A:316:ILE:HG13	2.00	0.43
1:A:158:GLU:O	1:A:161:SER:HB2	2.18	0.43
5:D:77:MET:N	5:D:77:MET:SD	2.90	0.43
1:A:260:ARG:HG2	1:A:269:TYR:CE1	2.53	0.43
1:A:333:TYR:C	1:A:333:TYR:CD1	2.91	0.43
1:A:358:MET:HB3	1:A:398:SER:H	1.83	0.43
1:A:26:VAL:HA	1:A:91:PHE:CD2	2.53	0.43
1:A:98:GLU:OE2	1:A:99:VAL:N	2.47	0.43
1:A:242:ILE:HG22	1:A:291:PRO:HG3	2.00	0.43
1:A:270:GLU:HA	1:A:271:PRO:HD3	1.71	0.43
1:A:280:ARG:HA	1:A:285:GLU:CB	2.48	0.43
1:A:239:GLY:HA2	1:A:297:ILE:HG12	2.01	0.43
3:D:63:G:N1	3:D:64:G:C6	2.87	0.43
1:A:120:ALA:HA	1:A:162:GLN:HG3	2.00	0.42
3:D:53:G:C6	3:D:54:U:C4	3.07	0.42
1:A:150:LYS:HD2	4:A:501:GNP:C5	2.48	0.42
1:A:218:ILE:HD11	1:A:293:GLY:O	2.19	0.42
1:A:121:ASN:HD22	4:A:501:GNP:HN1	1.65	0.42
1:A:352:ARG:NH1	1:A:353:ALA:H	2.13	0.42
1:A:403:GLY:HA3	3:D:11:A:C2	2.50	0.42
3:D:44:A:H3'	3:D:45:G:C5	2.54	0.42
3:D:50:U:C4	3:D:65:C:N3	2.88	0.42
1:A:333:TYR:C	1:A:333:TYR:HD1	2.23	0.42
3:D:21:A:H2'	3:D:21:A:N3	2.34	0.42
1:A:307:LYS:CG	1:A:311:LEU:HG	2.48	0.42
1:A:20:HIS:NE2	1:A:119:ALA:HB2	2.34	0.42
1:A:63:LYS:HD2	1:A:63:LYS:N	2.34	0.42
1:A:239:GLY:HA3	1:A:297:ILE:HG12	2.02	0.42
1:A:249:VAL:HG13	1:A:287:LYS:O	2.19	0.42
1:A:325:VAL:HG23	1:A:327:TRP:NE1	2.34	0.42
1:A:15:VAL:HG12	1:A:16:GLY:N	2.35	0.41
3:D:58:A:C2'	3:D:59:A:H5'	2.49	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:D:65:C:H2'	3:D:66:C:O4'	2.19	0.41
1:A:219:ARG:C	1:A:219:ARG:HE	2.23	0.41
1:A:242:ILE:H	1:A:291:PRO:HG3	1.84	0.41
1:A:323:VAL:HB	1:A:326:LEU:HG	2.01	0.41
1:A:15:VAL:C	1:A:22:LYS:HZ2	2.24	0.41
1:A:64:LYS:N	1:A:65:PRO:HD2	2.35	0.41
1:A:253:ILE:HG22	1:A:254:LYS:HG3	2.01	0.41
3:D:30:G:H2'	3:D:31:G:C4'	2.50	0.41
1:A:97:HIS:O	1:A:128:GLN:NE2	2.53	0.41
3:D:5:G:H2'	3:D:6:G:C4'	2.51	0.41
1:A:22:LYS:NZ	1:A:117:VAL:HB	2.35	0.41
1:A:132:HIS:CE1	1:A:136:LEU:HD13	2.56	0.41
1:A:156:LYS:HD2	1:A:156:LYS:HA	1.91	0.41
1:A:281:PHE:CE1	1:A:290:LYS:HG2	2.56	0.41
1:A:105:LEU:H	1:A:105:LEU:HD22	1.86	0.41
1:A:195:ILE:O	1:A:198:ILE:HG13	2.21	0.41
3:D:62:C:H2'	3:D:63:G:O4'	2.20	0.41
1:A:14:VAL:HG11	1:A:25:LEU:HD23	2.03	0.40
1:A:135:ALA:HA	3:D:74:C:C5	2.56	0.40
1:A:217:VAL:HG23	1:A:314:SER:HB2	2.02	0.40
2:B:237:LYS:HD3	2:B:237:LYS:HA	1.86	0.40
3:D:22:G:O2'	3:D:23:C:C5'	2.65	0.40
1:A:281:PHE:HB2	1:A:286:PHE:CB	2.40	0.40
3:D:1:C:O5'	3:D:2:G:H5''	2.22	0.40
3:D:50:U:H3	3:D:64:G:N2	2.20	0.40
1:A:252:GLU:O	1:A:274:THR:O	2.40	0.40
3:D:43:A:C6	3:D:44:A:C5	3.10	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	
1	A	413/415 (100%)	331 (80%)	77 (19%)	5 (1%)	13	49
2	B	87/89 (98%)	75 (86%)	12 (14%)	0	100	100
All	All	500/504 (99%)	406 (81%)	89 (18%)	5 (1%)	15	54

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	47	ILE
1	A	393	ILE
1	A	154	VAL
1	A	10	VAL
1	A	279	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	357/357 (100%)	311 (87%)	46 (13%)	4	19
2	B	80/80 (100%)	64 (80%)	16 (20%)	1	6
All	All	437/437 (100%)	375 (86%)	62 (14%)	3	15

All (62) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1	MET
1	A	18	VAL
1	A	22	LYS
1	A	32	ILE
1	A	46	THR
1	A	48	LYS
1	A	51	TYR
1	A	53	GLU
1	A	62	CYS
1	A	68	TYR
1	A	69	VAL

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Mol	Chain	Res	Type
1	A	74	CYS
1	A	77	CYS
1	A	91	PHE
1	A	98	GLU
1	A	112	ASP
1	A	115	ILE
1	A	136	LEU
1	A	148	GLN
1	A	154	VAL
1	A	156	LYS
1	A	158	GLU
1	A	162	GLN
1	A	177	ASN
1	A	189	ILE
1	A	194	LEU
1	A	203	LYS
1	A	206	TYR
1	A	207	ARG
1	A	217	VAL
1	A	219	ARG
1	A	253	ILE
1	A	266	LYS
1	A	286	PHE
1	A	290	LYS
1	A	294	LEU
1	A	306	THR
1	A	333	TYR
1	A	340	VAL
1	A	349	ASP
1	A	352	ARG
1	A	359	LEU
1	A	377	GLU
1	A	386	VAL
1	A	405	TRP
1	A	410	TRP
2	B	180	SER
2	B	182	LEU
2	B	183	ILE
2	B	186	ARG
2	B	189	GLU
2	B	200	ILE
2	B	209	GLN

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Mol	Chain	Res	Type
2	B	214	LEU
2	B	218	LYS
2	B	221	THR
2	B	226	ARG
2	B	232	VAL
2	B	237	LYS
2	B	246	ILE
2	B	260	ASP
2	B	264	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (15) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	7	GLN
1	A	97	HIS
1	A	126	GLN
1	A	128	GLN
1	A	148	GLN
1	A	162	GLN
1	A	168	GLN
1	A	224	ASN
1	A	229	GLN
1	A	251	GLN
1	A	334	ASN
1	A	392	ASN
2	B	209	GLN
2	B	245	GLN
2	B	249	ASN

5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
3	D	76/77 (98%)	52 (68%)	4 (5%)

All (52) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
3	D	2	G
3	D	3	C
3	D	6	G

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Mol	Chain	Res	Type
3	D	8	U
3	D	9	G
3	D	10	G
3	D	11	A
3	D	14	A
3	D	15	G
3	D	16	C
3	D	17	C
3	D	18	G
3	D	19	G
3	D	20	U
3	D	21	A
3	D	22	G
3	D	23	C
3	D	24	U
3	D	27	U
3	D	28	C
3	D	30	G
3	D	32	C
3	D	33	U
3	D	34	C
3	D	37	A
3	D	38	A
3	D	39	C
3	D	40	C
3	D	41	C
3	D	42	G
3	D	43	A
3	D	45	G
3	D	46	A
3	D	47	U
3	D	48	C
3	D	49	G
3	D	50	U
3	D	52	G
3	D	53	G
3	D	57	A
3	D	58	A
3	D	59	A
3	D	61	C
3	D	62	C
3	D	66	C

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Mol	Chain	Res	Type
3	D	70	G
3	D	71	C
3	D	72	A
3	D	73	A
3	D	74	C
3	D	75	C
3	D	76	A

All (4) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
3	D	23	C
3	D	40	C
3	D	44	A
3	D	74	C

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 monosaccharides 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	#$|Z| > 2$
5	MET	D	77	3	6,7,8	0.33	0	2,7,9	0.14	0
4	GNP	A	501	-	29,34,34	1.82	5 (17%)	33,54,54	2.38	10 (30%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	MET	D	77	3	-	3/5/6/8	-
4	GNP	A	501	-	-	7/14/38/38	0/3/3/3

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	501	GNP	PB-O3A	-5.72	1.51	1.59
4	A	501	GNP	C6-N1	3.70	1.39	1.33
4	A	501	GNP	PG-O1G	3.62	1.51	1.46
4	A	501	GNP	PB-O2B	-3.32	1.47	1.56
4	A	501	GNP	C8-N7	-2.29	1.30	1.34

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	501	GNP	C5-C6-N1	-8.31	112.07	123.43
4	A	501	GNP	C2-N1-C6	5.50	124.67	115.93
4	A	501	GNP	O3G-PG-O1G	-3.97	103.48	113.45
4	A	501	GNP	O2B-PB-O1B	3.73	117.75	109.92
4	A	501	GNP	C2-N3-C4	-3.08	111.84	115.36
4	A	501	GNP	O2G-PG-O3G	2.97	115.54	107.64
4	A	501	GNP	PB-O3A-PA	-2.88	122.47	132.62
4	A	501	GNP	N3-C2-N1	-2.45	123.96	127.22
4	A	501	GNP	C4-C5-N7	2.16	111.65	109.40
4	A	501	GNP	O4'-C1'-C2'	-2.12	103.82	106.93

There are no chirality outliers.

All (10) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	501	GNP	PB-N3B-PG-O1G
4	A	501	GNP	PG-N3B-PB-O1B
4	A	501	GNP	C5'-O5'-PA-O1A
4	A	501	GNP	C5'-O5'-PA-O2A
5	D	77	MET	O-C-CA-CB
5	D	77	MET	CA-CB-CG-SD
4	A	501	GNP	C3'-C4'-C5'-O5'

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W O R L D W I D E
wwPDB
PROTEIN DATA BANK

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Mol	Chain	Res	Type	Atoms
5	D	77	MET	CB-CG-SD-CE
4	A	501	GNP	C5'-O5'-PA-O3A
4	A	501	GNP	PB-O3A-PA-O2A

There are no ring outliers.

2 monomers are involved in 11 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	D	77	MET	5	0
4	A	501	GNP	6	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

Ligand GNP A 501

Bond lengths

Bond angles

Torsions

Rings
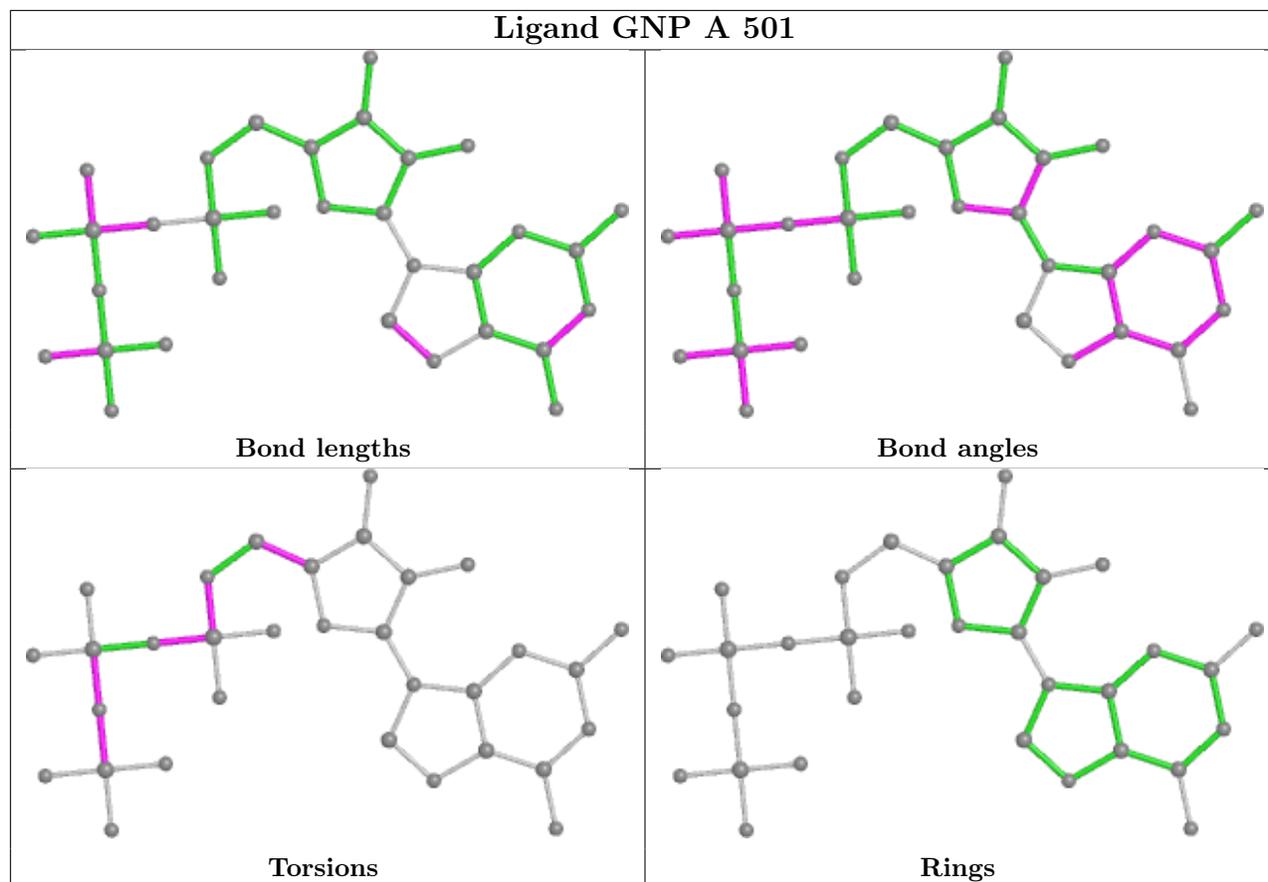
5.7 Other polymers ⓘ

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, 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(Å²)	Q<0.9
1	A	415/415 (100%)	-0.69	6 (1%)	75	63	42, 109, 331, 545	0
2	B	89/89 (100%)	-0.59	3 (3%)	45	29	41, 111, 284, 545	0
3	D	77/77 (100%)	-0.53	0	100	100	64, 113, 208, 345	0
All	All	581/581 (100%)	-0.65	9 (1%)	73	61	41, 110, 284, 545	0

All (9) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	1	MET	3.8
1	A	319	ALA	3.7
2	B	183	ILE	3.5
1	A	182	PRO	2.7
2	B	188	ASN	2.7
1	A	274	THR	2.7
1	A	2	ALA	2.6
2	B	248	SER	2.4
1	A	409	GLY	2.3

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 monosaccharides in this entry.

6.4　Ligands ⓘ

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. 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	B-factors(Å^2)	Q<0.9
5	MET	D	77	8/9	0.91	0.14	30,37,111,127	0
4	GNP	A	501	32/32	0.94	0.10	28,70,108,121	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around GNP A 501:

$2\text{mF}_o\text{-DF}_c$ (at 0.7 rmsd) in gray
$\text{mF}_o\text{-DF}_c$ (at 3 rmsd) in purple (negative) and green (positive)

6.5　Other polymers ⓘ

There are no such residues in this entry.