Full wwPDB X-ray Structure Validation Report ⓘ

Jun 12, 2024 – 06:30 AM EDT

PDB ID	:	1KIJ
Title	:	Crystal structure of the 43K ATPase domain of Thermus thermophilus gyrase B in complex with novobiocin
Authors	:	Lamour, V.; Hoermann, L.; Jeltsch, J.-M.; Oudet, P.; Moras, D.
Deposited on	:	2001-12-03
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
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:

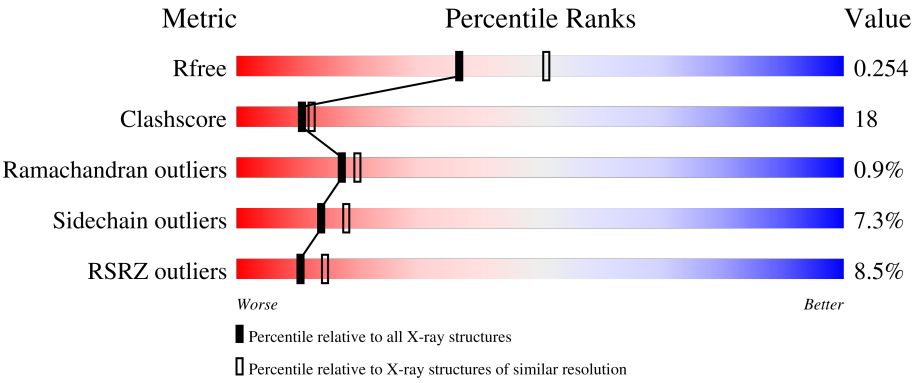
MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.20.1
EDS	:	2.36.2
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36.2

1 Overall quality at a glance (i)

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}	130704	5042 (2.30-2.30)
Clashscore	141614	5643 (2.30-2.30)
Ramachandran outliers	138981	5575 (2.30-2.30)
Sidechain outliers	138945	5575 (2.30-2.30)
RSRZ outliers	127900	4938 (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 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	390	9% 69% 25%
1	B	390	8% 69% 25%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	FMT	A	401	-	X	-	-
3	FMT	B	441	-	X	-	-

2 Entry composition

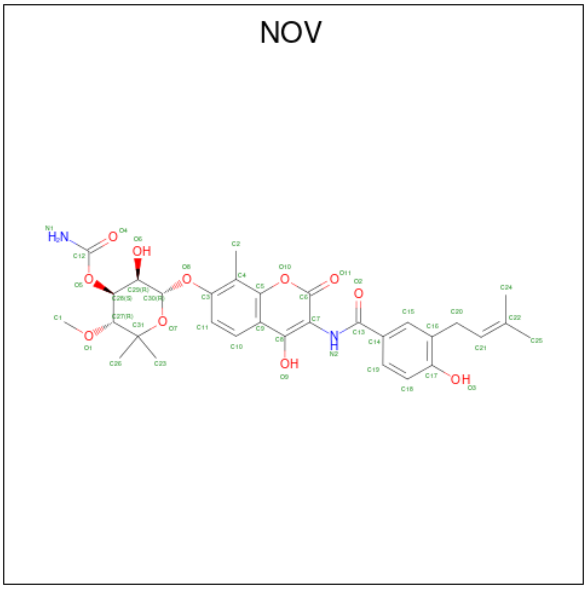
There are 4 unique types of molecules in this entry. The entry contains 6498 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 DNA GYRASE SUBUNIT B.

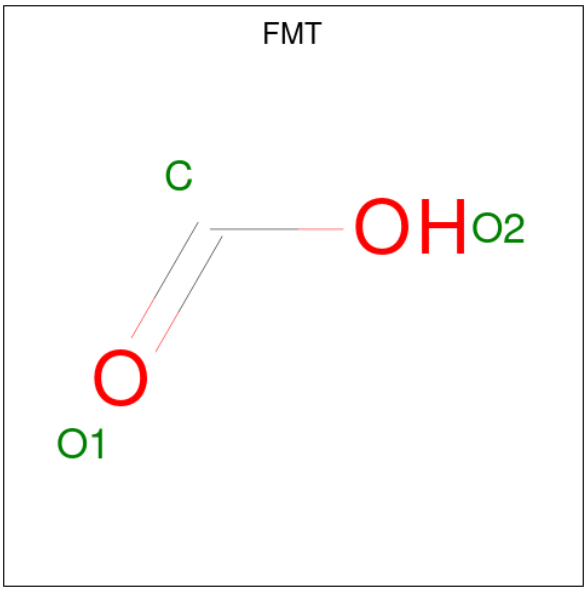
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	384	Total	C	N	O	S	0	0	0
			2968	1881	530	554	3			
1	B	384	Total	C	N	O	S	0	0	0
			2968	1881	530	554	3			

- Molecule 2 is NOVOBIOCIN (three-letter code: NOV) (formula: $C_{31}H_{36}N_2O_{11}$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			44	31	2	11		
2	B	1	Total	C	N	O	0	0
			44	31	2	11		

- Molecule 3 is FORMIC ACID (three-letter code: FMT) (formula: CH_2O_2).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C O 3 1 2	0	0
3	B	1	Total C O 3 1 2	0	0

- Molecule 4 is water.

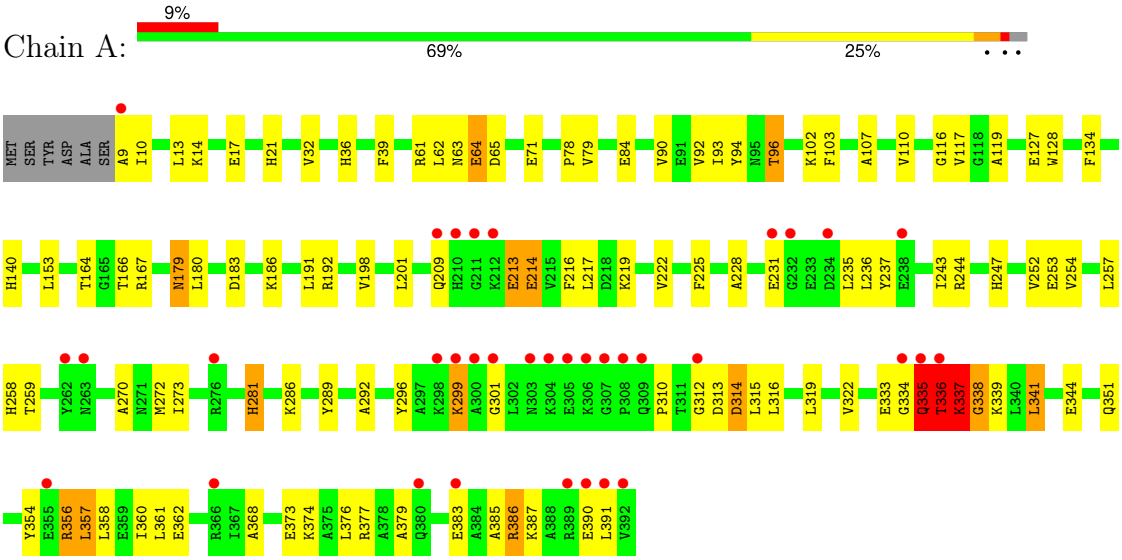
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	228	Total O 228 228	0	0
4	B	240	Total O 240 240	0	0

3 Residue-property plots (i)

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.

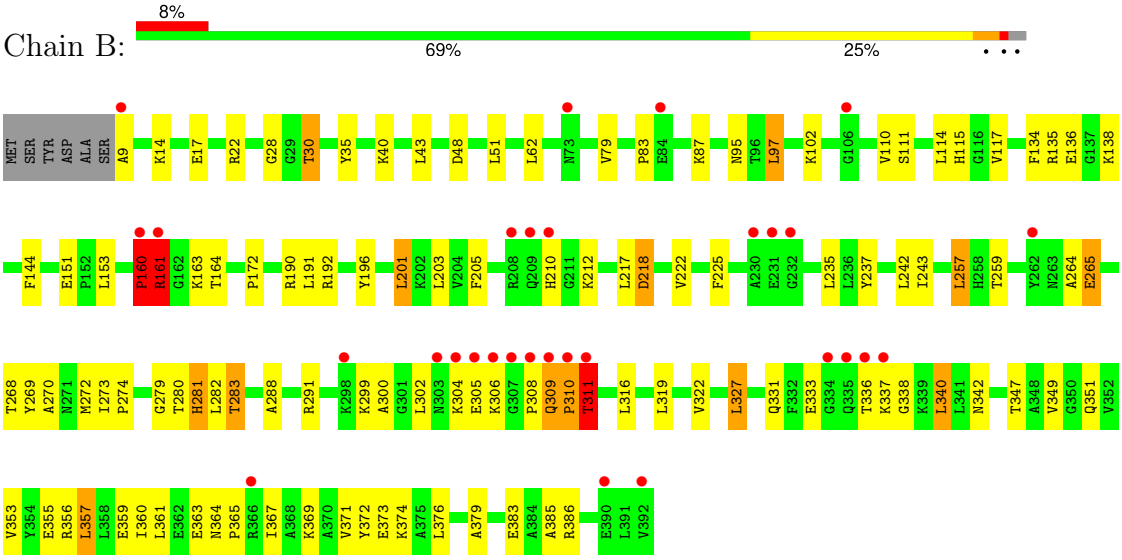
• Molecule 1: DNA GYRASE SUBUNIT B

Chain A:



• Molecule 1: DNA GYRASE SUBUNIT B

Chain B:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	44.88Å 125.55Å 79.83Å 90.00° 96.36° 90.00°	Depositor
Resolution (Å)	14.94 – 2.30 14.94 – 2.31	Depositor EDS
% Data completeness (in resolution range)	94.9 (14.94-2.30) 95.0 (14.94-2.31)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	5.35 (at 2.32Å)	Xtriage
Refinement program	CNS 1.0	Depositor
R, R_{free}	0.206 , 0.266 0.199 , 0.254	Depositor DCC
R_{free} test set	2815 reflections (7.56%)	wwPDB-VP
Wilson B-factor (Å^2)	21.6	Xtriage
Anisotropy	0.292	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.39 , 63.2	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	6498	wwPDB-VP
Average B, all atoms (Å^2)	27.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.44% of the height of the origin peak. No significant pseudotranslation is detected.*

[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: NOV, FMT

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	0.48	1/3025 (0.0%)	0.66	4/4086 (0.1%)
1	B	0.52	2/3025 (0.1%)	0.65	4/4086 (0.1%)
All	All	0.50	3/6050 (0.0%)	0.65	8/8172 (0.1%)

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	2
1	B	0	1
All	All	0	3

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	161	ARG	N-CA	18.61	1.83	1.46
1	A	338	GLY	N-CA	16.30	1.70	1.46
1	B	311	THR	N-CA	6.85	1.60	1.46

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	338	GLY	N-CA-C	-10.53	86.77	113.10
1	A	335	GLN	C-N-CA	8.47	142.86	121.70
1	B	161	ARG	N-CA-CB	8.27	125.48	110.60
1	B	160	PRO	C-N-CA	-8.02	101.66	121.70
1	B	311	THR	N-CA-C	-7.71	90.19	111.00
1	A	337	LYS	C-N-CA	-7.00	107.59	122.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	314	ASP	N-CA-C	-6.12	94.48	111.00
1	B	311	THR	N-CA-CB	5.46	120.67	110.30

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	335	GLN	Peptide
1	A	337	LYS	Peptide
1	B	160	PRO	Peptide

5.2 Too-close contacts (i)

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	2968	0	2985	113	0
1	B	2968	0	2985	115	0
2	A	44	0	35	5	0
2	B	44	0	36	1	0
3	A	3	0	2	0	0
3	B	3	0	2	0	0
4	A	228	0	0	7	0
4	B	240	0	0	10	0
All	All	6498	0	6045	221	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 18.

All (221) 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:338:GLY:N	1:A:338:GLY:CA	1.70	1.52
1:B:161:ARG:N	1:B:161:ARG:CA	1.83	1.41
1:B:331:GLN:H	1:B:342:ASN:HD21	1.09	0.98
1:A:334:GLY:O	1:A:335:GLN:HG2	1.63	0.97

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:349:VAL:O	1:B:353:VAL:HG12	1.66	0.93
1:A:243:ILE:HB	1:A:254:VAL:HG13	1.50	0.93
1:A:338:GLY:N	1:A:338:GLY:C	2.21	0.93
1:A:335:GLN:NE2	1:A:337:LYS:O	2.03	0.92
1:A:36:HIS:HE1	1:A:183:ASP:H	1.19	0.88
1:B:161:ARG:N	1:B:161:ARG:HA	1.87	0.87
1:A:337:LYS:C	1:A:338:GLY:CA	2.45	0.85
1:B:161:ARG:NH1	1:B:163:LYS:HD2	1.92	0.84
1:B:279:GLY:O	1:B:283:THR:HG22	1.78	0.83
1:B:160:PRO:C	1:B:161:ARG:CA	2.47	0.82
1:B:201:LEU:HD13	1:B:203:LEU:HD11	1.60	0.82
1:A:235:LEU:HD13	1:A:257:LEU:HD21	1.62	0.81
1:B:161:ARG:HH12	1:B:163:LYS:HD2	1.44	0.80
1:A:333:GLU:HG2	1:A:341:LEU:HD21	1.61	0.80
1:B:161:ARG:CZ	1:B:163:LYS:HB2	2.11	0.80
1:B:280:THR:HG21	1:B:342:ASN:O	1.83	0.78
1:B:235:LEU:HD22	1:B:257:LEU:HD21	1.66	0.78
1:A:36:HIS:CE1	1:A:183:ASP:H	2.05	0.74
1:A:236:LEU:O	1:A:236:LEU:HD23	1.91	0.71
1:B:161:ARG:NH2	1:B:163:LYS:HD2	2.06	0.71
1:A:243:ILE:HB	1:A:254:VAL:CG1	2.21	0.70
1:B:222:VAL:HG13	1:B:322:VAL:HB	1.74	0.70
1:B:161:ARG:CZ	1:B:163:LYS:HD2	2.21	0.70
1:B:160:PRO:O	4:B:831:HOH:O	2.10	0.70
1:A:92:VAL:O	1:A:96:THR:HG23	1.92	0.69
1:A:338:GLY:N	1:A:339:LYS:N	2.40	0.69
1:A:334:GLY:HA2	1:B:28:GLY:HA3	1.73	0.69
1:A:9:ALA:HB1	4:B:913:HOH:O	1.92	0.69
1:A:65:ASP:HB3	4:A:916:HOH:O	1.91	0.69
1:A:313:ASP:HA	1:A:316:LEU:HG	1.74	0.68
1:B:336:THR:O	1:B:337:LYS:HG3	1.94	0.68
1:A:333:GLU:O	1:A:335:GLN:OE1	2.12	0.68
1:B:243:ILE:HD11	1:B:360:ILE:HD12	1.75	0.68
1:B:161:ARG:HG3	1:B:163:LYS:N	2.08	0.67
1:B:309:GLN:HG2	1:B:310:PRO:HD3	1.77	0.67
1:B:161:ARG:HG3	1:B:163:LYS:H	1.60	0.67
1:A:334:GLY:C	1:A:335:GLN:HG2	2.15	0.65
1:A:107:ALA:HB1	4:A:595:HOH:O	1.95	0.65
1:B:161:ARG:HH22	1:B:163:LYS:HD2	1.62	0.64
1:A:228:ALA:HA	1:A:231:GLU:HG3	1.79	0.64
1:B:309:GLN:CG	1:B:310:PRO:HD3	2.27	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:179:ASN:C	1:A:179:ASN:HD22	2.01	0.63
1:B:243:ILE:HD12	1:B:356:ARG:HG3	1.79	0.62
1:B:369:LYS:O	1:B:373:GLU:HB2	2.00	0.62
1:A:222:VAL:CG2	1:A:322:VAL:HB	2.30	0.61
1:B:367:ILE:O	1:B:371:VAL:HG12	2.00	0.61
1:B:30:THR:CG2	1:B:30:THR:O	2.49	0.60
1:B:309:GLN:HG2	1:B:310:PRO:CD	2.31	0.60
1:B:160:PRO:O	1:B:161:ARG:O	2.19	0.60
1:B:308:PRO:HA	4:B:837:HOH:O	2.01	0.60
1:B:243:ILE:HD12	1:B:356:ARG:CG	2.31	0.60
1:A:102:LYS:HD2	1:B:9:ALA:CB	2.32	0.59
1:A:335:GLN:CD	1:A:337:LYS:O	2.41	0.59
1:A:391:LEU:HD23	1:A:391:LEU:O	2.01	0.59
1:A:244:ARG:HG2	1:A:253:GLU:HG2	1.84	0.59
1:B:333:GLU:OE2	1:B:338:GLY:HA3	2.01	0.59
1:B:331:GLN:H	1:B:342:ASN:ND2	1.90	0.58
1:B:379:ALA:O	1:B:383:GLU:HG3	2.03	0.58
1:B:135:ARG:HG2	1:B:136:GLU:HG3	1.85	0.57
1:A:273:ILE:HD12	1:A:273:ILE:O	2.04	0.57
1:A:79:VAL:HG12	1:A:90:VAL:HG21	1.86	0.57
1:A:247:HIS:CD2	1:A:351:GLN:HG2	2.38	0.57
1:B:268:THR:HG21	1:B:282:LEU:HB2	1.85	0.57
1:A:386:ARG:HD3	1:A:386:ARG:C	2.26	0.56
1:A:296:TYR:CE2	1:A:368:ALA:HB1	2.40	0.56
1:B:386:ARG:HB3	1:B:386:ARG:HH11	1.70	0.56
1:A:259:THR:O	1:A:374:LYS:HE2	2.04	0.56
1:A:102:LYS:HD2	1:B:9:ALA:HB1	1.87	0.56
1:B:288:ALA:CB	1:B:353:VAL:HG13	2.36	0.55
1:A:335:GLN:CG	1:A:337:LYS:O	2.55	0.55
1:B:95:ASN:HD21	1:B:144:PHE:HE2	1.55	0.55
1:A:387:LYS:HA	1:A:390:GLU:OE2	2.06	0.55
1:A:93:ILE:HG23	1:A:117:VAL:HG11	1.90	0.53
1:B:304:LYS:O	1:B:305:GLU:HB3	2.08	0.53
1:A:134:PHE:O	1:A:164:THR:HA	2.07	0.53
1:A:299:LYS:HE2	1:A:299:LYS:HA	1.90	0.53
1:B:97:LEU:HD22	1:B:115:HIS:CD2	2.43	0.53
1:B:340:LEU:HD22	1:B:342:ASN:HD22	1.73	0.53
1:A:247:HIS:HD2	1:A:351:GLN:HG2	1.74	0.53
1:B:161:ARG:NH1	1:B:163:LYS:CD	2.67	0.53
1:B:331:GLN:N	1:B:342:ASN:HD21	1.93	0.53
1:A:32:VAL:O	1:A:36:HIS:HD2	1.91	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:309:GLN:CD	1:B:310:PRO:HD3	2.30	0.52
1:B:300:ALA:HB3	1:B:302:LEU:HD13	1.91	0.52
1:A:110:VAL:HG22	1:A:272:MET:HG3	1.91	0.51
1:A:140:HIS:HB3	1:A:153:LEU:HD11	1.93	0.51
1:B:14:LYS:O	1:B:17:GLU:HB2	2.10	0.51
1:B:310:PRO:O	1:B:311:THR:HG23	2.08	0.51
1:A:217:LEU:C	1:A:217:LEU:HD23	2.30	0.51
1:B:363:GLU:C	1:B:365:PRO:HD3	2.31	0.51
1:A:335:GLN:HG3	1:A:337:LYS:O	2.10	0.51
1:A:386:ARG:HD3	1:A:386:ARG:O	2.11	0.50
1:A:373:GLU:O	1:A:377:ARG:HG3	2.12	0.50
1:A:312:GLY:O	1:A:313:ASP:HB2	2.10	0.50
1:A:383:GLU:OE2	1:A:383:GLU:HA	2.12	0.50
1:B:310:PRO:O	1:B:311:THR:OG1	2.26	0.50
1:A:127:GLU:HG3	1:A:128:TRP:CD1	2.45	0.50
1:A:228:ALA:O	1:A:231:GLU:HG3	2.11	0.50
1:B:281:HIS:H	1:B:281:HIS:CD2	2.30	0.50
1:B:79:VAL:HB	1:B:153:LEU:HD21	1.92	0.50
1:A:358:LEU:O	1:A:362:GLU:HG3	2.12	0.50
1:A:387:LYS:O	1:A:390:GLU:HG2	2.11	0.50
1:B:243:ILE:HD11	1:B:360:ILE:CD1	2.41	0.50
1:A:354:TYR:O	1:A:358:LEU:HD23	2.11	0.50
1:B:270:ALA:O	1:B:273:ILE:HG12	2.11	0.50
1:B:309:GLN:HB3	1:B:376:LEU:HD21	1.93	0.49
1:A:102:LYS:CD	1:B:9:ALA:HB1	2.42	0.49
1:A:289:TYR:CD1	1:A:357:LEU:HD11	2.48	0.49
1:B:210:HIS:HB3	1:B:212:LYS:HE3	1.94	0.49
1:A:281:HIS:H	1:A:281:HIS:CD2	2.32	0.48
1:B:161:ARG:NH2	1:B:163:LYS:HG3	2.29	0.48
1:A:79:VAL:HG12	1:A:90:VAL:CG2	2.42	0.48
1:B:161:ARG:NH2	1:B:163:LYS:CG	2.77	0.47
1:B:309:GLN:HG3	1:B:372:TYR:CE1	2.49	0.47
1:A:93:ILE:HD11	2:A:400:NOV:C24	2.44	0.47
1:A:78:PRO:O	1:A:90:VAL:HG22	2.14	0.47
1:B:83:PRO:HG2	4:B:880:HOH:O	2.13	0.47
1:B:161:ARG:NH2	1:B:163:LYS:CD	2.75	0.47
1:A:314:ASP:OD2	1:A:379:ALA:HA	2.15	0.47
1:B:43:LEU:C	1:B:43:LEU:HD13	2.35	0.47
1:B:161:ARG:CZ	1:B:163:LYS:CB	2.88	0.47
1:A:93:ILE:HD13	2:A:400:NOV:H233	1.97	0.47
1:B:269:TYR:HE2	1:B:274:PRO:HG3	1.79	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:160:PRO:O	1:B:161:ARG:C	2.53	0.46
1:B:196:TYR:HE2	1:B:218:ASP:OD1	1.99	0.46
1:A:179:ASN:C	1:A:179:ASN:ND2	2.68	0.46
1:B:347:THR:O	1:B:351:GLN:HB2	2.16	0.46
1:B:40:LYS:HD3	4:B:934:HOH:O	2.16	0.46
1:A:313:ASP:HA	1:A:316:LEU:CG	2.44	0.46
1:B:35:TYR:CE1	1:B:172:PRO:HB2	2.51	0.45
1:A:10:ILE:HD11	2:B:444:NOV:C22	2.46	0.45
1:A:61:ARG:HD2	1:A:63:ASN:OD1	2.15	0.45
1:A:222:VAL:HG22	1:A:322:VAL:HB	1.97	0.45
1:A:361:LEU:HD12	1:A:368:ALA:CB	2.47	0.45
1:B:217:LEU:HD23	1:B:218:ASP:N	2.32	0.45
1:B:222:VAL:HG13	1:B:322:VAL:CB	2.45	0.45
1:A:64:GLU:H	1:A:64:GLU:HG2	1.53	0.45
1:A:65:ASP:HB3	4:A:931:HOH:O	2.16	0.45
1:B:160:PRO:O	1:B:161:ARG:CA	2.63	0.45
1:A:94:TYR:CE2	1:A:119:ALA:HB1	2.52	0.45
1:A:198:VAL:HG23	1:A:272:MET:HE1	1.98	0.45
1:A:270:ALA:O	1:A:273:ILE:HG13	2.17	0.45
1:A:310:PRO:HG3	1:A:376:LEU:HD23	1.98	0.45
1:A:336:THR:HG22	4:A:841:HOH:O	2.16	0.45
1:A:357:LEU:HD22	1:A:361:LEU:CD2	2.46	0.45
1:A:214:GLU:HG2	1:A:216:PHE:CZ	2.52	0.45
1:A:258:HIS:CE1	1:A:319:LEU:HD13	2.51	0.45
1:B:190:ARG:HD3	4:B:918:HOH:O	2.17	0.45
1:A:357:LEU:HD22	1:A:361:LEU:HD21	1.98	0.45
1:A:93:ILE:HD11	2:A:400:NOV:H241	1.98	0.45
1:A:273:ILE:HD12	1:A:273:ILE:C	2.36	0.45
1:B:48:ASP:OD1	1:B:110:VAL:HG23	2.17	0.44
1:B:192:ARG:HD3	4:B:562:HOH:O	2.17	0.44
1:B:51:LEU:HD11	1:B:272:MET:HE3	1.99	0.44
1:B:134:PHE:O	1:B:164:THR:HA	2.18	0.44
1:B:201:LEU:HD13	1:B:203:LEU:CD1	2.41	0.44
1:B:310:PRO:HD2	4:B:837:HOH:O	2.17	0.44
1:B:288:ALA:HB1	1:B:353:VAL:HG13	2.00	0.44
1:A:192:ARG:HD3	4:A:887:HOH:O	2.17	0.44
1:A:214:GLU:HG2	1:A:216:PHE:CE2	2.53	0.44
1:A:32:VAL:CG1	1:A:186:LYS:HE3	2.48	0.44
1:A:316:LEU:HD12	1:A:316:LEU:O	2.18	0.44
1:B:87:LYS:HG2	4:B:897:HOH:O	2.16	0.44
1:B:161:ARG:NH1	1:B:163:LYS:HB2	2.32	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:310:PRO:O	1:B:311:THR:CB	2.65	0.44
1:B:30:THR:O	1:B:30:THR:HG22	2.18	0.43
1:B:264:ALA:HB2	1:B:316:LEU:O	2.18	0.43
1:B:264:ALA:O	1:B:265:GLU:HB2	2.18	0.43
1:B:161:ARG:CZ	1:B:163:LYS:CD	2.95	0.43
1:A:14:LYS:O	1:A:17:GLU:HG3	2.18	0.43
1:A:333:GLU:HB2	1:A:335:GLN:OE1	2.18	0.43
1:B:237:TYR:O	1:B:237:TYR:CD1	2.72	0.43
1:B:265:GLU:OE2	1:B:265:GLU:HA	2.18	0.43
1:B:364:ASN:N	1:B:365:PRO:HD3	2.34	0.43
1:B:243:ILE:CD1	1:B:356:ARG:HG3	2.48	0.43
1:A:13:LEU:HD11	1:A:21:HIS:CD2	2.53	0.43
1:B:309:GLN:HG3	1:B:372:TYR:HE1	1.84	0.43
1:A:79:VAL:HB	1:A:153:LEU:HD21	2.01	0.43
1:B:117:VAL:HG22	4:B:808:HOH:O	2.17	0.43
1:A:102:LYS:HD2	1:B:9:ALA:HB2	1.99	0.42
1:A:356:ARG:O	1:A:360:ILE:HG12	2.19	0.42
1:B:309:GLN:HB3	1:B:376:LEU:CD2	2.50	0.42
1:A:110:VAL:HG13	1:A:272:MET:HB2	2.02	0.42
1:A:213:GLU:HB2	4:A:901:HOH:O	2.18	0.42
1:A:228:ALA:CA	1:A:231:GLU:HG3	2.49	0.42
1:A:237:TYR:O	1:A:257:LEU:HD11	2.19	0.42
1:B:359:GLU:O	1:B:363:GLU:HG2	2.20	0.42
1:B:327:LEU:HD12	1:B:327:LEU:N	2.35	0.42
1:A:333:GLU:HG2	1:A:341:LEU:CD2	2.41	0.42
1:B:257:LEU:HD23	1:B:257:LEU:C	2.41	0.42
1:A:237:TYR:HE1	1:A:258:HIS:HB2	1.85	0.42
1:B:138:LYS:HB2	1:B:138:LYS:HE3	1.83	0.42
1:B:259:THR:O	1:B:374:LYS:HE3	2.20	0.42
1:A:71:GLU:CD	1:A:167:ARG:HD3	2.39	0.41
1:A:313:ASP:CA	1:A:316:LEU:HG	2.46	0.41
1:B:305:GLU:C	1:B:306:LYS:HG2	2.40	0.41
1:A:237:TYR:CE2	1:A:257:LEU:HD12	2.55	0.41
1:A:286:LYS:HE2	1:A:286:LYS:HB3	1.82	0.41
1:A:387:LYS:HE2	4:A:871:HOH:O	2.20	0.41
1:A:385:ALA:HB1	1:B:385:ALA:HB1	2.01	0.41
1:B:111:SER:O	1:B:273:ILE:HG21	2.19	0.41
1:B:191:LEU:HD23	1:B:205:PHE:HB2	2.02	0.41
1:A:237:TYR:CE1	1:A:258:HIS:HB2	2.55	0.41
1:A:292:ALA:HB1	1:A:358:LEU:HD22	2.02	0.41
1:B:30:THR:O	1:B:30:THR:HG23	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:344:GLU:H	1:A:344:GLU:CD	2.24	0.41
1:A:64:GLU:HA	1:A:209:GLN:HG3	2.02	0.41
1:B:191:LEU:CD2	1:B:205:PHE:HB2	2.51	0.41
1:A:373:GLU:HA	1:A:376:LEU:HD12	2.03	0.41
1:B:222:VAL:CG1	1:B:322:VAL:HB	2.48	0.41
1:B:269:TYR:CE2	1:B:274:PRO:HG3	2.56	0.41
1:B:340:LEU:CD2	1:B:342:ASN:HD22	2.32	0.41
1:B:353:VAL:O	1:B:357:LEU:HB2	2.20	0.41
1:A:166:THR:HB	2:A:400:NOV:HN11	1.86	0.40
1:A:116:GLY:HA2	1:B:22:ARG:NH2	2.36	0.40
1:A:333:GLU:CG	1:A:341:LEU:HD11	2.51	0.40
1:A:103:PHE:HB2	2:A:400:NOV:H10	2.03	0.40

There are no symmetry-related clashes.

5.3 Torsion angles (i)

5.3.1 Protein backbone (i)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	382/390 (98%)	363 (95%)	17 (4%)	2 (0%)	29	35
1	B	382/390 (98%)	356 (93%)	21 (6%)	5 (1%)	12	12
All	All	764/780 (98%)	719 (94%)	38 (5%)	7 (1%)	17	20

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	311	THR
1	A	336	THR
1	B	160	PRO
1	B	161	ARG
1	B	265	GLU
1	A	301	GLY

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Mol	Chain	Res	Type
1	B	310	PRO

5.3.2 Protein sidechains (i)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	303/308 (98%)	281 (93%)	22 (7%)	14	18
1	B	303/308 (98%)	281 (93%)	22 (7%)	14	18
All	All	606/616 (98%)	562 (93%)	44 (7%)	14	18

All (44) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	39	PHE
1	A	62	LEU
1	A	64	GLU
1	A	84	GLU
1	A	96	THR
1	A	179	ASN
1	A	180	LEU
1	A	191	LEU
1	A	201	LEU
1	A	213	GLU
1	A	214	GLU
1	A	219	LYS
1	A	225	PHE
1	A	252	VAL
1	A	281	HIS
1	A	299	LYS
1	A	315	LEU
1	A	336	THR
1	A	341	LEU
1	A	356	ARG
1	A	357	LEU
1	A	386	ARG

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Mol	Chain	Res	Type
1	B	30	THR
1	B	62	LEU
1	B	97	LEU
1	B	102	LYS
1	B	114	LEU
1	B	151	GLU
1	B	201	LEU
1	B	218	ASP
1	B	225	PHE
1	B	242	LEU
1	B	257	LEU
1	B	281	HIS
1	B	283	THR
1	B	291	ARG
1	B	299	LYS
1	B	309	GLN
1	B	319	LEU
1	B	327	LEU
1	B	340	LEU
1	B	355	GLU
1	B	357	LEU
1	B	361	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (20) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	21	HIS
1	A	36	HIS
1	A	45	ASN
1	A	95	ASN
1	A	179	ASN
1	A	210	HIS
1	A	247	HIS
1	A	281	HIS
1	A	295	GLN
1	A	335	GLN
1	A	351	GLN
1	A	380	GLN
1	B	45	ASN
1	B	73	ASN
1	B	209	GLN
1	B	210	HIS

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Mol	Chain	Res	Type
1	B	281	HIS
1	B	295	GLN
1	B	309	GLN
1	B	342	ASN

5.3.3 RNA

There are no RNA molecules in this entry.

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

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates

There are no monosaccharides in this entry.

5.6 Ligand geometry

4 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	NOV	B	444	-	47,47,47	1.42	7 (14%)	65,70,70	2.30	18 (27%)
3	FMT	B	441	-	2,2,2	3.11	2 (100%)	1,1,1	1.25	0
2	NOV	A	400	-	47,47,47	1.68	11 (23%)	65,70,70	2.28	22 (33%)
3	FMT	A	401	-	2,2,2	3.15	2 (100%)	1,1,1	1.33	0

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	NOV	B	444	-	-	4/23/46/46	0/4/4/4
2	NOV	A	400	-	-	4/23/46/46	0/4/4/4

All (22) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	400	NOV	O5-C28	5.42	1.52	1.44
3	A	401	FMT	O1-C	3.68	1.42	1.22
3	B	441	FMT	O1-C	3.65	1.42	1.22
2	A	400	NOV	O7-C31	-3.60	1.41	1.46
2	B	444	NOV	C9-C8	-3.43	1.40	1.45
2	A	400	NOV	C19-C14	3.22	1.44	1.39
2	B	444	NOV	O11-C6	3.22	1.28	1.21
2	A	400	NOV	C28-C27	3.15	1.58	1.52
2	A	400	NOV	O11-C6	2.95	1.27	1.21
2	B	444	NOV	O7-C31	-2.94	1.42	1.46
2	B	444	NOV	O5-C28	2.73	1.48	1.44
2	A	400	NOV	C31-C27	2.68	1.57	1.53
2	A	400	NOV	C17-C16	2.62	1.43	1.40
3	A	401	FMT	O2-C	2.51	1.41	1.28
3	B	441	FMT	O2-C	2.45	1.41	1.28
2	A	400	NOV	C7-C6	-2.45	1.37	1.45
2	B	444	NOV	O5-C12	2.33	1.40	1.35
2	A	400	NOV	O6-C29	-2.29	1.37	1.43
2	B	444	NOV	C19-C18	2.21	1.42	1.38
2	B	444	NOV	C13-N2	-2.21	1.34	1.37
2	A	400	NOV	O1-C27	-2.09	1.39	1.42
2	A	400	NOV	C11-C3	2.02	1.43	1.39

All (40) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	444	NOV	C28-O5-C12	9.19	130.35	117.03
2	A	400	NOV	C28-O5-C12	6.28	126.14	117.03
2	A	400	NOV	O5-C28-C27	6.16	121.73	108.17
2	B	444	NOV	O9-C8-C7	-6.11	114.96	123.19
2	A	400	NOV	O8-C30-C29	-5.34	99.37	107.16
2	B	444	NOV	O4-C12-N1	-5.30	117.22	125.58
2	B	444	NOV	C6-C7-N2	5.19	122.99	112.61
2	A	400	NOV	O9-C8-C7	-4.84	116.67	123.19
2	B	444	NOV	O8-C30-C29	-4.82	100.13	107.16
2	A	400	NOV	C14-C13-N2	4.35	122.52	116.25
2	B	444	NOV	O9-C8-C9	4.30	124.21	115.69

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	400	NOV	C6-C7-N2	4.22	121.05	112.61
2	A	400	NOV	C19-C18-C17	-3.58	116.92	120.50
2	B	444	NOV	O5-C12-N1	3.43	116.24	110.92
2	A	400	NOV	O10-C5-C4	3.33	118.90	114.89
2	B	444	NOV	C26-C31-C27	-3.32	106.12	111.91
2	A	400	NOV	C1-O1-C27	3.25	119.95	114.46
2	B	444	NOV	O7-C31-C27	3.19	112.80	107.67
2	A	400	NOV	O9-C8-C9	3.16	121.96	115.69
2	A	400	NOV	O10-C6-C7	3.08	121.89	116.84
2	A	400	NOV	O2-C13-N2	-2.98	117.93	122.27
2	A	400	NOV	O4-C12-N1	-2.97	120.90	125.58
2	A	400	NOV	C31-O7-C30	2.96	122.02	115.44
2	A	400	NOV	C20-C16-C15	-2.95	115.19	121.02
2	A	400	NOV	O10-C5-C9	-2.92	118.06	121.25
2	A	400	NOV	C20-C21-C22	-2.80	122.71	127.52
2	B	444	NOV	O10-C6-C7	2.76	121.37	116.84
2	B	444	NOV	C14-C13-N2	2.71	120.15	116.25
2	A	400	NOV	C7-N2-C13	2.64	130.93	122.98
2	B	444	NOV	O2-C13-N2	-2.61	118.47	122.27
2	A	400	NOV	C20-C16-C17	2.58	125.76	120.78
2	B	444	NOV	O10-C5-C4	2.57	117.99	114.89
2	A	400	NOV	O5-C12-O4	2.57	126.98	123.06
2	A	400	NOV	O5-C28-C29	2.55	113.61	107.76
2	B	444	NOV	O5-C28-C27	2.35	113.35	108.17
2	A	400	NOV	O7-C31-C27	2.30	111.37	107.67
2	B	444	NOV	O5-C12-O4	2.28	126.54	123.06
2	B	444	NOV	C29-C28-C27	-2.15	106.94	110.75
2	B	444	NOV	O10-C5-C9	-2.10	118.95	121.25
2	B	444	NOV	C5-O10-C6	-2.01	120.27	122.64

There are no chirality outliers.

All (8) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	400	NOV	O2-C13-N2-C7
2	A	400	NOV	C14-C13-N2-C7
2	B	444	NOV	O2-C13-N2-C7
2	B	444	NOV	C14-C13-N2-C7
2	A	400	NOV	C17-C16-C20-C21
2	A	400	NOV	C15-C16-C20-C21
2	B	444	NOV	N2-C13-C14-C19
2	B	444	NOV	O2-C13-C14-C19

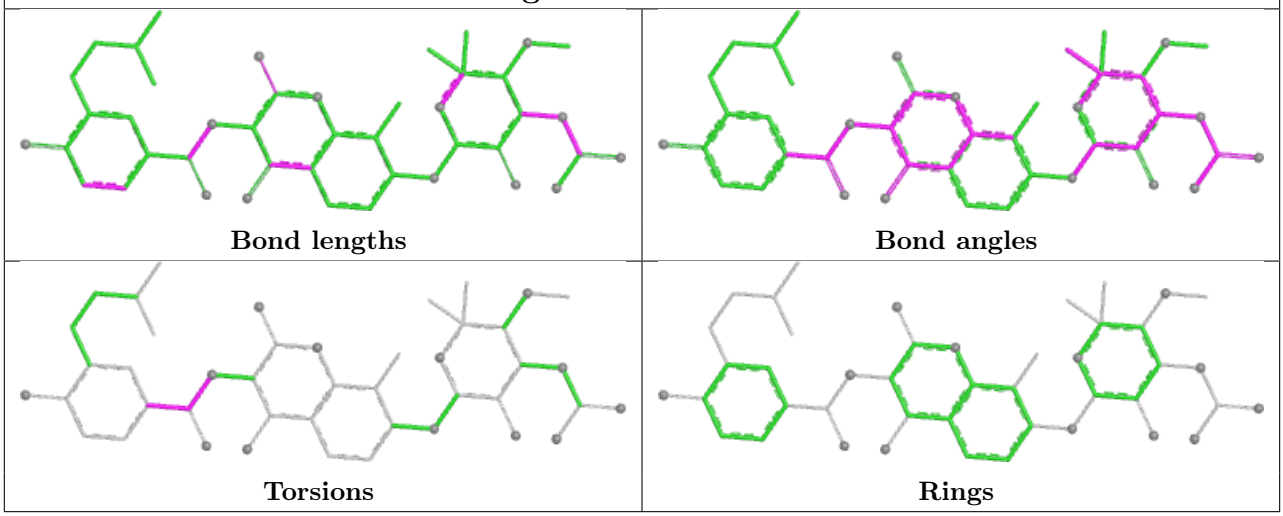
There are no ring outliers.

2 monomers are involved in 6 short contacts:

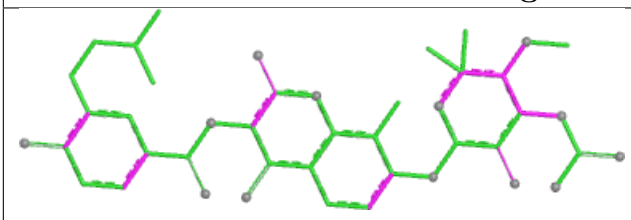
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	444	NOV	1	0
2	A	400	NOV	5	0

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.

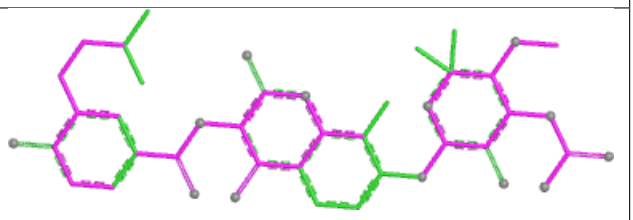
Ligand NOV B 444



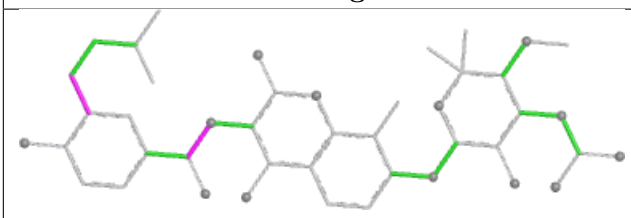
Ligand NOV A 400



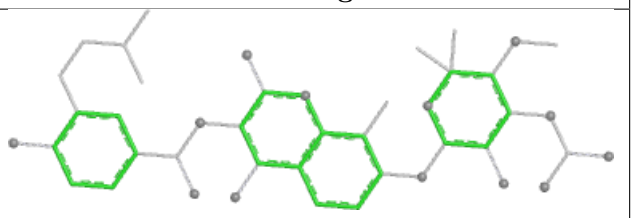
Bond lengths



Bond angles



Torsions



Rings

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, 95^{th} 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	384/390 (98%)	0.24	35 (9%)	9	12	7, 23, 49, 60	0
1	B	384/390 (98%)	0.33	30 (7%)	13	17	6, 23, 49, 58	0
All	All	768/780 (98%)	0.29	65 (8%)	10	14	6, 23, 49, 60	0

All (65) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	336	THR	6.9
1	A	306	LYS	6.5
1	A	335	GLN	6.5
1	A	262	TYR	5.3
1	B	161	ARG	5.3
1	B	308	PRO	5.2
1	B	231	GLU	4.9
1	B	307	GLY	4.8
1	B	210	HIS	4.7
1	B	337	LYS	4.4
1	B	305	GLU	4.4
1	B	311	THR	4.3
1	B	232	GLY	4.2
1	B	392	VAL	4.1
1	A	304	LYS	4.1
1	B	304	LYS	4.1
1	A	210	HIS	4.1
1	A	305	GLU	4.0
1	B	309	GLN	3.8
1	A	232	GLY	3.6
1	B	335	GLN	3.6
1	A	209	GLN	3.4
1	A	336	THR	3.4
1	A	390	GLU	3.3

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Mol	Chain	Res	Type	RSRZ
1	B	298	LYS	3.3
1	B	262	TYR	3.2
1	A	300	ALA	3.2
1	B	310	PRO	3.2
1	A	380	GLN	3.0
1	A	212	LYS	3.0
1	B	366	ARG	3.0
1	A	392	VAL	3.0
1	A	366	ARG	3.0
1	B	390	GLU	3.0
1	B	208	ARG	2.8
1	A	263	ASN	2.8
1	B	106	GLY	2.8
1	B	303	ASN	2.6
1	B	209	GLN	2.6
1	A	307	GLY	2.6
1	A	276	ARG	2.6
1	B	306	LYS	2.6
1	A	9	ALA	2.5
1	A	334	GLY	2.5
1	A	298	LYS	2.5
1	A	238	GLU	2.4
1	A	303	ASN	2.4
1	A	231	GLU	2.4
1	A	234	ASP	2.4
1	A	301	GLY	2.4
1	A	308	PRO	2.4
1	A	309	GLN	2.4
1	A	312	GLY	2.3
1	B	84	GLU	2.3
1	B	230	ALA	2.3
1	A	211	GLY	2.3
1	A	383	GLU	2.3
1	A	391	LEU	2.2
1	B	160	PRO	2.2
1	A	389	ARG	2.1
1	B	73	ASN	2.1
1	A	355	GLU	2.1
1	B	334	GLY	2.1
1	B	9	ALA	2.0
1	A	299	LYS	2.0

6.2 Non-standard residues in protein, DNA, RNA chains (i)

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates (i)

There are no monosaccharides in this entry.

6.4 Ligands (i)

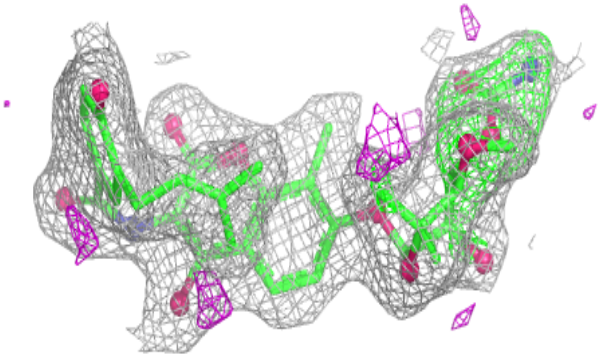
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

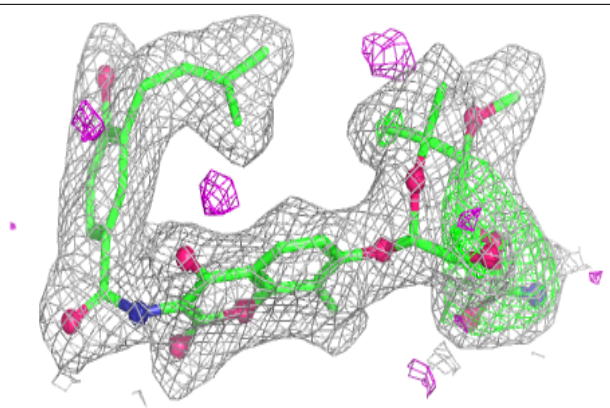
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	NOV	B	444	44/44	0.80	0.19	19,24,77,84	0
2	NOV	A	400	44/44	0.82	0.20	12,20,76,84	0
3	FMT	B	441	3/3	0.88	0.11	33,33,33,34	0
3	FMT	A	401	3/3	0.90	0.11	36,36,36,37	0

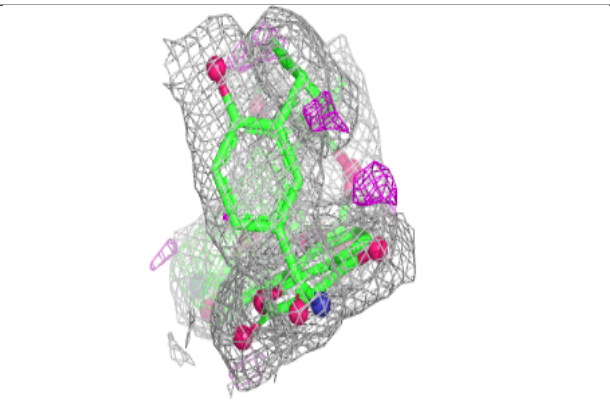
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around NOV B 444:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

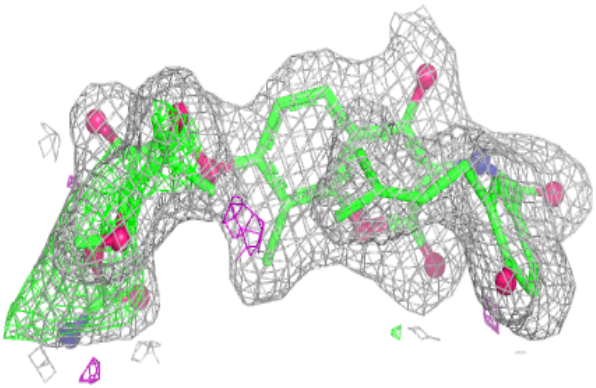


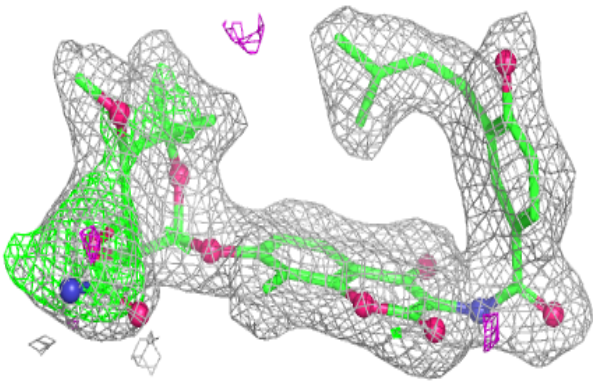


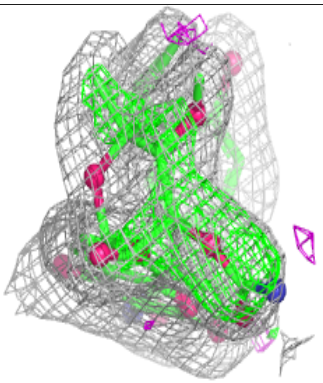


Electron density around NOV A 400:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)







6.5 Other polymers (i)

There are no such residues in this entry.