Full wwPDB X-ray Structure Validation Report ⓘ

Apr 28, 2025 – 07:27 PM EDT

PDB ID	:	4HXZ / pdb_00004hxz
Title	:	Pyrrolopyrimidine inhibitors of dna gyrase b and topoisomerase iv, part i: structure guided discovery and optimization of dual targeting agents with potent, broad-spectrum enzymatic activity.
Authors	:	Bensen, D.C.; Creighton, C.J.; Kwan, B.; Tari, L.W.
Deposited on	:	2012-11-12
Resolution	:	2.70 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

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

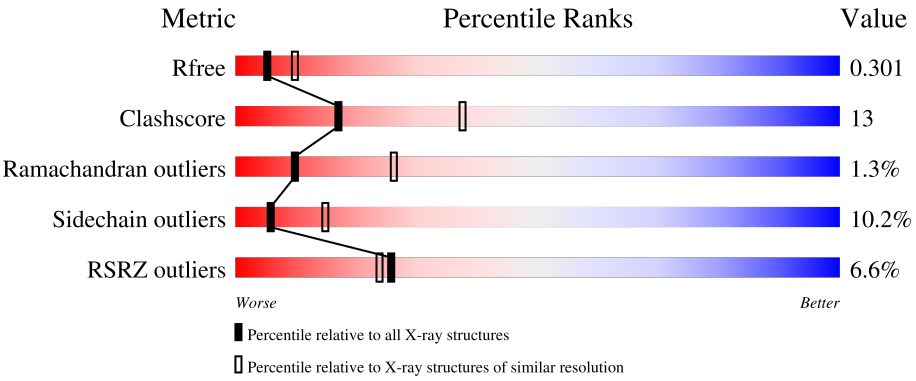
MolProbity	:	4-5-2 with Phenix2.0rc1
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0rc1
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.006 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.43.1

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 2.70 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	3333 (2.70-2.70)
Clashscore	180529	3684 (2.70-2.70)
Ramachandran outliers	177936	3633 (2.70-2.70)
Sidechain outliers	177891	3633 (2.70-2.70)
RSRZ outliers	164620	3333 (2.70-2.70)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=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	3% 69% 19% 5% 6%
1	B	390	8% 48% 22% • 27%

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 5360 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.

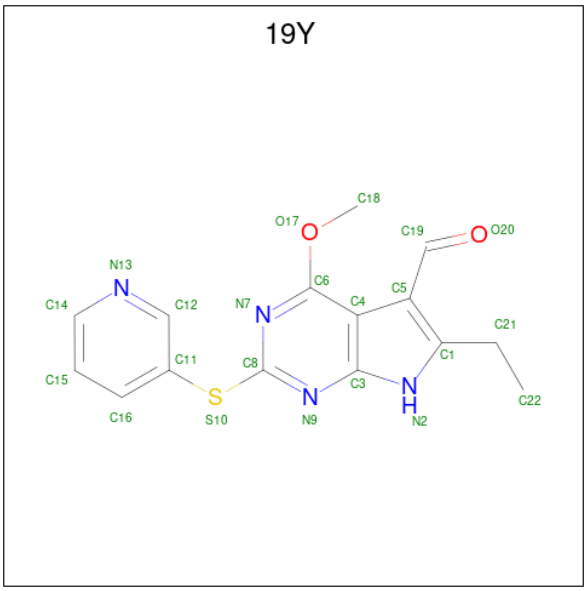
- Molecule 1 is a protein called Topoisomerase IV, subunit B.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	366	Total	C	N	O	S	0	0	0
			2891	1842	485	557	7			
1	B	284	Total	C	N	O	S	0	0	0
			2253	1440	378	429	6			

There are 18 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	258	PRO	LEU	SEE REMARK 999	UNP Q2A1P5
A	383	LEU	-	expression tag	UNP Q2A1P5
A	384	GLU	-	expression tag	UNP Q2A1P5
A	385	HIS	-	expression tag	UNP Q2A1P5
A	386	HIS	-	expression tag	UNP Q2A1P5
A	387	HIS	-	expression tag	UNP Q2A1P5
A	388	HIS	-	expression tag	UNP Q2A1P5
A	389	HIS	-	expression tag	UNP Q2A1P5
A	390	HIS	-	expression tag	UNP Q2A1P5
B	258	PRO	LEU	SEE REMARK 999	UNP Q2A1P5
B	383	LEU	-	expression tag	UNP Q2A1P5
B	384	GLU	-	expression tag	UNP Q2A1P5
B	385	HIS	-	expression tag	UNP Q2A1P5
B	386	HIS	-	expression tag	UNP Q2A1P5
B	387	HIS	-	expression tag	UNP Q2A1P5
B	388	HIS	-	expression tag	UNP Q2A1P5
B	389	HIS	-	expression tag	UNP Q2A1P5
B	390	HIS	-	expression tag	UNP Q2A1P5

- Molecule 2 is 6-ethyl-4-methoxy-2-(pyridin-3-ylsulfanyl)-7H-pyrrolo[2,3-d]pyrimidine-5-carb aldehyde (CCD ID: 19Y) (formula: $C_{15}H_{14}N_4O_2S$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	S	0	0
			22	15	4	2	1		
2	B	1	Total	C	N	O	S	0	0
			22	15	4	2	1		

- Molecule 3 is water.

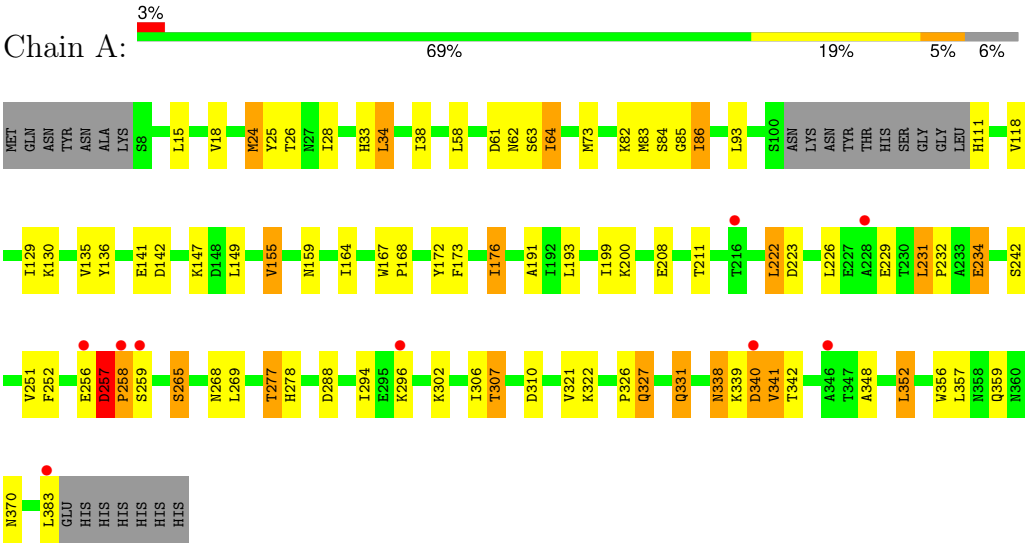
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	110	Total	O	0	0
			110	110		
3	B	62	Total	O	0	0
			62	62		

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.

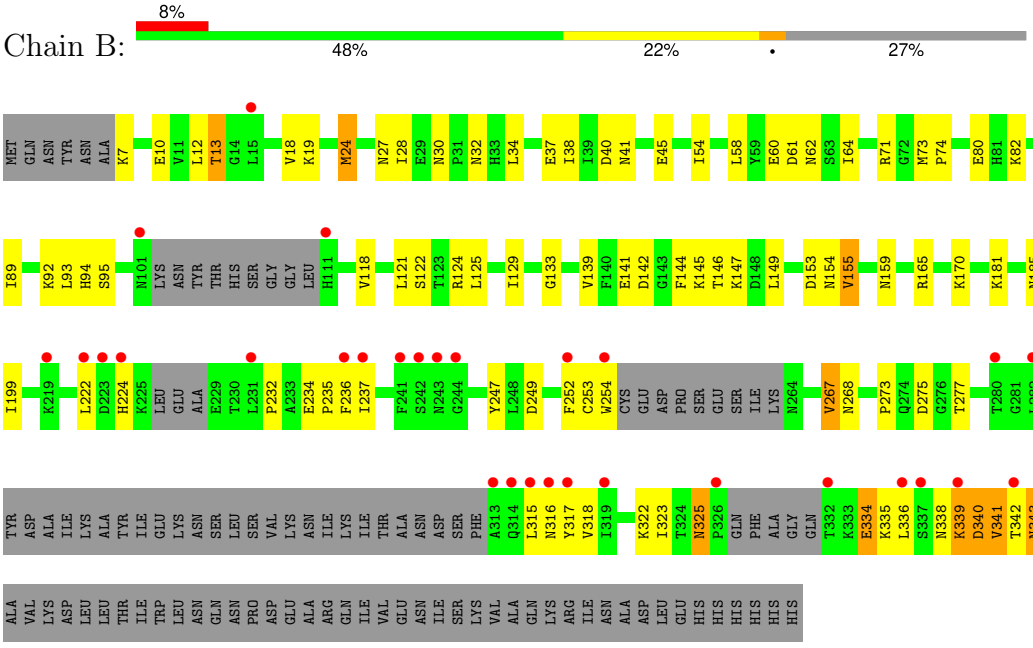
• Molecule 1: Topoisomerase IV, subunit B

Chain A:



• Molecule 1: Topoisomerase IV, 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	44.12Å 162.87Å 77.41Å 90.00° 92.71° 90.00°	Depositor
Resolution (Å)	40.72 – 2.70 40.72 – 2.70	Depositor EDS
% Data completeness (in resolution range)	97.0 (40.72-2.70) 97.0 (40.72-2.70)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.20 (at 2.69Å)	Xtriage
Refinement program	REFMAC 5.6.0117	Depositor
R, R_{free}	0.240 , 0.303 0.239 , 0.301	Depositor DCC
R_{free} test set	1519 reflections (5.04%)	wwPDB-VP
Wilson B-factor (Å^2)	40.7	Xtriage
Anisotropy	0.135	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.31 , 37.5	EDS
L-test for twinning[2]	$< \|L\| > = 0.51$, $< L^2 > = 0.35$	Xtriage
Estimated twinning fraction	0.095 for h,-k,-l	Xtriage
F_o,F_c correlation	0.91	EDS
Total number of atoms	5360	wwPDB-VP
Average B, all atoms (Å^2)	43.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.20% 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: 19Y

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	0.79	1/2944 (0.0%)	1.00	2/3982 (0.1%)
1	B	0.78	0/2294	0.93	0/3094
All	All	0.79	1/5238 (0.0%)	0.97	2/7076 (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	245	ASP	CA-C	5.04	1.59	1.52

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	302	LYS	N-CA-C	6.40	119.24	111.82
1	A	252	PHE	N-CA-C	5.80	117.92	108.76

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	257	ASP	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	2891	0	2912	68	0
1	B	2253	0	2262	61	0
2	A	22	0	14	2	0
2	B	22	0	14	5	0
3	A	110	0	0	5	0
3	B	62	0	0	6	0
All	All	5360	0	5202	130	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 13.

All (130) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:252:PHE:HD2	1:B:315:LEU:HD11	1.21	1.03
1:B:73:MET:HB2	1:B:129:ILE:CD1	1.94	0.98
1:A:245:ASP:N	1:A:246:SER:HA	1.79	0.97
1:B:254:TRP:HE3	3:B:1549:HOH:O	1.56	0.89
1:A:245:ASP:H	1:A:246:SER:HA	1.39	0.86
1:A:366:GLN:O	1:A:370:ASN:ND2	2.07	0.86
1:B:73:MET:HE2	1:B:86:ILE:HG12	1.57	0.85
1:B:73:MET:HB2	1:B:129:ILE:HD13	1.59	0.83
1:A:277:THR:HB	1:A:341:VAL:HG13	1.60	0.82
1:B:73:MET:HB2	1:B:129:ILE:HD11	1.59	0.82
1:B:252:PHE:CD2	1:B:315:LEU:HD11	2.12	0.79
1:A:24:MET:HE3	1:A:24:MET:HA	1.66	0.78
1:A:256:GLU:O	1:A:258:PRO:HD2	1.85	0.77
1:A:331:GLN:HE21	1:A:331:GLN:HA	1.51	0.76
1:A:338:ASN:O	1:A:341:VAL:HG12	1.87	0.74
1:A:28:ILE:HG23	1:A:172:TYR:O	1.88	0.74
1:A:339:LYS:O	1:A:340:ASP:HB2	1.90	0.71
1:B:80:GLU:O	1:B:82:LYS:HG2	1.90	0.70
1:A:111:HIS:CD2	3:A:1591:HOH:O	2.44	0.69
1:A:247:TYR:HB2	1:A:322:LYS:HB2	1.77	0.66
1:A:296:LYS:HA	3:A:1576:HOH:O	1.94	0.66

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:19:LYS:NZ	1:B:142:ASP:O	2.29	0.66
1:A:246:SER:HB3	1:A:247:TYR:CD2	2.32	0.64
1:B:73:MET:CE	1:B:86:ILE:HG12	2.28	0.63
1:B:73:MET:HE3	1:B:89:ILE:HD12	1.81	0.63
1:B:18:VAL:HG23	1:B:93:LEU:HD11	1.80	0.63
1:A:155:VAL:HG13	1:A:159:ASN:HB3	1.80	0.63
1:B:85:GLY:O	1:B:89:ILE:HG13	1.99	0.62
1:B:275:ASP:O	1:B:335:LYS:HA	2.02	0.60
1:B:86:ILE:CG2	1:B:87:GLU:N	2.64	0.60
1:A:18:VAL:HG23	1:A:93:LEU:HD11	1.84	0.60
1:A:245:ASP:N	1:A:246:SER:CA	2.62	0.59
1:A:231:LEU:HD22	1:A:367:ILE:HG13	1.84	0.58
1:A:86:ILE:HD12	1:A:129:ILE:HD13	1.86	0.58
1:A:164:ILE:HD12	2:A:1401:19Y:H3	1.85	0.58
1:B:232:PRO:HD3	3:B:1549:HOH:O	2.03	0.58
1:A:63:SER:C	1:A:64:ILE:HD13	2.29	0.57
1:B:343:ASN:H	1:B:343:ASN:ND2	2.02	0.57
1:B:41:ASN:HB3	2:B:1401:19Y:C5	2.35	0.56
1:A:24:MET:HA	1:A:24:MET:CE	2.35	0.56
1:A:307:THR:HG22	1:A:310:ASP:CG	2.31	0.56
1:B:155:VAL:HG13	1:B:159:ASN:HB3	1.88	0.55
1:B:86:ILE:HG22	1:B:87:GLU:H	1.71	0.55
1:B:247:TYR:HB2	1:B:322:LYS:HB2	1.89	0.54
1:B:267:VAL:HG11	1:B:336:LEU:HD13	1.90	0.54
1:B:74:PRO:HD3	2:B:1401:19Y:C12	2.39	0.53
1:B:181:LYS:NZ	1:B:185:ASN:HD21	2.07	0.53
1:A:26:THR:HG23	1:A:28:ILE:HD13	1.91	0.52
1:A:62:ASN:ND2	1:A:176:ILE:HD13	2.25	0.52
1:A:340:ASP:H	1:A:342:THR:HG22	1.76	0.51
1:B:18:VAL:CG2	1:B:93:LEU:HD11	2.40	0.51
1:A:73:MET:HG2	2:A:1401:19Y:C6	2.41	0.51
1:B:122:SER:HB3	1:B:124:ARG:O	2.11	0.50
1:B:13:THR:O	1:B:92:LYS:HB3	2.11	0.50
1:A:277:THR:HG22	1:A:342:THR:HB	1.93	0.50
1:A:307:THR:HG22	1:A:310:ASP:OD2	2.11	0.50
1:B:60:GLU:HG2	3:B:1543:HOH:O	2.11	0.50
1:B:125:LEU:C	1:B:125:LEU:HD23	2.36	0.49
1:B:37:GLU:O	1:B:40:ASP:HB2	2.12	0.49
1:B:133:GLY:HA2	1:B:155:VAL:HG12	1.95	0.49
1:A:15:LEU:HD13	1:A:120:ALA:HB2	1.95	0.48
1:A:34:LEU:HD22	1:A:173:PHE:CZ	2.48	0.48

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:144:PHE:O	1:B:146:THR:HG23	2.13	0.48
1:A:231:LEU:HD23	1:A:232:PRO:HA	1.94	0.48
1:A:123:THR:HB	3:A:1573:HOH:O	2.13	0.48
1:B:24:MET:HE3	1:B:24:MET:HA	1.96	0.48
2:B:1401:19Y:N13	3:B:1561:HOH:O	2.35	0.48
1:B:38:ILE:HD11	1:B:118:VAL:HG11	1.95	0.48
1:B:236:PHE:CD1	1:B:252:PHE:HE1	2.32	0.48
1:A:348:ALA:O	1:A:352:LEU:HB2	2.14	0.47
1:A:200:LYS:HG2	1:A:211:THR:HG23	1.95	0.47
1:B:45:GLU:OE1	1:B:71:ARG:HB2	2.15	0.47
1:A:155:VAL:HG22	1:A:159:ASN:HD22	1.78	0.47
1:A:193:LEU:HD12	1:A:269:LEU:HG	1.96	0.47
1:A:268:ASN:ND2	1:A:326:PRO:HG3	2.29	0.47
1:B:61:ASP:O	1:B:62:ASN:HB2	2.14	0.47
1:A:232:PRO:HG3	1:A:356:TRP:CH2	2.50	0.47
1:B:87:GLU:OE2	1:B:145:LYS:NZ	2.45	0.46
1:A:18:VAL:HA	1:A:25:TYR:CD2	2.51	0.46
1:A:18:VAL:CG2	1:A:93:LEU:HD11	2.46	0.46
1:B:73:MET:HE2	1:B:73:MET:HB3	1.81	0.46
1:B:54:ILE:HD12	1:B:197:LEU:HD11	1.97	0.46
1:A:64:ILE:HD13	1:A:64:ILE:N	2.31	0.46
1:B:86:ILE:HG13	1:B:129:ILE:HD12	1.98	0.46
1:A:257:ASP:C	1:A:259:SER:N	2.74	0.45
1:A:38:ILE:HD11	1:A:118:VAL:HG11	1.98	0.45
1:A:26:THR:HG23	1:A:28:ILE:CD1	2.46	0.45
1:A:141:GLU:O	1:A:142:ASP:C	2.60	0.45
1:A:242:SER:CB	1:A:246:SER:O	2.65	0.45
1:B:153:ASP:OD1	1:B:154:ASN:N	2.51	0.44
1:A:136:TYR:HB3	1:A:149:LEU:HD11	1.98	0.44
1:A:339:LYS:O	1:A:340:ASP:CB	2.63	0.44
1:B:339:LYS:C	1:B:341:VAL:H	2.26	0.44
1:B:30:ASN:OD1	1:B:32:ASN:HB2	2.18	0.43
1:B:19:LYS:HE3	3:B:1562:HOH:O	2.19	0.43
1:B:64:ILE:O	1:B:165:ARG:HA	2.18	0.43
1:B:27:ASN:OD1	1:B:28:ILE:N	2.51	0.43
1:B:88:LEU:O	1:B:94:HIS:CE1	2.72	0.43
1:B:139:VAL:HB	1:B:147:LYS:HB3	2.01	0.43
1:A:191:ALA:HB2	1:A:199:ILE:HD12	2.00	0.43
1:B:252:PHE:HA	1:B:316:ASN:O	2.19	0.43
1:A:34:LEU:CD2	1:A:173:PHE:CZ	3.02	0.42
1:A:234:GLU:CD	3:A:1588:HOH:O	2.62	0.42

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:84:SER:O	1:A:85:GLY:C	2.62	0.42
1:B:325:ASN:HD22	1:B:325:ASN:HA	1.61	0.42
1:A:28:ILE:HD13	1:A:28:ILE:HA	1.82	0.42
1:A:222:LEU:HD22	1:A:251:VAL:HG13	2.00	0.42
1:A:327:GLN:N	1:A:338:ASN:OD1	2.48	0.42
1:B:235:PRO:HB3	1:B:253:CYS:HB3	2.01	0.42
1:B:268:ASN:OD1	1:B:322:LYS:HA	2.20	0.42
1:A:222:LEU:O	1:A:223:ASP:C	2.62	0.42
1:B:273:PRO:HD2	1:B:334:GLU:HG3	2.02	0.42
1:A:167:TRP:O	1:A:168:PRO:C	2.62	0.41
1:B:222:LEU:C	1:B:224:HIS:H	2.28	0.41
1:A:277:THR:HB	1:A:341:VAL:CG1	2.41	0.41
1:B:28:ILE:HD13	1:B:28:ILE:HA	1.97	0.41
1:B:38:ILE:HG23	2:B:1401:19Y:H3	2.02	0.41
1:B:254:TRP:CE3	3:B:1549:HOH:O	2.45	0.41
1:B:73:MET:HG2	2:B:1401:19Y:C6	2.51	0.41
1:A:111:HIS:HD2	3:A:1591:HOH:O	1.94	0.41
1:A:130:LYS:HG2	1:A:135:VAL:HG22	2.03	0.41
1:B:317:TYR:O	1:B:318:VAL:HG23	2.20	0.41
1:A:34:LEU:CD2	1:A:173:PHE:HZ	2.33	0.41
1:A:265:SER:HB2	1:A:278:HIS:NE2	2.37	0.40
1:A:33:HIS:O	1:A:34:LEU:C	2.64	0.40
1:A:176:ILE:H	1:A:176:ILE:HG13	1.78	0.40
1:A:265:SER:HB2	1:A:278:HIS:HE2	1.86	0.40
1:A:61:ASP:O	1:A:62:ASN:HB2	2.21	0.40
1:A:231:LEU:HA	1:A:232:PRO:C	2.46	0.40
1:B:141:GLU:HB2	1:B:146:THR:HG21	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	362/390 (93%)	325 (90%)	31 (9%)	6 (2%)	7 20
1	B	272/390 (70%)	243 (89%)	27 (10%)	2 (1%)	19 42
All	All	634/780 (81%)	568 (90%)	58 (9%)	8 (1%)	10 26

All (8) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	257	ASP
1	A	258	PRO
1	A	288	ASP
1	A	340	ASP
1	B	338	ASN
1	A	338	ASN
1	B	340	ASP
1	A	83	MET

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	323/344 (94%)	293 (91%)	30 (9%)	7 18
1	B	253/344 (74%)	224 (88%)	29 (12%)	4 11
All	All	576/688 (84%)	517 (90%)	59 (10%)	6 15

All (59) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	24	MET
1	A	34	LEU
1	A	58	LEU
1	A	64	ILE
1	A	82	LYS
1	A	86	ILE
1	A	121	LEU
1	A	123	THR

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	A	147	LYS
1	A	155	VAL
1	A	176	ILE
1	A	208	GLU
1	A	222	LEU
1	A	226	LEU
1	A	229	GLU
1	A	231	LEU
1	A	234	GLU
1	A	265	SER
1	A	277	THR
1	A	294	ILE
1	A	306	ILE
1	A	307	THR
1	A	321	VAL
1	A	327	GLN
1	A	331	GLN
1	A	341	VAL
1	A	352	LEU
1	A	357	LEU
1	A	359	GLN
1	A	383	LEU
1	B	7	LYS
1	B	10	GLU
1	B	12	LEU
1	B	13	THR
1	B	24	MET
1	B	34	LEU
1	B	58	LEU
1	B	86	ILE
1	B	95	SER
1	B	121	LEU
1	B	149	LEU
1	B	155	VAL
1	B	170	LYS
1	B	186	LEU
1	B	199	ILE
1	B	234	GLU
1	B	237	ILE
1	B	249	ASP
1	B	267	VAL
1	B	277	THR

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	B	284	ASN
1	B	323	ILE
1	B	325	ASN
1	B	334	GLU
1	B	339	LYS
1	B	340	ASP
1	B	341	VAL
1	B	342	THR
1	B	343	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (13) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	137	HIS
1	A	274	GLN
1	A	303	ASN
1	A	327	GLN
1	A	331	GLN
1	A	358	ASN
1	A	380	ASN
1	B	134	ASN
1	B	137	HIS
1	B	185	ASN
1	B	325	ASN
1	B	338	ASN
1	B	343	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 oligosaccharides in this entry.

5.6 Ligand geometry (i)

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	19Y	A	1401	-	21,24,24	2.26	9 (42%)	20,33,33	2.56	7 (35%)
2	19Y	B	1401	-	21,24,24	2.48	7 (33%)	20,33,33	2.53	6 (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
2	19Y	A	1401	-	-	5/7/10/10	0/3/3/3
2	19Y	B	1401	-	-	3/7/10/10	0/3/3/3

All (16) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	1401	19Y	C5-C1	8.08	1.48	1.38
2	A	1401	19Y	C5-C1	7.42	1.47	1.38
2	B	1401	19Y	C8-S10	-3.96	1.70	1.76
2	B	1401	19Y	C11-S10	-3.40	1.71	1.77
2	A	1401	19Y	C11-S10	-3.22	1.71	1.77
2	B	1401	19Y	C5-C19	3.09	1.51	1.45
2	B	1401	19Y	C6-C4	2.83	1.48	1.42
2	A	1401	19Y	C6-N7	2.83	1.36	1.31
2	A	1401	19Y	C6-C4	2.57	1.48	1.42
2	A	1401	19Y	C8-N9	2.44	1.37	1.34
2	A	1401	19Y	C8-S10	-2.24	1.72	1.76
2	B	1401	19Y	C4-C3	2.22	1.48	1.43
2	A	1401	19Y	C5-C19	2.17	1.49	1.45
2	B	1401	19Y	C6-N7	2.13	1.35	1.31
2	A	1401	19Y	C8-N7	2.09	1.37	1.34

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1401	19Y	C4-C3	2.04	1.48	1.43

All (13) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	1401	19Y	C8-N7-C6	5.96	124.02	115.69
2	B	1401	19Y	O17-C6-C4	5.90	123.70	116.00
2	B	1401	19Y	C8-N7-C6	5.20	122.95	115.69
2	B	1401	19Y	C5-C4-C3	-4.92	103.61	107.54
2	A	1401	19Y	O17-C6-C4	4.71	122.15	116.00
2	A	1401	19Y	C5-C4-C3	-4.50	103.94	107.54
2	A	1401	19Y	N9-C8-N7	-3.79	120.09	127.03
2	A	1401	19Y	C8-S10-C11	3.18	108.53	102.76
2	B	1401	19Y	C22-C21-C1	-3.03	106.42	114.59
2	B	1401	19Y	C14-N13-C12	2.94	122.00	116.85
2	B	1401	19Y	N9-C8-N7	-2.88	121.75	127.03
2	A	1401	19Y	C21-C1-C5	-2.71	126.96	130.31
2	A	1401	19Y	C5-C1-N2	-2.67	105.82	110.30

There are no chirality outliers.

All (8) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	1401	19Y	C5-C1-C21-C22
2	A	1401	19Y	C4-C6-O17-C18
2	A	1401	19Y	N7-C6-O17-C18
2	B	1401	19Y	C4-C6-O17-C18
2	B	1401	19Y	N7-C6-O17-C18
2	A	1401	19Y	C16-C11-S10-C8
2	B	1401	19Y	N9-C8-S10-C11
2	A	1401	19Y	C12-C11-S10-C8

There are no ring outliers.

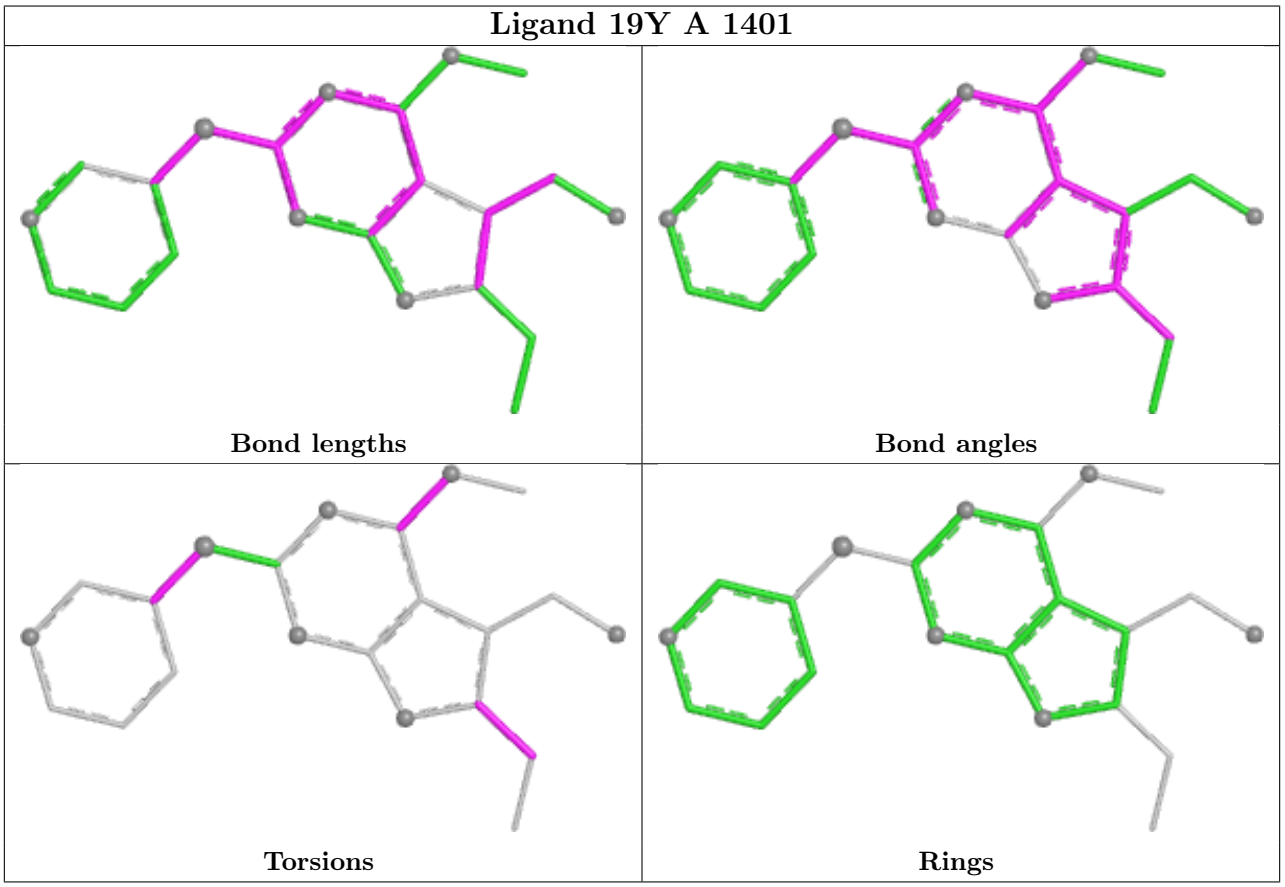
2 monomers are involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	1401	19Y	2	0
2	B	1401	19Y	5	0

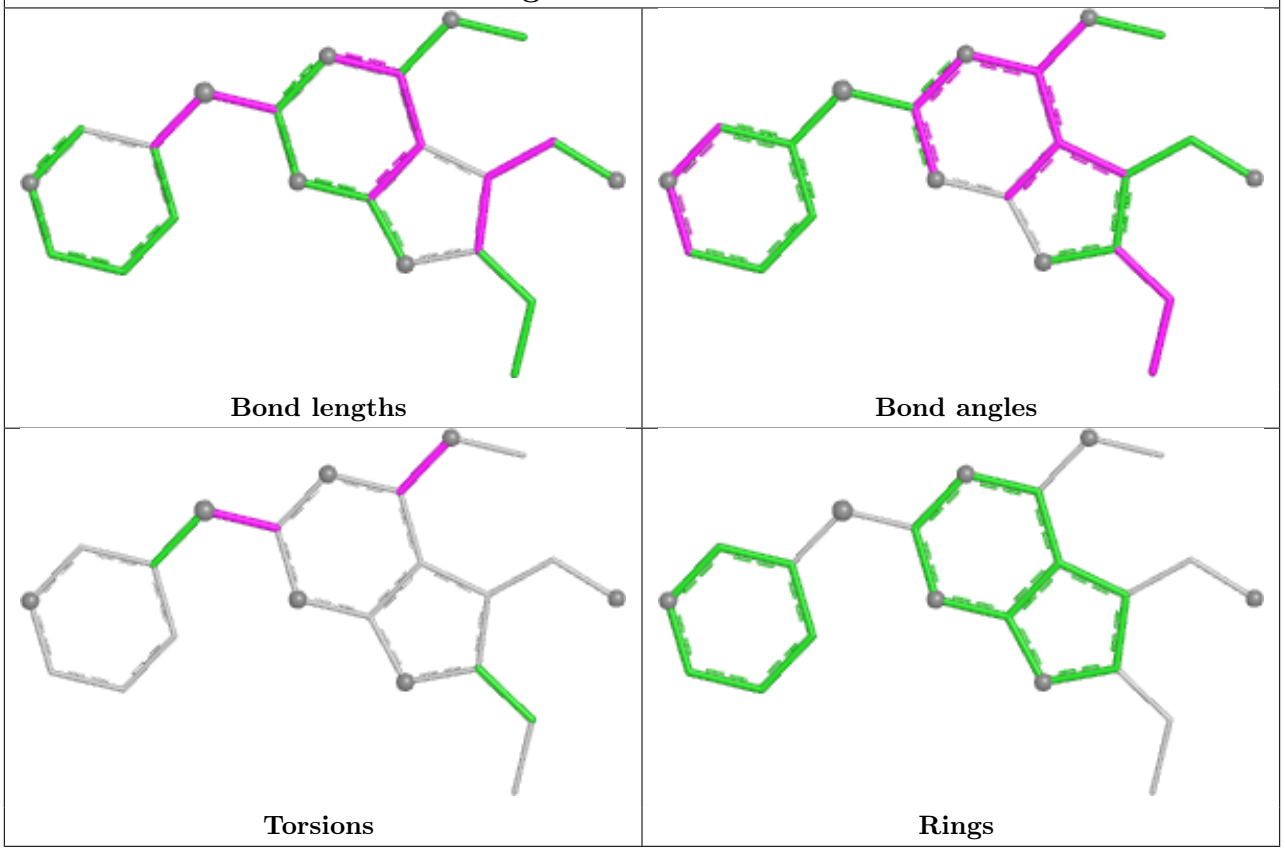
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In

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 19Y A 1401



Ligand 19Y B 1401



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	366/390 (93%)	0.00	12 (3%)	49	47	16, 33, 71, 105	0
1	B	284/390 (72%)	0.54	31 (10%)	12	11	22, 41, 94, 114	0
All	All	650/780 (83%)	0.24	43 (6%)	26	24	16, 38, 89, 114	0

All (43) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	316	ASN	6.3
1	A	383	LEU	6.2
1	B	237	ILE	5.6
1	B	344	PHE	5.3
1	A	258	PRO	4.8
1	B	231	LEU	4.1
1	B	222	LEU	4.1
1	B	332	THR	3.9
1	A	244	GLY	3.9
1	B	313	ALA	3.7
1	B	244	GLY	3.6
1	B	243	ASN	3.6
1	B	315	LEU	3.5
1	B	252	PHE	3.3
1	B	101	ASN	3.1
1	A	228	ALA	3.0
1	B	242	SER	3.0
1	A	216	THR	2.9
1	B	337	SER	2.9
1	B	111	HIS	2.8
1	B	280	THR	2.8
1	A	259	SER	2.7
1	B	339	LYS	2.7
1	B	236	PHE	2.6

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	B	223	ASP	2.5
1	A	296	LYS	2.4
1	A	340	ASP	2.4
1	B	241	PHE	2.3
1	B	314	GLN	2.3
1	A	361	PRO	2.3
1	B	224	HIS	2.3
1	B	282	LEU	2.3
1	A	256	GLU	2.2
1	B	342	THR	2.2
1	B	319	ILE	2.2
1	B	15	LEU	2.2
1	B	336	LEU	2.2
1	B	317	TYR	2.2
1	A	346	ALA	2.2
1	B	254	TRP	2.1
1	B	326	PRO	2.1
1	B	219	LYS	2.1
1	A	245	ASP	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.

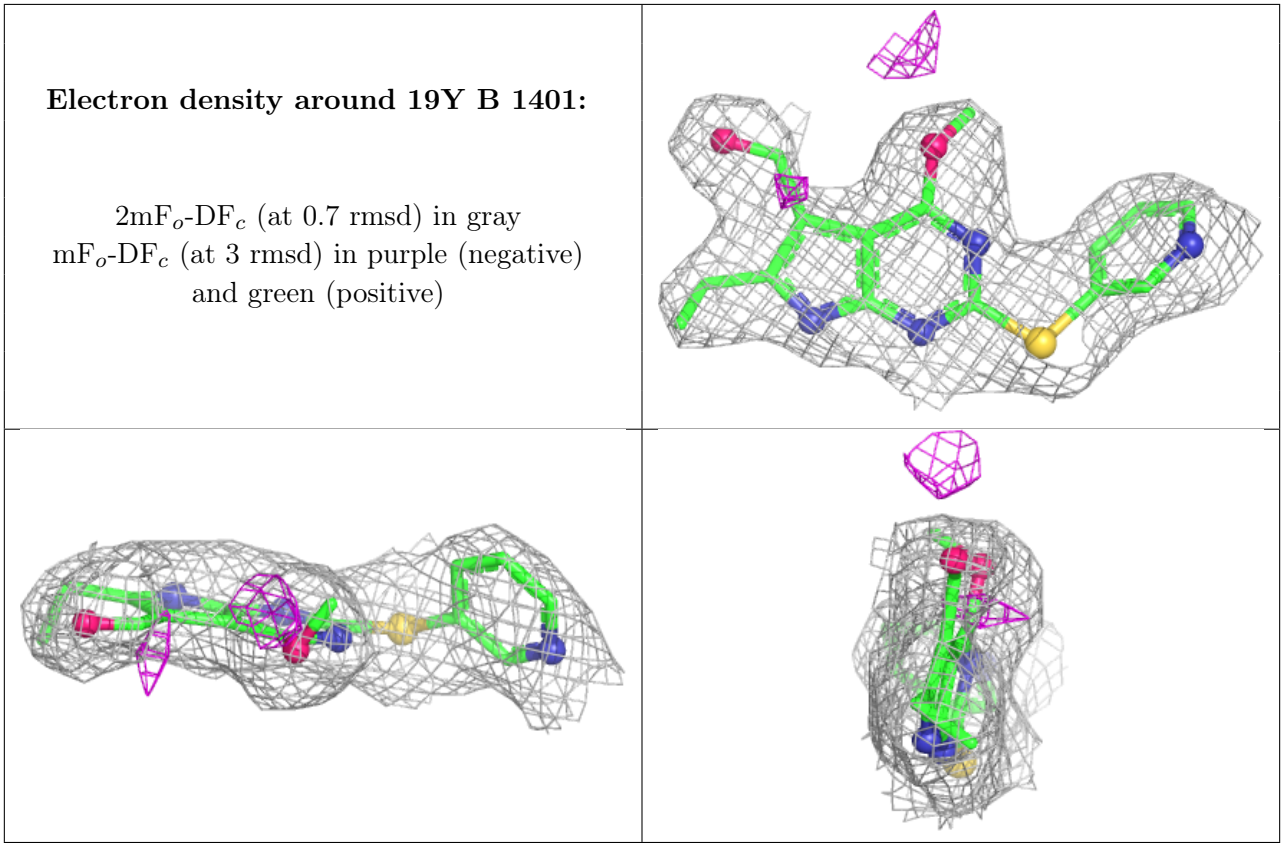
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	19Y	B	1401	22/22	0.94	0.10	31,41,45,47	0
2	19Y	A	1401	22/22	0.95	0.09	22,26,31,32	0

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.

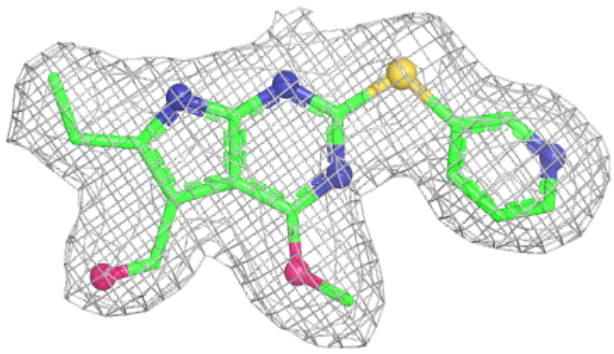
Electron density around 19Y B 1401:

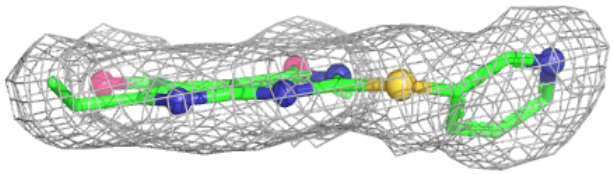
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

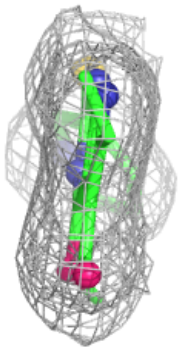


Electron density around 19Y A 1401:

$2mF_o$-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

There are no such residues in this entry.