



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 10:52 AM UTC

PDB ID : 9D4B / pdb\_00009d4b  
Title : Discovery of SMD-3236, a Potent, Highly Selective and Efficacious SMARCA2 Degradar for the Treatment of SMARCA4-Deficient Human Cancers  
Authors : Strickland, C.  
Deposited on : 2024-08-12  
Resolution : 3.30 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](mailto: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>.

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

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

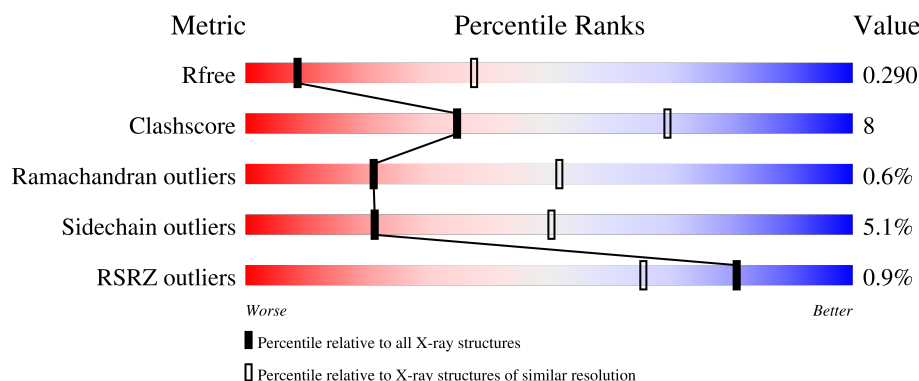
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.30 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))
$R_{free}$	180053	1169 (3.32-3.28)
Clashscore	190562	1209 (3.32-3.28)
Ramachandran outliers	187476	1188 (3.32-3.28)
Sidechain outliers	187428	1187 (3.32-3.28)
RSRZ outliers	180081	1169 (3.32-3.28)

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  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . 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	161	<div> <div>73%</div> <div>16%</div> <div>•</div> <div>9%</div> </div>
1	D	161	<div> <div>%</div> <div>64%</div> <div>25%</div> <div>•</div> <div>9%</div> </div>
2	B	104	<div> <div>%</div> <div>74%</div> <div>24%</div> <div>•</div> </div>
2	E	104	<div> <div>3%</div> <div>70%</div> <div>29%</div> <div>•</div> </div>
3	C	96	<div> <div>%</div> <div>75%</div> <div>10%</div> <div>•</div> <div>10%</div> </div>

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Mol	Chain	Length	Quality of chain
3	F	96	<div><div></div><div>75%</div><div>11%</div><div>•</div><div>10%</div></div>
4	G	123	<div><div></div><div>76%</div><div>15%</div><div>•</div><div>8%</div></div>
4	H	123	<div><div>2%</div><div></div><div>84%</div><div>8%</div><div>8%</div></div>

## 2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 7428 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 von Hippel-Lindau disease tumor suppressor.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	147	Total	C	N	O	S	0	0	0
			1202	764	220	216	2			
1	D	147	Total	C	N	O	S	0	0	0
			1202	764	220	216	2			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	53	GLY	-	expression tag	UNP P40337
D	53	GLY	-	expression tag	UNP P40337

- Molecule 2 is a protein called Elongin-B.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	104	Total	C	N	O	S	0	0	0
			816	517	135	159	5			
2	E	104	Total	C	N	O	S	0	0	0
			822	520	138	159	5			

- Molecule 3 is a protein called Elongin-C.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	C	86	Total	C	N	O	S	0	0	0
			688	444	110	128	6			
3	F	86	Total	C	N	O	S	0	0	0
			682	441	107	128	6			

- Molecule 4 is a protein called Probable global transcription activator SNF2L2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	G	113	Total	C	N	O	S	0	0	0
			930	592	164	171	3			

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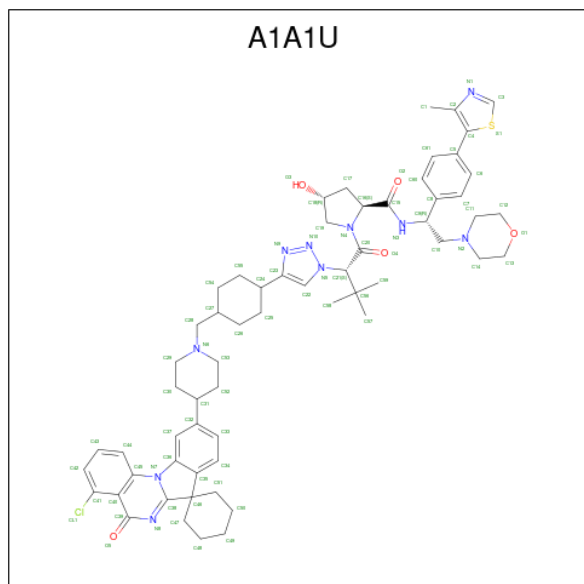
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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	H	113	Total	C	N	O	S	0	0	0
			930	592	164	171	3			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
G	1371	SER	-	expression tag	UNP B4DNT1
G	1372	MET	-	expression tag	UNP B4DNT1
H	1371	SER	-	expression tag	UNP B4DNT1
H	1372	MET	-	expression tag	UNP B4DNT1

- Molecule 5 is (4R)-1-[(2S)-2-{4-[(1S,4S)-4-({4-[(12'S)-4'-chloro-5'-oxo-5'H-spiro[cyclohexane-1,7'-indolo[1,2-a]quinazolin]-10'-yl]piperidin-1-yl}methyl)cyclohexyl]-1H-1,2,3-triazol-1-yl}-3,3-dimethylbutanoyl]-4-hydroxy-N-[(1R)-1-[4-(4-methyl-1,3-thiazol-5-yl)phenyl]-2-(morpholin-4-yl)ethyl]-L-prolinamide (CCD ID: A1A1U) (formula: C<sub>61</sub>H<sub>75</sub>ClN<sub>10</sub>O<sub>5</sub>S) (labeled as "Ligand of Interest" by depositor).

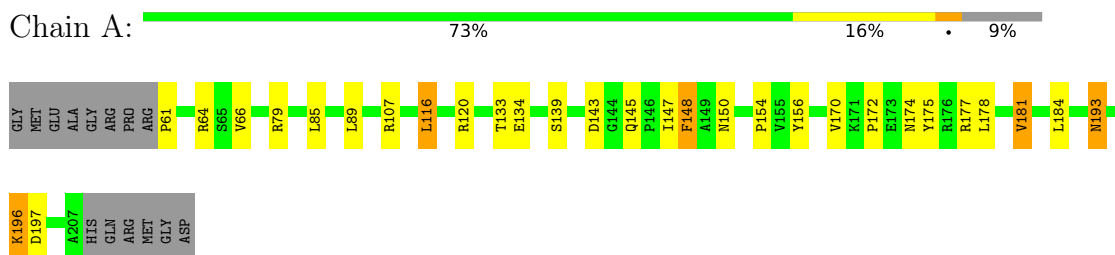


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
5	A	1	Total 78	C 61	Cl 1	N 10	O 5	S 1	0	0
5	D	1	Total 78	C 61	Cl 1	N 10	O 5	S 1	0	0

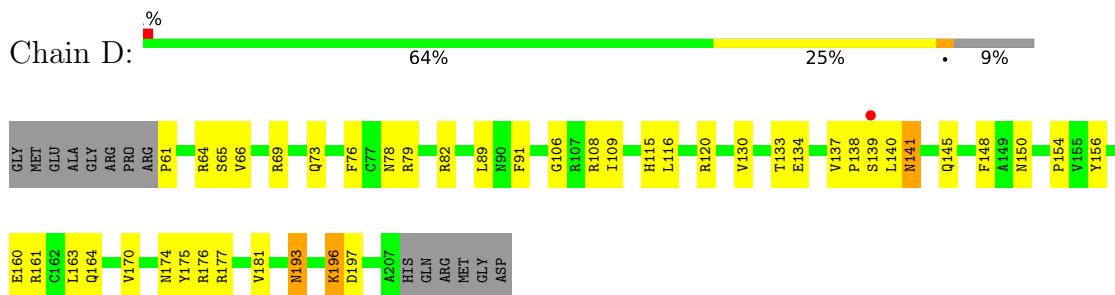
### 3 Residue-property plots [i](#)

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.

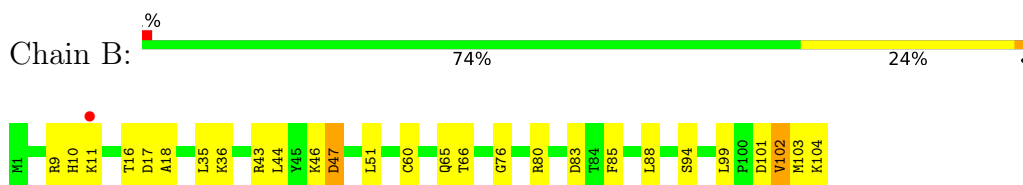
- Molecule 1: von Hippel-Lindau disease tumor suppressor



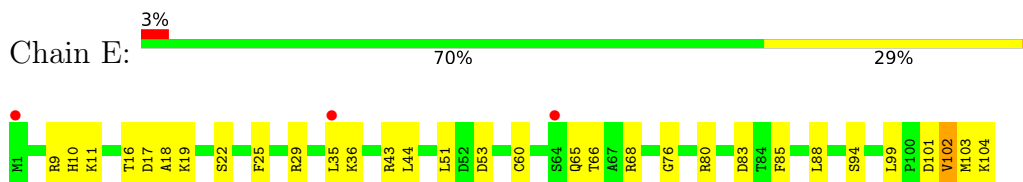
- Molecule 1: von Hippel-Lindau disease tumor suppressor



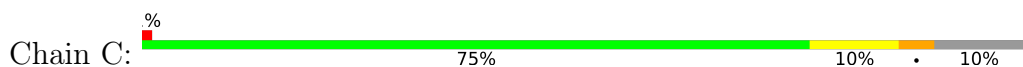
- Molecule 2: Elongin-B

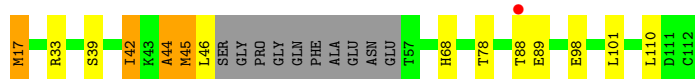


- Molecule 2: Elongin-B



- Molecule 3: Elongin-C





• Molecule 3: Elongin-C

Chain F: 75% 11% 10%



• Molecule 4: Probable global transcription activator SNF2L2

Chain G: 76% 15% 8%



• Molecule 4: Probable global transcription activator SNF2L2

Chain H: 2% 84% 8% 8%



## 4 Data and refinement statistics

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	93.13Å 132.01Å 210.70Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.10 – 3.30 48.10 – 3.30	Depositor EDS
% Data completeness (in resolution range)	99.9 (48.10-3.30) 99.9 (48.10-3.30)	Depositor EDS
$R_{merge}$	0.28	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.25 (at 3.33Å)	Xtriage
Refinement program	REFMAC 5.8.0403	Depositor
R, $R_{free}$	0.207 , 0.286 0.210 , 0.290	Depositor DCC
$R_{free}$ test set	1014 reflections (5.09%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	74.2	Xtriage
Anisotropy	0.055	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 50.0	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	7428	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	79.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.68% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

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



## 5 Model quality

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: A1A1U

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	0.56	0/1233	1.05	2/1682 (0.1%)
1	D	0.55	0/1233	1.08	0/1682
2	B	0.50	0/832	1.00	0/1125
2	E	0.49	0/838	1.01	0/1132
3	C	0.53	0/702	1.07	1/947 (0.1%)
3	F	0.55	0/696	1.04	0/940
4	G	0.49	0/946	1.03	0/1269
4	H	0.49	0/946	1.03	0/1269
All	All	0.52	0/7426	1.04	3/10046 (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
1	D	0	1
2	E	0	2
All	All	0	4

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	143	ASP	CA-CB-CG	5.25	117.85	112.60
1	A	150	ASN	CB-CA-C	-5.22	102.22	111.05
3	C	42	ILE	N-CA-C	-5.03	107.85	112.83

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	177	ARG	Sidechain
1	D	69	ARG	Sidechain
2	E	29	ARG	Sidechain
2	E	68	ARG	Sidechain

## 5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1202	0	1205	23	0
1	D	1202	0	1205	34	0
2	B	816	0	813	15	0
2	E	822	0	824	18	0
3	C	688	0	690	10	0
3	F	682	0	679	12	0
4	G	930	0	964	10	2
4	H	930	0	964	4	2
5	A	78	0	0	4	0
5	D	78	0	0	2	0
All	All	7428	0	7344	111	2

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 8.

All (111) 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:79:ARG:NH1	3:C:89:GLU:OE1	1.91	1.03
1:D:79:ARG:NH1	3:F:89:GLU:OE1	1.98	0.96
2:E:101:ASP:HA	2:E:104:LYS:HE2	1.60	0.81
2:B:101:ASP:HA	2:B:104:LYS:HE2	1.63	0.80
2:E:94:SER:HG	3:F:68:HIS:HD1	1.20	0.80
1:D:141:ASN:HB3	1:D:145:GLN:O	1.84	0.77
1:A:120:ARG:HG2	1:A:120:ARG:HH11	1.52	0.75
2:B:51:LEU:HD22	2:B:60:CYS:SG	2.27	0.75

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:170:VAL:HG13	2:E:102:VAL:HG13	1.70	0.72
1:A:64:ARG:HH21	1:A:64:ARG:HG2	1.55	0.72
1:D:120:ARG:HG2	1:D:120:ARG:HH11	1.52	0.72
2:E:51:LEU:HD22	2:E:60:CYS:SG	2.30	0.71
3:C:44:ALA:O	3:C:46:LEU:N	2.28	0.66
3:F:44:ALA:O	3:F:46:LEU:N	2.29	0.65
4:G:1410:ILE:O	4:G:1430:ASP:HB2	1.98	0.64
1:D:64:ARG:HG2	1:D:64:ARG:HH21	1.65	0.62
4:H:1410:ILE:O	4:H:1430:ASP:HB2	2.01	0.61
1:A:79:ARG:CZ	1:D:79:ARG:CZ	2.79	0.60
2:B:94:SER:OG	3:C:68:HIS:ND1	2.34	0.58
1:A:79:ARG:CZ	3:C:89:GLU:OE1	2.53	0.56
1:A:193:ASN:OD1	1:A:196:LYS:HB3	2.06	0.56
1:A:154:PRO:HG2	1:A:156:TYR:CE1	2.41	0.55
1:A:174:ASN:O	1:A:175:TYR:C	2.49	0.55
2:B:46:LYS:O	2:B:47:ASP:HB2	2.07	0.54
1:A:178:LEU:HD22	3:C:101:LEU:HD11	1.90	0.54
1:A:145:GLN:HE22	1:D:137:VAL:H	1.56	0.54
4:H:1467:GLY:HA2	4:H:1472:GLU:OE2	2.09	0.52
1:D:193:ASN:OD1	1:D:196:LYS:HB3	2.10	0.51
1:D:73:GLN:NE2	1:D:108:ARG:HD3	2.25	0.51
5:A:301:A1A1U:C51	4:G:1470:ILE:HD12	2.41	0.51
1:A:107:ARG:NH1	5:A:301:A1A1U:N1	2.57	0.51
2:B:9:ARG:NH2	2:B:10:HIS:CE1	2.79	0.51
1:D:174:ASN:O	1:D:175:TYR:C	2.52	0.50
1:A:148:PHE:CE2	1:D:150:ASN:ND2	2.80	0.50
4:G:1454:MET:O	4:G:1458:HIS:ND1	2.39	0.50
2:E:94:SER:OG	3:F:68:HIS:ND1	2.21	0.50
2:E:9:ARG:NH2	2:E:10:HIS:CE1	2.80	0.50
3:C:44:ALA:O	3:C:45:MET:C	2.55	0.49
2:E:76:GLY:HA3	2:E:88:LEU:HD11	1.95	0.48
3:F:44:ALA:O	3:F:45:MET:C	2.56	0.48
1:D:176:ARG:HH21	1:D:177:ARG:NH1	2.12	0.48
4:G:1467:GLY:HA2	4:G:1472:GLU:OE2	2.13	0.48
2:E:65:GLN:O	2:E:66:THR:HG23	2.13	0.48
1:D:109:ILE:HG23	5:D:301:A1A1U:C61	2.44	0.47
2:B:65:GLN:O	2:B:66:THR:HG23	2.13	0.47
2:E:80:ARG:HB2	2:E:85:PHE:CD1	2.50	0.47
2:B:43:ARG:CZ	2:B:85:PHE:CD2	2.98	0.47
2:B:80:ARG:HB2	2:B:85:PHE:CD1	2.50	0.46
2:E:43:ARG:CZ	2:E:85:PHE:CD2	2.98	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:39:SER:OG	3:C:110:LEU:O	2.32	0.46
1:D:154:PRO:HG2	1:D:156:TYR:CE1	2.50	0.46
1:A:120:ARG:HG2	1:A:120:ARG:NH1	2.27	0.46
1:D:120:ARG:HG2	1:D:120:ARG:NH1	2.28	0.45
1:D:141:ASN:OD1	1:D:141:ASN:N	2.49	0.45
2:E:19:LYS:O	2:E:22:SER:OG	2.24	0.45
4:G:1412:LEU:HG	4:G:1430:ASP:HB3	1.99	0.45
2:B:35:LEU:O	2:B:36:LYS:HB2	2.17	0.44
1:D:82:ARG:HH21	3:F:92:GLU:CD	2.25	0.44
2:E:17:ASP:O	2:E:18:ALA:HB2	2.16	0.44
1:A:107:ARG:HH11	5:A:301:A1A1U:C3	2.30	0.44
1:A:170:VAL:HG13	2:B:102:VAL:HG13	2.00	0.43
1:D:65:SER:OG	1:D:89:LEU:O	2.32	0.43
1:A:64:ARG:HH21	1:A:64:ARG:CG	2.29	0.43
1:D:170:VAL:HG13	2:E:102:VAL:CG1	2.44	0.43
2:E:35:LEU:O	2:E:36:LYS:HB2	2.19	0.43
1:A:133:THR:OG1	1:A:134:GLU:N	2.52	0.43
1:D:79:ARG:HG3	1:D:150:ASN:OD1	2.19	0.43
2:B:17:ASP:O	2:B:18:ALA:HB2	2.18	0.43
3:C:42:ILE:O	3:C:42:ILE:HG22	2.18	0.43
1:D:115:HIS:HE1	5:D:301:A1A1U:N10	2.17	0.43
2:E:80:ARG:HB2	2:E:85:PHE:CE1	2.54	0.43
2:E:99:LEU:HD21	2:E:103:MET:O	2.19	0.43
1:D:133:THR:OG1	1:D:134:GLU:N	2.52	0.42
2:B:99:LEU:HD21	2:B:103:MET:O	2.20	0.42
3:C:17:MET:SD	3:C:33:ARG:HD2	2.60	0.42
1:D:64:ARG:HG2	1:D:64:ARG:NH2	2.32	0.42
1:A:79:ARG:NH1	1:D:79:ARG:CZ	2.83	0.42
1:D:120:ARG:HH21	1:D:197:ASP:CG	2.28	0.42
1:A:120:ARG:NH2	1:A:197:ASP:OD2	2.52	0.42
2:E:25:PHE:HB3	2:E:53:ASP:OD2	2.20	0.42
1:D:61:PRO:O	1:D:64:ARG:NH2	2.53	0.42
1:D:78:ASN:OD1	1:D:78:ASN:C	2.63	0.42
3:F:35:HIS:HB3	3:F:77:PHE:HB3	2.02	0.42
3:F:42:ILE:HG22	3:F:42:ILE:O	2.19	0.42
4:H:1397:TYR:CD1	4:H:1397:TYR:C	2.97	0.41
5:A:301:A1A1U:C51	4:G:1470:ILE:CD1	2.98	0.41
1:D:76:PHE:O	1:D:106:GLY:HA2	2.21	0.41
1:A:61:PRO:O	1:A:64:ARG:NH2	2.53	0.41
3:C:44:ALA:C	3:C:46:LEU:N	2.78	0.41
2:B:76:GLY:HA3	2:B:88:LEU:HD11	2.03	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:140:LEU:HD23	1:D:140:LEU:HA	1.91	0.41
3:F:44:ALA:C	3:F:46:LEU:N	2.79	0.41
1:A:172:PRO:HA	1:A:175:TYR:CE1	2.56	0.41
1:D:161:ARG:O	1:D:164:GLN:HB2	2.21	0.41
1:D:64:ARG:HD2	1:D:91:PHE:O	2.21	0.41
2:B:44:LEU:HA	2:B:76:GLY:O	2.20	0.41
2:B:80:ARG:HB2	2:B:85:PHE:CE1	2.56	0.40
1:D:160:GLU:HA	1:D:163:LEU:HD12	2.03	0.40
3:F:98:GLU:CD	3:F:98:GLU:H	2.28	0.40
1:A:89:LEU:HD12	1:A:116:LEU:HD22	2.04	0.40
1:D:130:VAL:HG13	1:D:130:VAL:O	2.21	0.40
1:D:137:VAL:HA	1:D:138:PRO:HD3	1.97	0.40
2:E:44:LEU:HA	2:E:76:GLY:O	2.20	0.40
3:F:80:LYS:HD3	3:F:80:LYS:C	2.46	0.40
4:G:1488:ILE:O	4:G:1488:ILE:HG22	2.22	0.40
3:F:102:GLU:HA	3:F:105:MET:HE3	2.03	0.40
4:G:1388:ASN:ND2	4:G:1438:ILE:HG21	2.36	0.40
4:H:1412:LEU:HG	4:H:1430:ASP:HB3	2.04	0.40
1:A:181:VAL:HG13	1:A:184:LEU:HG	2.03	0.40
4:G:1397:TYR:CD1	4:G:1397:TYR:C	2.99	0.40
4:G:1425:ILE:HD11	4:G:1463:PHE:HB2	2.04	0.40

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

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:G:1472:GLU:OE1	4:H:1397:TYR:OH[5_455]	2.08	0.12
4:G:1397:TYR:OH	4:H:1472:GLU:OE1[5_455]	2.19	0.01

## 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	145/161 (90%)	135 (93%)	10 (7%)	0	100	100
1	D	145/161 (90%)	136 (94%)	9 (6%)	0	100	100
2	B	102/104 (98%)	91 (89%)	10 (10%)	1 (1%)	12	40
2	E	102/104 (98%)	89 (87%)	13 (13%)	0	100	100
3	C	82/96 (85%)	77 (94%)	3 (4%)	2 (2%)	4	24
3	F	82/96 (85%)	76 (93%)	4 (5%)	2 (2%)	4	24
4	G	111/123 (90%)	105 (95%)	6 (5%)	0	100	100
4	H	111/123 (90%)	106 (96%)	5 (4%)	0	100	100
All	All	880/968 (91%)	815 (93%)	60 (7%)	5 (1%)	21	52

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	C	44	ALA
3	F	44	ALA
2	B	47	ASP
3	C	45	MET
3	F	45	MET

### 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	137/147 (93%)	128 (93%)	9 (7%)	15	43
1	D	137/147 (93%)	129 (94%)	8 (6%)	18	47
2	B	91/92 (99%)	87 (96%)	4 (4%)	25	54
2	E	92/92 (100%)	88 (96%)	4 (4%)	26	54
3	C	78/85 (92%)	74 (95%)	4 (5%)	21	50
3	F	77/85 (91%)	75 (97%)	2 (3%)	40	64
4	G	106/115 (92%)	99 (93%)	7 (7%)	15	43
4	H	106/115 (92%)	102 (96%)	4 (4%)	29	57

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
All	All	824/878 (94%)	782 (95%)	42 (5%)	21	50

All (42) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	66	VAL
1	A	85	LEU
1	A	116	LEU
1	A	139	SER
1	A	147	ILE
1	A	148	PHE
1	A	181	VAL
1	A	193	ASN
1	A	196	LYS
2	B	11	LYS
2	B	16	THR
2	B	83	ASP
2	B	102	VAL
3	C	17	MET
3	C	78	THR
3	C	88	THR
3	C	98	GLU
1	D	66	VAL
1	D	116	LEU
1	D	139	SER
1	D	141	ASN
1	D	148	PHE
1	D	181	VAL
1	D	193	ASN
1	D	196	LYS
2	E	11	LYS
2	E	16	THR
2	E	83	ASP
2	E	102	VAL
3	F	78	THR
3	F	98	GLU
4	G	1382	LYS
4	G	1400	SER
4	G	1405	LEU
4	G	1424	LEU
4	G	1432	LYS
4	G	1436	GLU

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Mol	Chain	Res	Type
4	G	1470	ILE
4	H	1382	LYS
4	H	1400	SER
4	H	1432	LYS
4	H	1436	GLU

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	145	GLN
1	A	150	ASN
2	B	10	HIS
3	C	35	HIS
3	C	108	ASN
1	D	73	GLN
2	E	10	HIS
3	F	35	HIS
3	F	58	ASN
3	F	108	ASN
4	G	1379	ASN
4	G	1478	GLN
4	H	1478	GLN

### 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 oligosaccharides 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	A1A1U	D	301	-	85,89,89	0.68	2 (2%)	117,133,133	1.56	20 (17%)
5	A1A1U	A	301	-	85,89,89	0.49	1 (1%)	117,133,133	1.47	15 (12%)

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	A1A1U	D	301	-	-	4/50/116/116	0/12/12/12
5	A1A1U	A	301	-	-	6/50/116/116	0/12/12/12

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	D	301	A1A1U	C40-C41	2.52	1.43	1.39
5	D	301	A1A1U	C2-N1	-2.18	1.35	1.38
5	A	301	A1A1U	C36-N7	2.04	1.43	1.40

All (35) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	D	301	A1A1U	C40-C41-CL1	5.88	127.20	119.62
5	A	301	A1A1U	C3-S1-C4	4.63	91.39	88.96
5	A	301	A1A1U	C40-C41-CL1	4.47	125.38	119.62
5	D	301	A1A1U	C21-N5-C22	4.37	135.81	128.96
5	A	301	A1A1U	C2-C4-S1	-4.34	106.98	109.64
5	D	301	A1A1U	C9-N3-C15	4.11	128.69	122.98
5	A	301	A1A1U	C1-C2-N1	-4.01	111.99	120.69
5	D	301	A1A1U	C21-N5-N10	-3.84	114.94	120.12
5	D	301	A1A1U	C20-C21-N5	3.69	119.87	107.83
5	A	301	A1A1U	S1-C3-N1	-3.49	113.08	116.08
5	A	301	A1A1U	C51-C46-C47	3.35	113.86	109.89

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	D	301	A1A1U	C42-C41-CL1	-3.18	112.16	118.42
5	D	301	A1A1U	C45-C40-C39	-3.08	116.94	119.84
5	D	301	A1A1U	C2-C4-S1	-3.07	107.76	109.64
5	D	301	A1A1U	C58-C56-C21	-3.06	103.36	109.91
5	A	301	A1A1U	C35-C36-N7	-2.98	107.81	109.79
5	A	301	A1A1U	C14-N2-C10	2.86	119.28	111.35
5	D	301	A1A1U	C60-C8-C9	-2.85	115.00	120.79
5	D	301	A1A1U	C1-C2-N1	-2.84	114.53	120.69
5	A	301	A1A1U	C42-C41-CL1	-2.81	112.88	118.42
5	D	301	A1A1U	C35-C36-N7	-2.76	107.96	109.79
5	A	301	A1A1U	C56-C21-N5	2.66	116.31	113.31
5	D	301	A1A1U	C7-C8-C9	2.57	126.01	120.79
5	A	301	A1A1U	C36-N7-C38	2.51	110.27	106.07
5	D	301	A1A1U	C36-N7-C38	2.48	110.21	106.07
5	A	301	A1A1U	C45-C40-C39	-2.43	117.56	119.84
5	A	301	A1A1U	N7-C38-N8	-2.41	124.06	125.74
5	D	301	A1A1U	C57-C56-C21	2.40	115.05	109.91
5	D	301	A1A1U	C3-S1-C4	2.38	90.21	88.96
5	D	301	A1A1U	S1-C3-N1	-2.35	114.06	116.08
5	A	301	A1A1U	C37-C36-C35	-2.32	119.34	121.99
5	D	301	A1A1U	N7-C38-N8	-2.20	124.21	125.74
5	A	301	A1A1U	C55-C24-C25	2.17	114.58	110.00
5	D	301	A1A1U	C59-C56-C58	2.03	112.76	108.80
5	D	301	A1A1U	C11-N2-C10	2.01	116.92	111.35

There are no chirality outliers.

All (10) torsion outliers are listed below:

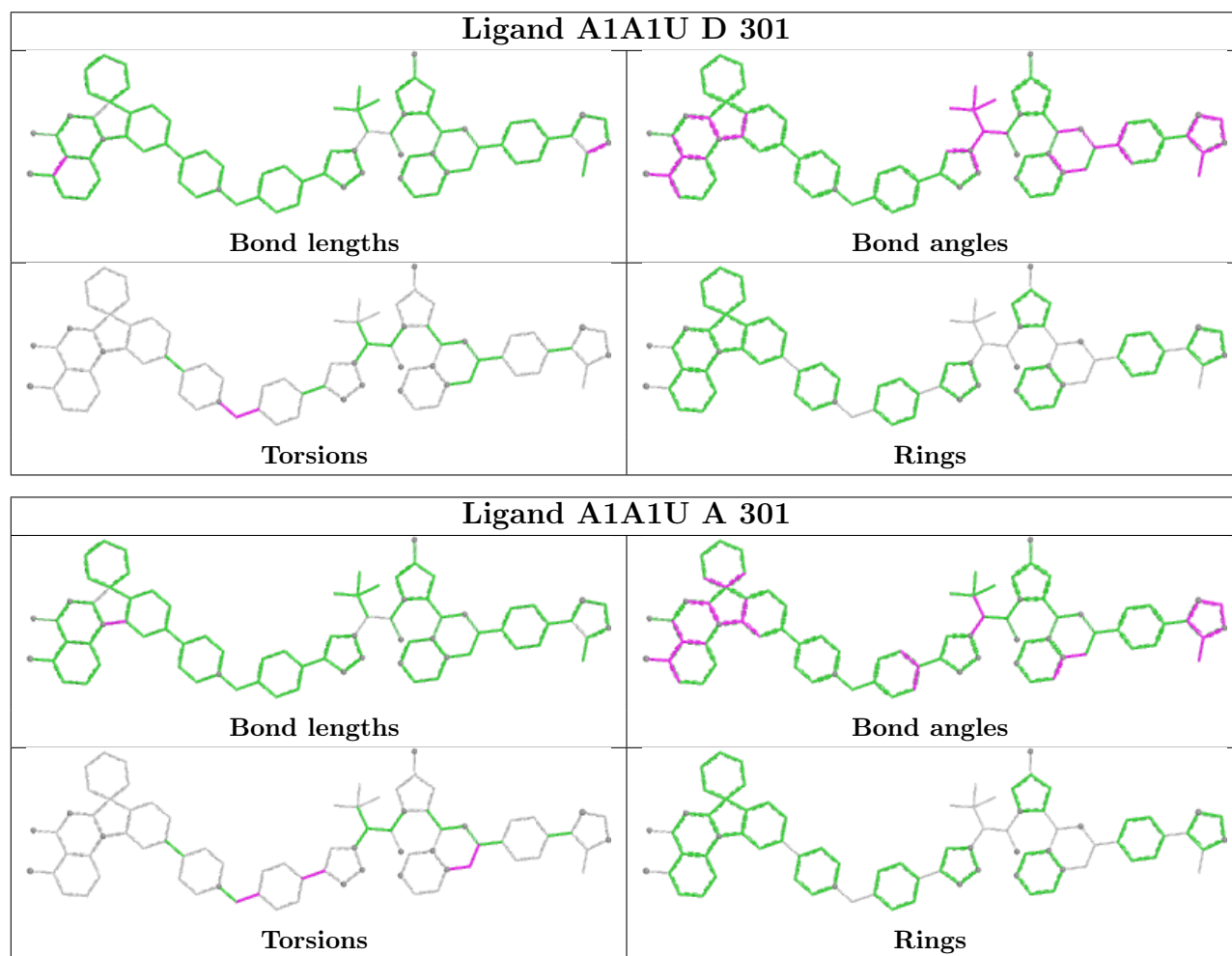
Mol	Chain	Res	Type	Atoms
5	A	301	A1A1U	C9-C10-N2-C14
5	A	301	A1A1U	C22-C23-C24-C25
5	A	301	A1A1U	C26-C27-C28-N6
5	A	301	A1A1U	C54-C27-C28-N6
5	D	301	A1A1U	C26-C27-C28-N6
5	A	301	A1A1U	C9-C10-N2-C11
5	D	301	A1A1U	C54-C27-C28-N6
5	A	301	A1A1U	N2-C10-C9-N3
5	D	301	A1A1U	C27-C28-N6-C53
5	D	301	A1A1U	C27-C28-N6-C29

There are no ring outliers.

2 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	D	301	A1A1U	2	0
5	A	301	A1A1U	4	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 than 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.



## 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 [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

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<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	147/161 (91%)	-0.44	0 <span>100</span> <span>100</span>	32, 57, 89, 116	0
1	D	147/161 (91%)	-0.31	1 (0%) <span>84</span> <span>70</span>	35, 60, 104, 129	0
2	B	104/104 (100%)	-0.14	1 (0%) <span>79</span> <span>63</span>	53, 82, 114, 145	0
2	E	104/104 (100%)	0.14	3 (2%) <span>53</span> <span>35</span>	60, 92, 139, 157	0
3	C	86/96 (89%)	-0.30	1 (1%) <span>76</span> <span>58</span>	33, 63, 100, 159	0
3	F	86/96 (89%)	-0.07	0 <span>100</span> <span>100</span>	40, 71, 107, 139	0
4	G	113/123 (91%)	-0.04	0 <span>100</span> <span>100</span>	50, 85, 124, 143	0
4	H	113/123 (91%)	0.18	2 (1%) <span>67</span> <span>49</span>	55, 98, 168, 211	0
All	All	900/968 (92%)	-0.14	8 (0%) <span>81</span> <span>65</span>	32, 74, 130, 211	0

All (8) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	E	35	LEU	2.9
2	E	1	MET	2.3
1	D	139	SER	2.3
4	H	1465	LEU	2.2
4	H	1446	LEU	2.1
3	C	88	THR	2.1
2	E	64	SER	2.1
2	B	11	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 oligosaccharides in this entry.

## 6.4 Ligands [i](#)

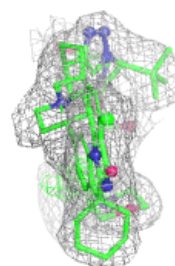
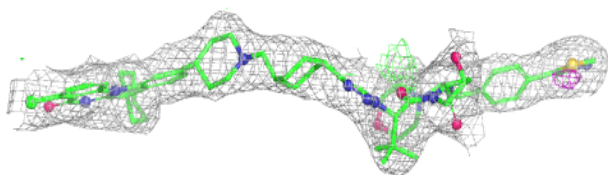
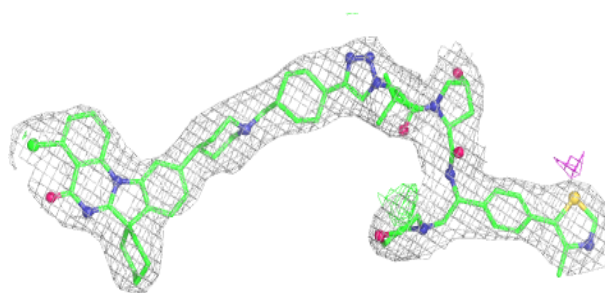
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
5	A1A1U	A	301	78/78	0.94	0.10	43,58,72,85	0
5	A1A1U	D	301	78/78	0.94	0.10	44,58,80,94	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.

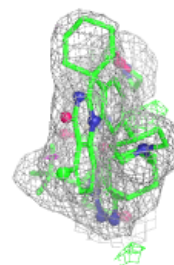
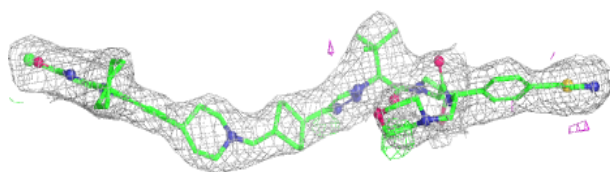
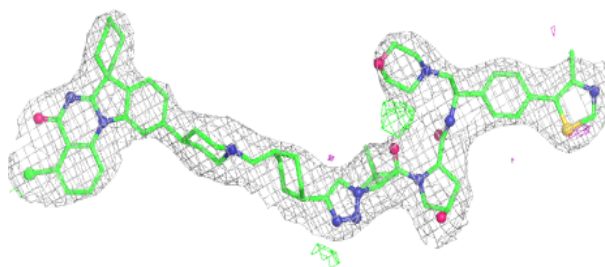
### Electron density around A1A1U A 301:

2mF<sub>o</sub>-DF<sub>c</sub> (at 0.7 rmsd) in gray  
mF<sub>o</sub>-DF<sub>c</sub> (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around A1A1U D 301:**

$2mF_o-DF_c$  (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.