



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 7, 2023 – 05:16 PM EST

PDB ID : 7FSV
Title : SDCBP PanDDA analysis group deposition – The PDZ domains of SDCBP in complex with Z1454310449
Authors : Bradshaw, W.J.; Katis, V.L.; Bountra, C.; von Delft, F.; Brennan, P.E.
Deposited on : 2023-01-24
Resolution : 2.25 Å(reported)

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

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.32.1
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) : 2.32.1

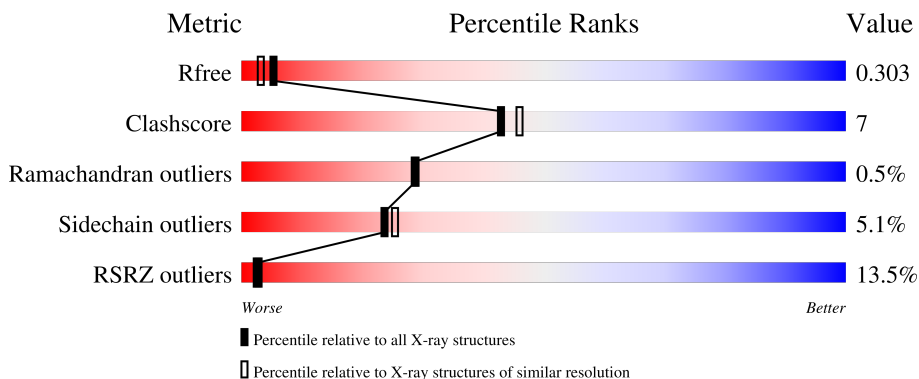
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.25 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	1377 (2.26-2.26)
Clashscore	141614	1487 (2.26-2.26)
Ramachandran outliers	138981	1449 (2.26-2.26)
Sidechain outliers	138945	1450 (2.26-2.26)
RSRZ outliers	127900	1356 (2.26-2.26)

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 $\leq 5\%$. 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	195	 20% 78% 18% ..
1	B	195	 9% 75% 23% ..
1	C	195	 10% 82% 14% ..
1	D	195	 14% 80% 17% ..

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
2	UQS	A	301	-	-	-	X
5	GLY	D	307	-	X	-	-

2 Entry composition

There are 8 unique types of molecules in this entry. The entry contains 6345 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.

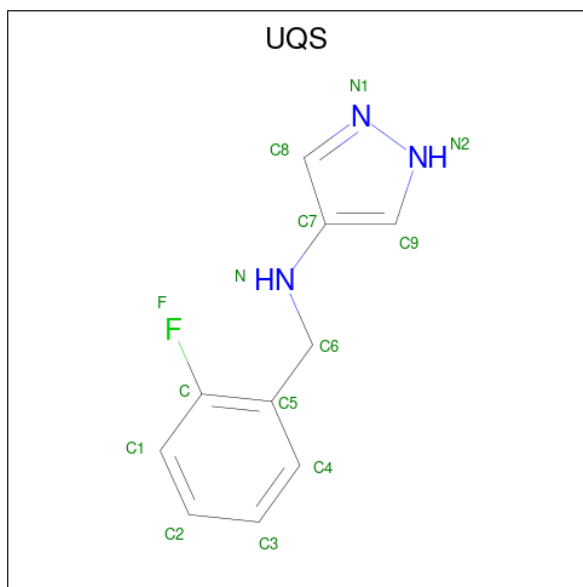
- Molecule 1 is a protein called Syntenin-1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	191	1481	935	262	275	9	0	1	0
1	B	193	1495	943	264	279	9	0	1	0
1	C	193	1514	953	270	282	9	0	3	0
1	D	191	1481	935	262	275	9	0	1	0

There are 8 discrepancies between the modelled and reference sequences:

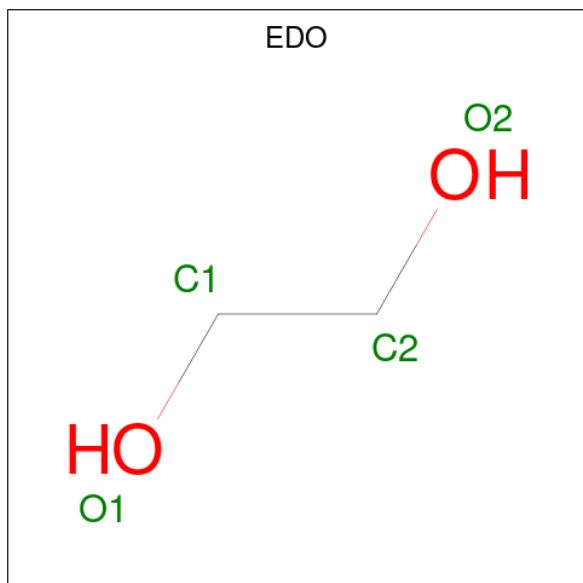
Chain	Residue	Modelled	Actual	Comment	Reference
A	104	SER	-	expression tag	UNP O00560
A	105	MET	-	expression tag	UNP O00560
B	104	SER	-	expression tag	UNP O00560
B	105	MET	-	expression tag	UNP O00560
C	104	SER	-	expression tag	UNP O00560
C	105	MET	-	expression tag	UNP O00560
D	104	SER	-	expression tag	UNP O00560
D	105	MET	-	expression tag	UNP O00560

- Molecule 2 is N-[(2-fluorophenyl)methyl]-1H-pyrazol-4-amine (three-letter code: UQS) (formula: C₁₀H₁₀FN₃) (labeled as "Ligand of Interest" by depositor).



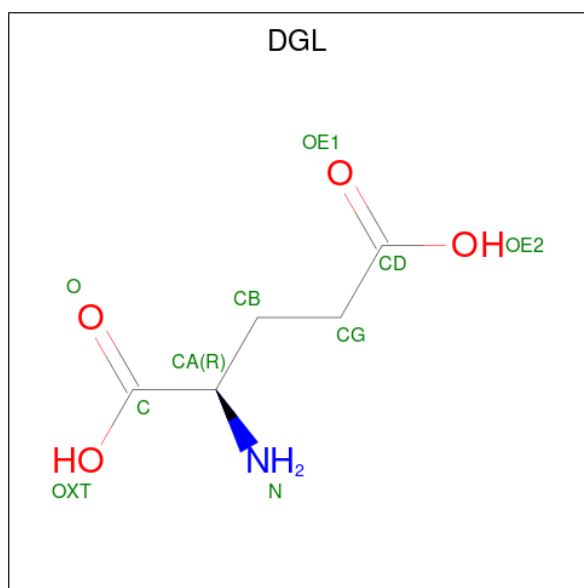
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	F	N		
2	A	1	14	10	1	3	0	0
2	B	1	14	10	1	3	0	0
2	C	1	14	10	1	3	0	0
2	D	1	14	10	1	3	0	0

- Molecule 3 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C₂H₆O₂).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	C	1	Total C O 4 2 2	0	0
3	C	1	Total C O 4 2 2	0	0
3	C	1	Total C O 4 2 2	0	0
3	D	1	Total C O 4 2 2	0	0
3	D	1	Total C O 4 2 2	0	0

- Molecule 4 is D-GLUTAMIC ACID (three-letter code: DGL) (formula: C₅H₉NO₄).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	B	1	Total C N O 10 5 1 4	0	0
4	D	1	Total C N O 10 5 1 4	0	0

- Molecule 5 is GLYCINE (three-letter code: GLY) (formula: C₂H₅NO₂).



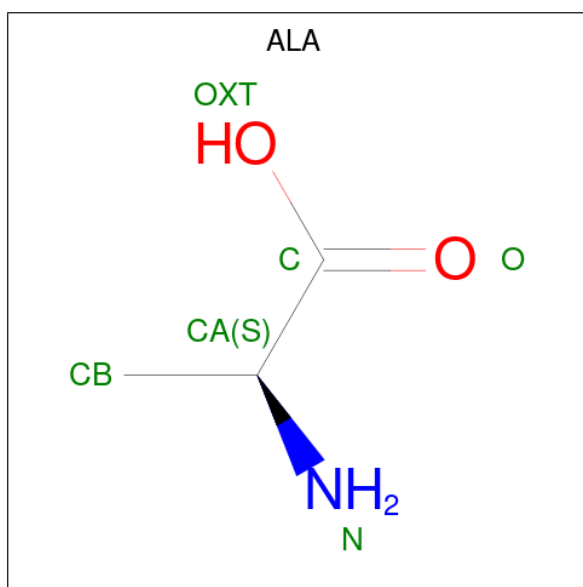
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	
			Total	C	N			O
5	C	1	5	2	1	2	0	0
5	D	1	5	2	1	2	0	0

- Molecule 6 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms		ZeroOcc	AltConf	
			Total	O			S
6	D	1	5	4	1	0	0

- Molecule 7 is ALANINE (three-letter code: ALA) (formula: C₃H₇NO₂).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
7	D	1	6	3	1	2	0	0

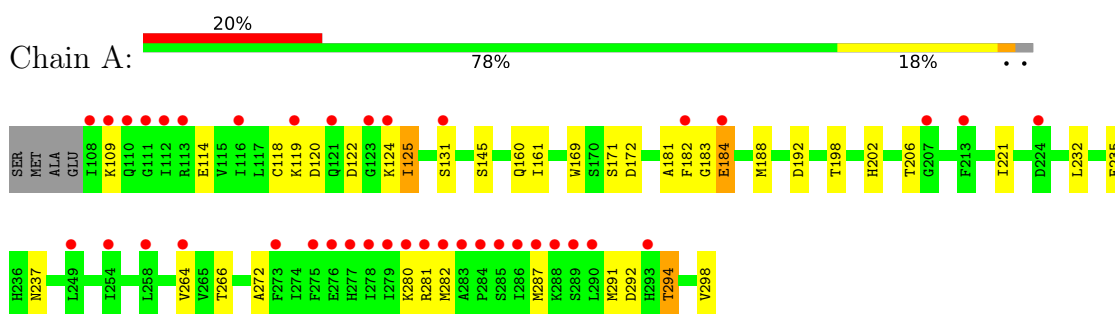
- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	39	Total	O	0	0
			39	39		
8	B	73	Total	O	0	0
			73	73		
8	C	54	Total	O	0	0
			54	54		
8	D	79	Total	O	0	1
			79	79		

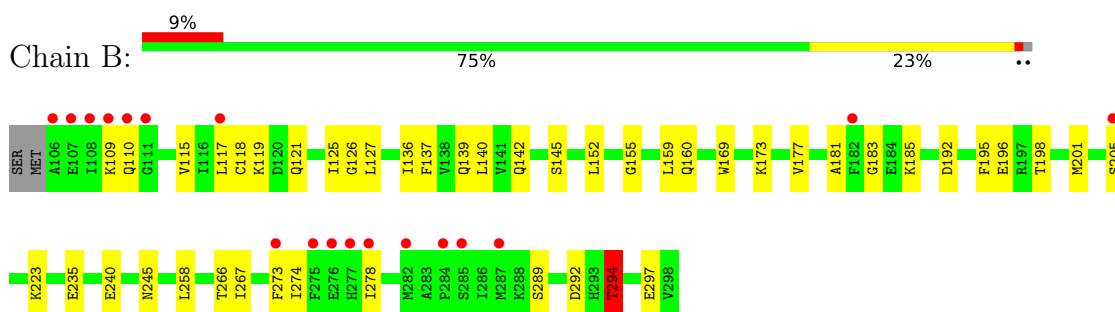
3 Residue-property plots [i](#)

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.

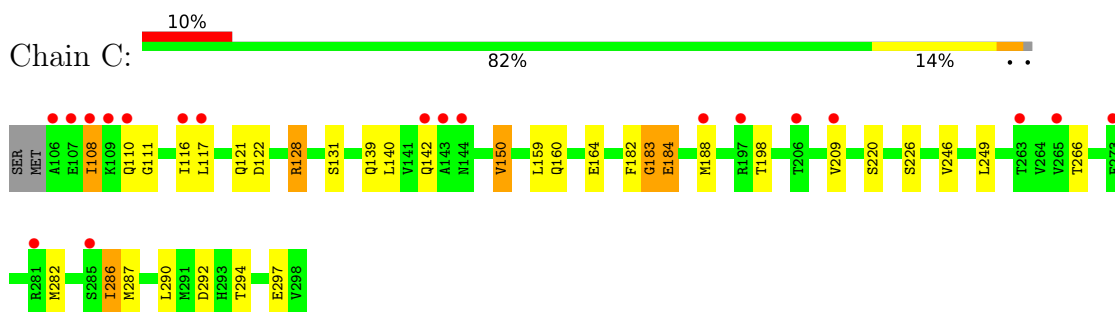
- Molecule 1: Syntenin-1



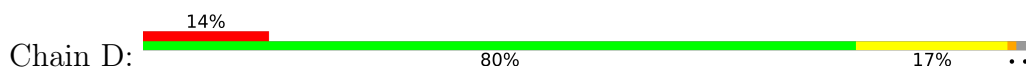
- Molecule 1: Syntenin-1

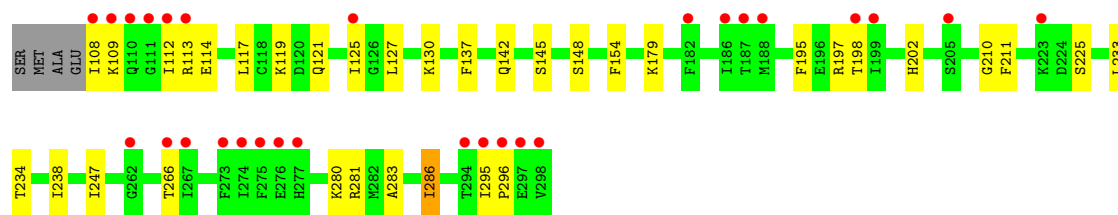


- Molecule 1: Syntenin-1



- Molecule 1: Syntenin-1





4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	80.91Å 49.21Å 114.40Å 90.00° 95.35° 90.00°	Depositor
Resolution (Å)	113.82 – 2.25 113.90 – 2.25	Depositor EDS
% Data completeness (in resolution range)	99.7 (113.82-2.25) 99.7 (113.90-2.25)	Depositor EDS
R_{merge}	0.14	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.95 (at 2.25Å)	Xtrriage
Refinement program	REFMAC 5.8.0267	Depositor
R, R_{free}	0.222 , 0.288 0.246 , 0.303	Depositor DCC
R_{free} test set	2098 reflections (4.89%)	wwPDB-VP
Wilson B-factor (Å ²)	43.4	Xtrriage
Anisotropy	0.473	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 47.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	6345	wwPDB-VP
Average B, all atoms (Å ²)	54.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 25.85 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 2.9389e-03. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

¹Intensities estimated from amplitudes.

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

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: UQS, EDO, DGL, SO4

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	1/1502 (0.1%)	0.87	0/2019
1	B	0.99	6/1516 (0.4%)	1.01	2/2038 (0.1%)
1	C	0.78	0/1535	0.89	0/2063
1	D	0.86	2/1502 (0.1%)	0.93	0/2019
All	All	0.86	9/6055 (0.1%)	0.93	2/8139 (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	C	0	1
1	D	0	1
All	All	0	3

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	235	GLU	CG-CD	8.79	1.65	1.51
1	B	273[A]	PHE	C-O	8.04	1.38	1.23
1	B	273[B]	PHE	C-O	8.04	1.38	1.23
1	D	234	THR	C-O	7.38	1.37	1.23
1	B	235	GLU	CD-OE1	7.30	1.33	1.25
1	B	240	GLU	CG-CD	6.73	1.62	1.51
1	A	120	ASP	CB-CG	6.62	1.65	1.51
1	B	127	LEU	C-O	5.73	1.34	1.23
1	D	233	LEU	C-O	5.09	1.33	1.23

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	294	THR	CB-CA-C	-5.44	96.92	111.60
1	B	142	GLN	CB-CA-C	-5.28	99.85	110.40

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	183	GLY	Peptide
1	C	111	GLY	Peptide
1	D	127	LEU	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	1481	0	1530	19	0
1	B	1495	0	1541	23	0
1	C	1514	0	1558	17	0
1	D	1481	0	1530	27	0
2	A	14	0	0	0	0
2	B	14	0	0	0	0
2	C	14	0	0	0	0
2	D	14	0	0	1	0
3	A	4	0	6	0	0
3	B	8	0	12	0	0
3	C	12	0	18	0	0
3	D	8	0	12	0	0
4	B	10	0	7	0	0
4	D	10	0	7	0	0
5	C	5	0	2	0	0
5	D	5	0	2	0	0
6	D	5	0	0	0	0
7	D	6	0	4	1	0
8	A	39	0	0	2	0
8	B	73	0	0	1	0
8	C	54	0	0	2	0
8	D	79	0	0	3	0
All	All	6345	0	6229	84	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 7.

All (84) 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:D:198:THR:CG2	1:D:266:THR:HG23	1.85	1.06
1:D:198:THR:HG23	1:D:266:THR:HG23	1.45	0.98
1:C:110:GLN:NE2	8:C:401:HOH:O	2.07	0.86
1:D:108:ILE:HG22	1:D:109:LYS:H	1.44	0.81
1:D:198:THR:CG2	1:D:266:THR:CG2	2.60	0.79
1:D:198:THR:HG23	1:D:266:THR:CG2	2.18	0.73
1:B:118:CYS:HA	1:B:183:GLY:O	1.92	0.68
1:B:292:ASP:OD1	1:B:294:THR:OG1	2.13	0.67
1:D:117:LEU:HD22	1:D:125:ILE:HG23	1.78	0.64
1:A:292:ASP:OD1	1:A:294:THR:OG1	2.16	0.64
1:D:108:ILE:O	1:D:109:LYS:HG2	1.98	0.64
1:D:108:ILE:O	1:D:109:LYS:CG	2.46	0.63
1:C:246:VAL:HG12	1:C:249:LEU:HD12	1.82	0.62
1:D:154:PHE:CD1	1:D:247:ILE:HD13	2.37	0.60
1:D:197:ARG:NH1	8:D:401:HOH:O	2.22	0.59
1:D:295:ILE:HB	1:D:296:PRO:HD2	1.86	0.57
1:C:128:ARG:HB2	1:C:140:LEU:HB3	1.86	0.56
1:D:108:ILE:C	1:D:109:LYS:HG3	2.25	0.56
1:B:136:ILE:HD11	1:B:169:TRP:O	2.06	0.56
1:D:238:ILE:O	2:D:301:UQS:N2	2.39	0.56
1:B:119:LYS:HB2	1:B:183:GLY:HA3	1.88	0.55
1:D:210:GLY:HA3	1:D:225:SER:HB2	1.88	0.55
1:D:198:THR:HG21	1:D:266:THR:CG2	2.36	0.54
1:A:161:ILE:HD12	1:A:169:TRP:HZ3	1.74	0.53
1:B:109:LYS:N	1:B:192:ASP:OD2	2.43	0.52
1:B:274:ILE:HG22	1:B:278:ILE:CD1	2.41	0.51
1:C:116:ILE:HD12	1:C:116:ILE:N	2.26	0.50
1:C:117:LEU:HD13	1:C:150:VAL:HG11	1.93	0.50
1:A:119:LYS:NZ	1:A:181:ALA:O	2.44	0.50
1:C:108:ILE:HD12	1:C:198:THR:CG2	2.41	0.50
1:D:108:ILE:C	1:D:109:LYS:CG	2.80	0.50
1:A:235:GLU:OE1	8:A:401:HOH:O	2.19	0.49
1:D:130:LYS:HE2	1:D:281:ARG:HD3	1.94	0.49
1:A:280:LYS:HG2	1:A:281:ARG:HG2	1.94	0.49
1:B:201:MET:CE	1:B:267:ILE:HD12	2.42	0.49
1:A:221:ILE:HD12	1:A:232:LEU:HB3	1.95	0.49
1:D:154:PHE:CD1	1:D:247:ILE:CD1	2.95	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:122:ASP:HB3	1:A:124:LYS:HE3	1.94	0.48
1:A:109:LYS:N	1:A:192:ASP:OD2	2.46	0.48
1:D:112:ILE:HG22	1:D:113:ARG:N	2.29	0.48
1:A:118:CYS:SG	1:A:184:GLU:O	2.65	0.47
1:C:282:MET:CE	1:C:287:MET:SD	3.02	0.47
1:D:137:PHE:CE2	1:D:195:PHE:CE2	3.02	0.47
1:A:287:MET:O	1:A:291:MET:HB3	2.14	0.47
1:C:286:ILE:HG23	1:C:290:LEU:HD12	1.96	0.46
1:C:159:LEU:HD12	1:C:159:LEU:N	2.31	0.46
1:C:282:MET:HE3	1:C:287:MET:SD	2.56	0.46
1:D:283:ALA:HB3	1:D:286:ILE:HG13	1.96	0.46
1:B:119:LYS:HB2	1:B:183:GLY:CA	2.45	0.46
1:B:173:LYS:O	1:B:177:VAL:HG23	2.16	0.45
1:B:274:ILE:HG22	1:B:278:ILE:HD11	1.99	0.45
1:A:172:ASP:OD1	1:B:121:GLN:HB3	2.18	0.44
1:A:125:ILE:O	1:A:145:SER:HB2	2.17	0.44
1:A:237:ASN:HD22	1:A:272:ALA:HA	1.83	0.44
1:A:198:THR:CG2	1:A:266:THR:HG23	2.48	0.44
1:D:280:LYS:HE3	8:D:434:HOH:O	2.17	0.44
1:B:159:LEU:O	1:B:160:GLN:HG3	2.18	0.43
1:C:142:GLN:HA	1:C:290:LEU:O	2.18	0.43
1:C:209:VAL:HG23	8:C:416:HOH:O	2.17	0.43
1:C:128:ARG:HB3	1:C:139:GLN:HG3	2.00	0.43
1:C:160:GLN:HA	1:C:164:GLU:O	2.19	0.43
1:B:126:GLY:HA3	1:B:145:SER:CB	2.49	0.43
1:D:119:LYS:NZ	1:D:179:LYS:O	2.52	0.43
1:B:115:VAL:HG21	1:B:152:LEU:HD21	2.01	0.42
1:B:245:ASN:OD1	1:B:245:ASN:C	2.57	0.42
1:B:201:MET:HE1	1:B:267:ILE:HD12	2.00	0.42
1:D:202:HIS:CE1	8:D:425:HOH:O	2.72	0.42
1:C:159:LEU:N	1:C:159:LEU:CD1	2.83	0.42
1:C:292:ASP:OD1	1:C:294:THR:HB	2.20	0.42
1:B:137:PHE:CE2	1:B:195:PHE:CE2	3.08	0.42
1:A:124:LYS:HE2	1:B:185:LYS:HB3	2.01	0.41
1:B:258:LEU:HA	1:B:258:LEU:HD23	1.81	0.41
1:C:182:PHE:O	1:C:183:GLY:C	2.59	0.41
1:D:211:PHE:O	7:D:305:ALA:N	2.53	0.41
1:A:266:THR:HG22	8:A:415:HOH:O	2.20	0.41
1:B:119:LYS:NZ	1:B:181:ALA:O	2.41	0.41
1:B:117:LEU:HD22	1:B:125:ILE:CG2	2.51	0.41
1:A:202:HIS:ND1	1:A:264:VAL:HG22	2.35	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:118:CYS:O	1:B:119:LYS:C	2.59	0.40
1:A:282:MET:HE1	8:B:447:HOH:O	2.21	0.40
1:B:155:GLY:HA3	1:B:196:GLU:OE2	2.20	0.40
1:D:137:PHE:CZ	1:D:195:PHE:CE2	3.10	0.40
1:A:160:GLN:O	1:A:188:MET:HA	2.22	0.40
1:D:142:GLN:HB3	1:D:145:SER:HB3	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	190/195 (97%)	181 (95%)	8 (4%)	1 (0%)	29	29
1	B	192/195 (98%)	177 (92%)	14 (7%)	1 (0%)	29	29
1	C	194/195 (100%)	182 (94%)	10 (5%)	2 (1%)	15	13
1	D	190/195 (97%)	181 (95%)	9 (5%)	0	100	100
All	All	766/780 (98%)	721 (94%)	41 (5%)	4 (0%)	29	29

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	183	GLY
1	A	182	PHE
1	B	110	GLN
1	C	184	GLU

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	166/168 (99%)	158 (95%)	8 (5%)	25	28
1	B	167/168 (99%)	158 (95%)	9 (5%)	22	22
1	C	169/168 (101%)	156 (92%)	13 (8%)	13	11
1	D	166/168 (99%)	162 (98%)	4 (2%)	49	58
All	All	668/672 (99%)	634 (95%)	34 (5%)	24	25

All (34) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	114	GLU
1	A	125	ILE
1	A	131	SER
1	A	171	SER
1	A	184	GLU
1	A	206	THR
1	A	294	THR
1	A	298	VAL
1	B	139	GLN
1	B	140	LEU
1	B	198	THR
1	B	205	SER
1	B	223	LYS
1	B	266	THR
1	B	289	SER
1	B	294	THR
1	B	297	GLU
1	C	108	ILE
1	C	121	GLN
1	C	122	ASP
1	C	128	ARG
1	C	131	SER
1	C	150	VAL
1	C	184	GLU
1	C	188	MET
1	C	220	SER
1	C	226	SER
1	C	266	THR

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Mol	Chain	Res	Type
1	C	286	ILE
1	C	297	GLU
1	D	114	GLU
1	D	121	GLN
1	D	148	SER
1	D	286	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	180	GLN
1	A	237	ASN
1	A	242	ASN
1	D	215	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 monosaccharides in this entry.

5.6 Ligand geometry [i](#)

18 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
3	EDO	C	302	-	3,3,3	0.11	0	2,2,2	0.03	0
2	UQS	D	301	-	15,15,15	0.86	1 (6%)	13,19,19	1.03	0
3	EDO	D	303	-	3,3,3	0.12	0	2,2,2	0.38	0
4	DGL	B	304	-	8,9,9	1.11	1 (12%)	10,11,11	1.38	2 (20%)
5	GLY	D	307	-	4,4,4	1.25	1 (25%)	3,4,4	1.73	2 (66%)
3	EDO	B	303	-	3,3,3	0.22	0	2,2,2	0.40	0
3	EDO	C	303	-	3,3,3	0.08	0	2,2,2	0.23	0
3	EDO	D	302	-	3,3,3	0.21	0	2,2,2	0.12	0
2	UQS	C	301	-	15,15,15	0.95	1 (6%)	13,19,19	1.02	0
2	UQS	B	301	-	15,15,15	1.01	1 (6%)	13,19,19	0.95	0
3	EDO	A	302	-	3,3,3	0.14	0	2,2,2	0.08	0
2	UQS	A	301	-	15,15,15	0.74	1 (6%)	13,19,19	1.57	3 (23%)
6	SO4	D	304	-	4,4,4	0.39	0	6,6,6	0.05	0
7	ALA	D	305	-	5,5,5	1.14	1 (20%)	6,6,6	1.09	0
3	EDO	B	302	-	3,3,3	0.14	0	2,2,2	0.22	0
3	EDO	C	304	-	3,3,3	0.16	0	2,2,2	0.42	0
5	GLY	C	305	-	4,4,4	0.97	0	3,4,4	1.50	0
4	DGL	D	306	-	8,9,9	1.05	0	10,11,11	0.92	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
3	EDO	C	302	-	-	1/1/1/1	-
2	UQS	D	301	-	-	0/3/5/5	0/2/2/2
3	EDO	D	303	-	-	1/1/1/1	-
4	DGL	B	304	-	-	0/9/9/9	-
5	GLY	D	307	-	-	2/2/2/2	-
3	EDO	B	303	-	-	0/1/1/1	-
3	EDO	C	303	-	-	1/1/1/1	-
3	EDO	D	302	-	-	1/1/1/1	-
2	UQS	C	301	-	-	0/3/5/5	0/2/2/2
2	UQS	B	301	-	-	0/3/5/5	0/2/2/2
3	EDO	A	302	-	-	1/1/1/1	-
2	UQS	A	301	-	-	0/3/5/5	0/2/2/2
7	ALA	D	305	-	-	0/4/4/4	-
3	EDO	B	302	-	-	1/1/1/1	-
3	EDO	C	304	-	-	1/1/1/1	-
5	GLY	C	305	-	-	0/2/2/2	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	DGL	D	306	-	-	3/9/9/9	-

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	301	UQS	C7-N	2.92	1.47	1.38
2	D	301	UQS	C7-N	2.84	1.47	1.38
2	C	301	UQS	C7-N	2.54	1.46	1.38
5	D	307	GLY	OXT-C	-2.43	1.22	1.30
7	D	305	ALA	OXT-C	-2.29	1.23	1.30
2	A	301	UQS	C7-N	2.10	1.44	1.38
4	B	304	DGL	OXT-C	-2.08	1.23	1.30

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	301	UQS	C8-C7-C9	3.83	107.80	106.02
4	B	304	DGL	OXT-C-O	-2.91	117.49	124.09
2	A	301	UQS	C4-C5-C	2.58	121.12	116.61
4	B	304	DGL	OXT-C-CA	2.30	121.23	113.38
2	A	301	UQS	C1-C-C5	-2.24	119.54	123.61
5	D	307	GLY	OXT-C-CA	2.11	121.84	113.45
5	D	307	GLY	OXT-C-O	-2.04	118.20	123.30

There are no chirality outliers.

All (12) torsion outliers are listed below:

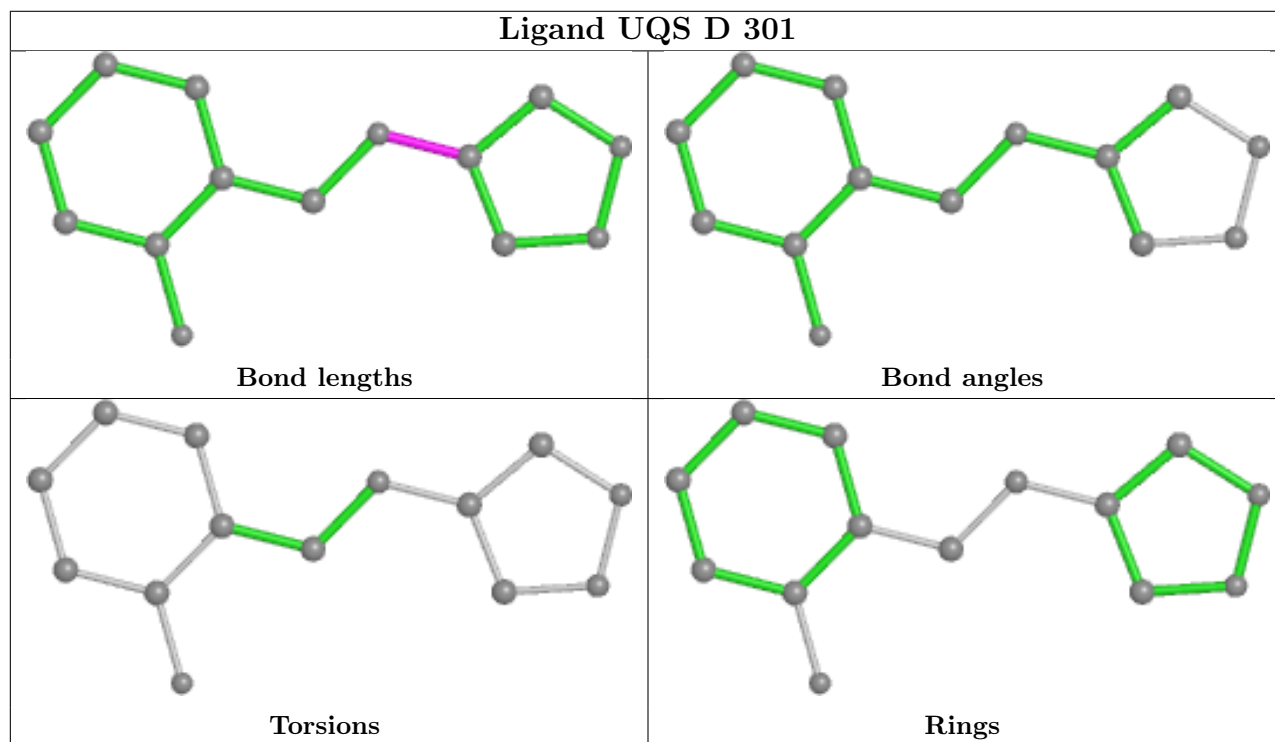
Mol	Chain	Res	Type	Atoms
5	D	307	GLY	O-C-CA-N
5	D	307	GLY	OXT-C-CA-N
3	A	302	EDO	O1-C1-C2-O2
3	C	304	EDO	O1-C1-C2-O2
3	B	302	EDO	O1-C1-C2-O2
4	D	306	DGL	O-C-CA-CB
4	D	306	DGL	OXT-C-CA-CB
4	D	306	DGL	CA-CB-CG-CD
3	C	302	EDO	O1-C1-C2-O2
3	C	303	EDO	O1-C1-C2-O2
3	D	303	EDO	O1-C1-C2-O2
3	D	302	EDO	O1-C1-C2-O2

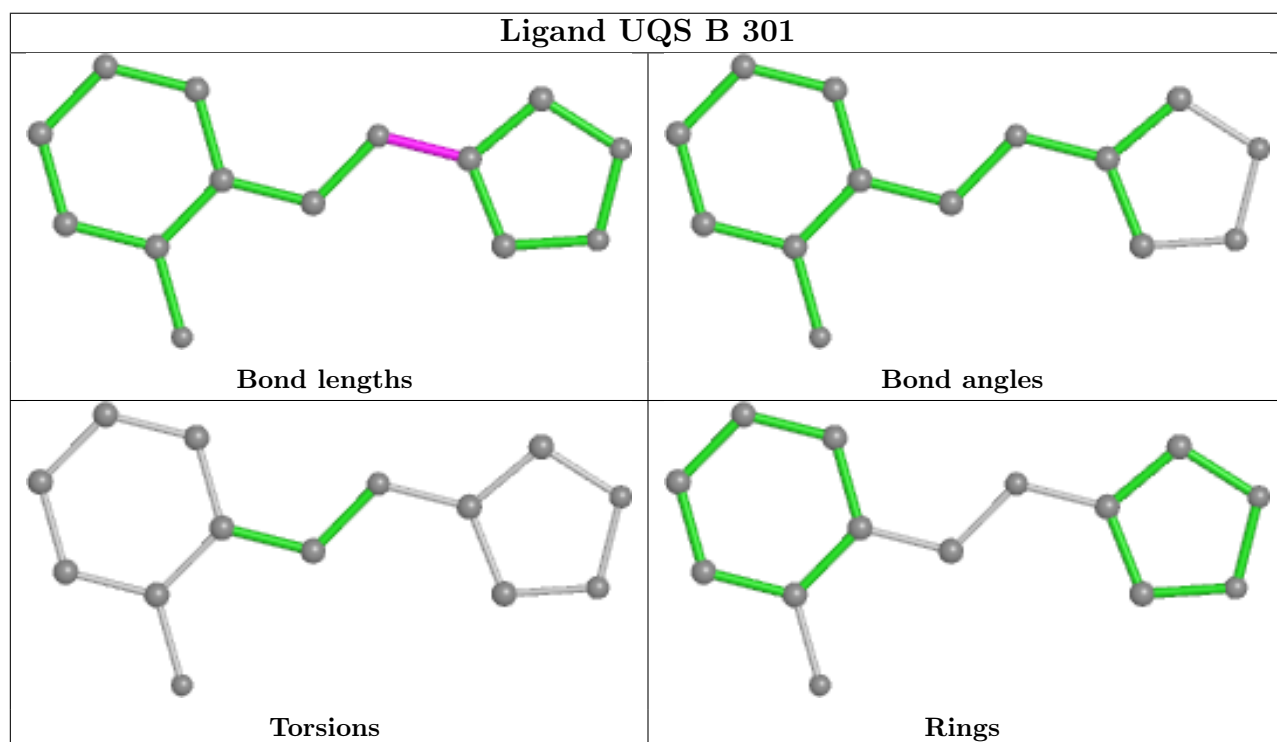
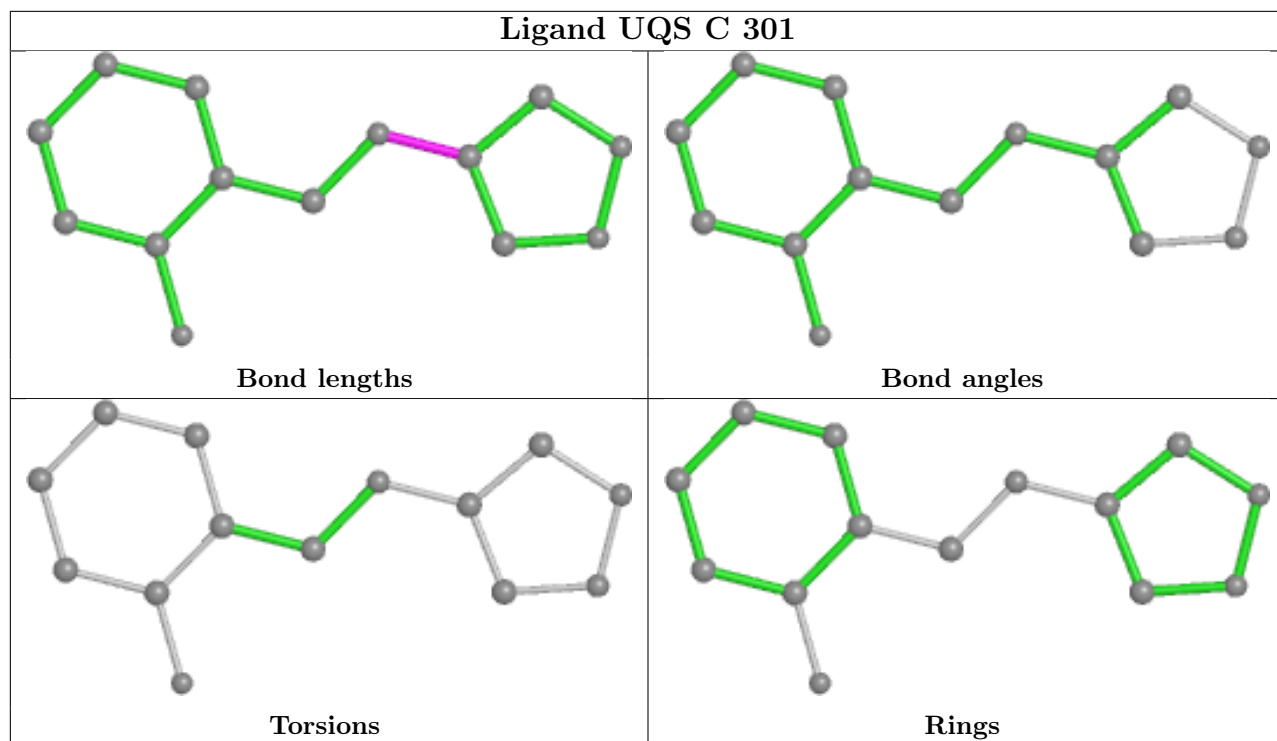
There are no ring outliers.

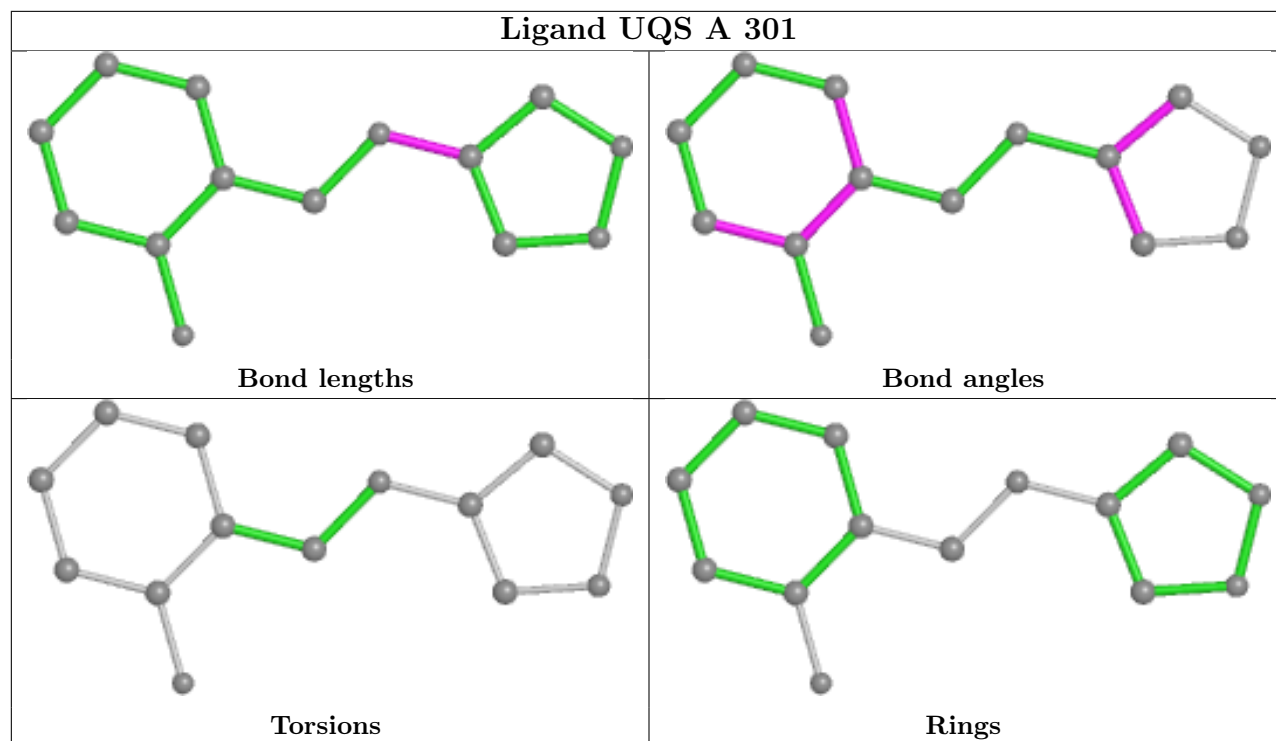
2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	301	UQS	1	0
7	D	305	ALA	1	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

6.1 Protein, DNA and RNA chains

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	191/195 (97%)	1.37	39 (20%) 1 1	41, 59, 83, 104	31 (16%)
1	B	193/195 (98%)	0.61	18 (9%) 8 9	34, 51, 76, 107	10 (5%)
1	C	193/195 (98%)	0.69	19 (9%) 7 8	37, 55, 83, 130	9 (4%)
1	D	191/195 (97%)	0.68	28 (14%) 2 2	33, 44, 66, 96	26 (13%)
All	All	768/780 (98%)	0.84	104 (13%) 3 2	33, 52, 80, 130	76 (9%)

All (104) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	110	GLN	14.4
1	B	106	ALA	10.4
1	C	273[A]	PHE	9.8
1	A	278	ILE	9.3
1	A	290	LEU	8.8
1	A	282	MET	8.8
1	C	108	ILE	8.5
1	A	273[A]	PHE	8.3
1	A	279	ILE	8.3
1	C	109	LYS	8.3
1	C	110	GLN	8.0
1	A	289	SER	7.8
1	B	110	GLN	7.8
1	D	273[A]	PHE	7.7
1	A	275	PHE	7.5
1	A	284	PRO	7.4
1	A	286	ILE	7.4
1	A	285	SER	7.3
1	D	274	ILE	7.0
1	D	275	PHE	6.9
1	A	277	HIS	6.8

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Mol	Chain	Res	Type	RSRZ
1	A	287	MET	6.7
1	B	273[A]	PHE	6.5
1	A	288	LYS	6.4
1	D	108	ILE	6.3
1	B	275	PHE	6.2
1	B	109	LYS	6.2
1	A	108	ILE	6.0
1	A	131	SER	5.8
1	C	107	GLU	5.8
1	A	283	ALA	5.6
1	A	111	GLY	5.6
1	A	276	GLU	5.5
1	A	280	LYS	5.4
1	A	109	LYS	5.1
1	A	281	ARG	5.0
1	D	277	HIS	4.9
1	B	276	GLU	4.8
1	C	206	THR	4.7
1	D	112	ILE	4.6
1	B	277	HIS	4.6
1	C	116	ILE	4.5
1	A	184	GLU	4.5
1	D	188	MET	4.4
1	C	106	ALA	4.4
1	D	295	ILE	4.3
1	D	276	GLU	4.2
1	A	254	ILE	4.1
1	D	182	PHE	4.1
1	A	258	LEU	4.0
1	D	111	GLY	3.9
1	A	112	ILE	3.8
1	A	121	GLN	3.8
1	D	110	GLN	3.7
1	B	108	ILE	3.6
1	B	287	MET	3.5
1	D	267	ILE	3.5
1	C	188	MET	3.4
1	D	186	ILE	3.4
1	D	125	ILE	3.4
1	D	199	ILE	3.4
1	A	264	VAL	3.4
1	D	298	VAL	3.3

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Mol	Chain	Res	Type	RSRZ
1	D	294	THR	3.3
1	B	282	MET	3.3
1	D	266	THR	3.2
1	D	205	SER	3.1
1	C	197[A]	ARG	3.1
1	A	182	PHE	3.1
1	D	296	PRO	3.1
1	C	117	LEU	3.0
1	B	284	PRO	3.0
1	D	109	LYS	3.0
1	C	285	SER	2.9
1	A	224	ASP	2.9
1	D	198	THR	2.8
1	B	111	GLY	2.8
1	C	265	VAL	2.8
1	D	187	THR	2.8
1	B	182	PHE	2.7
1	D	262	GLY	2.7
1	B	205	SER	2.7
1	A	116	ILE	2.6
1	C	281	ARG	2.6
1	B	107	GLU	2.6
1	C	144[A]	ASN	2.6
1	C	143	ALA	2.6
1	A	124	LYS	2.6
1	C	142	GLN	2.6
1	A	207	GLY	2.6
1	C	209	VAL	2.5
1	A	213	PHE	2.5
1	B	285	SER	2.3
1	B	117	LEU	2.3
1	D	297	GLU	2.3
1	A	119	LYS	2.3
1	A	249	LEU	2.3
1	D	113	ARG	2.3
1	D	223	LYS	2.3
1	B	278	ILE	2.2
1	A	123	GLY	2.2
1	C	263	THR	2.1
1	A	113	ARG	2.0
1	A	293	HIS	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](#)

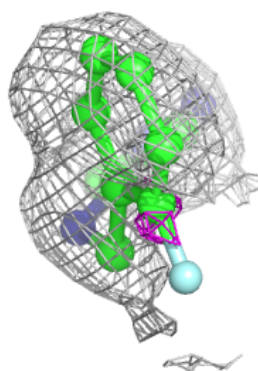
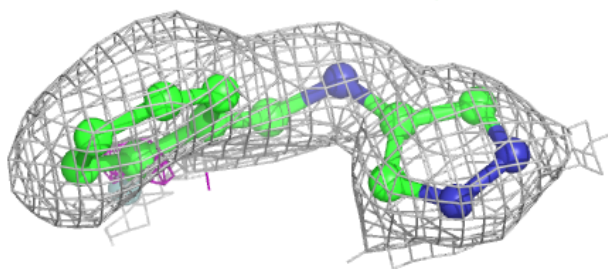
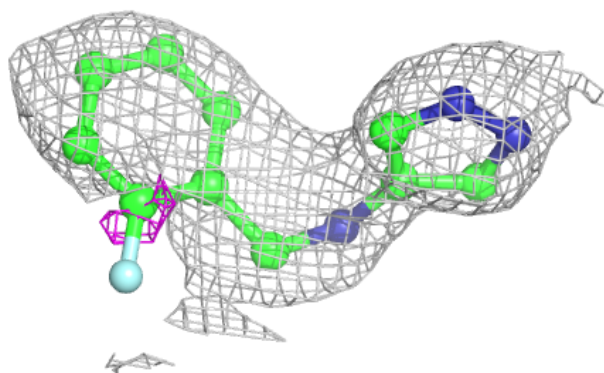
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	UQS	C	301	14/14	0.71	0.27	51,54,58,60	14
2	UQS	A	301	14/14	0.75	0.49	38,41,43,43	14
4	DGL	D	306	10/10	0.76	0.22	60,79,92,98	0
3	EDO	C	304	4/4	0.81	0.23	71,73,74,75	0
4	DGL	B	304	10/10	0.83	0.26	64,80,87,90	0
6	SO4	D	304	5/5	0.83	0.42	79,80,80,82	5
7	ALA	D	305	6/6	0.85	0.34	62,65,70,71	0
3	EDO	B	303	4/4	0.86	0.15	42,46,48,50	0
2	UQS	B	301	14/14	0.86	0.31	31,33,34,35	14
2	UQS	D	301	14/14	0.88	0.35	24,25,25,26	14
3	EDO	D	302	4/4	0.88	0.29	33,36,39,41	0
3	EDO	B	302	4/4	0.89	0.16	44,46,48,51	0
5	GLY	C	305	5/5	0.89	0.18	52,55,62,66	0
3	EDO	C	302	4/4	0.91	0.19	49,50,51,52	0
3	EDO	C	303	4/4	0.92	0.22	55,55,55,59	0
3	EDO	A	302	4/4	0.92	0.19	67,67,67,68	0
3	EDO	D	303	4/4	0.95	0.14	48,49,53,55	0
5	GLY	D	307	5/5	0.95	0.20	55,59,66,71	0

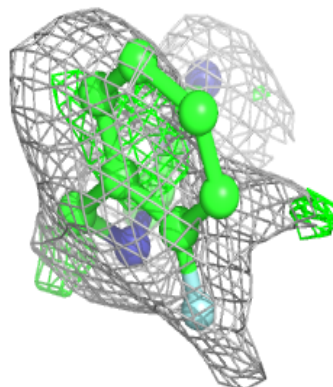
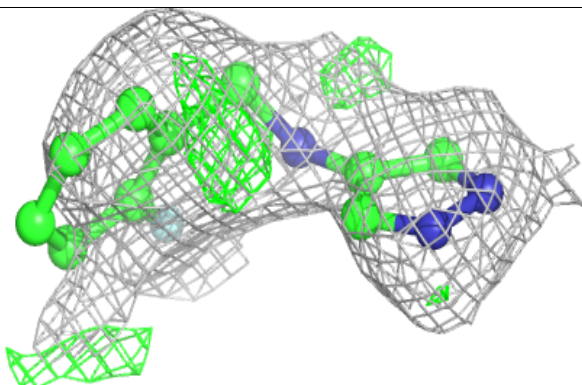
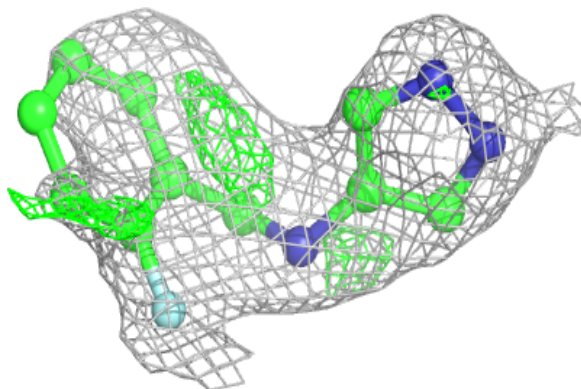
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around UQS C 301:

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

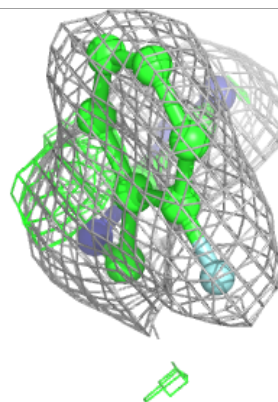
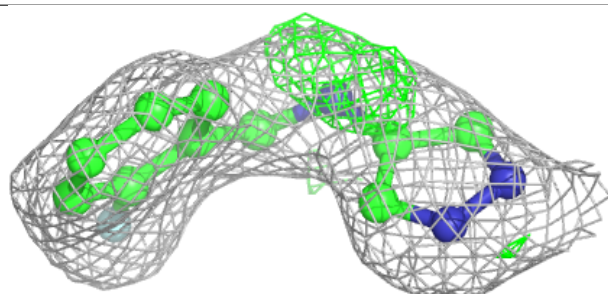
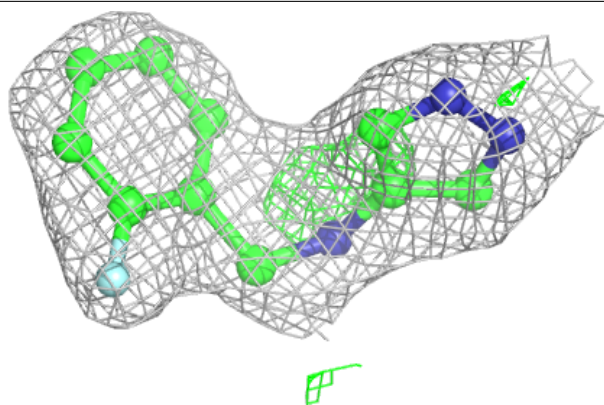
**Electron density around UQS A 301:**

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

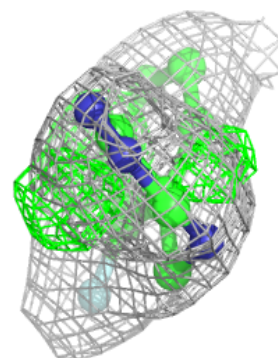
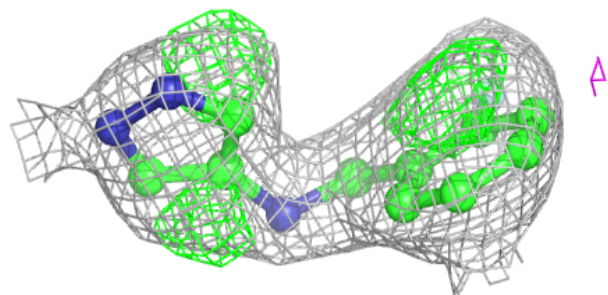
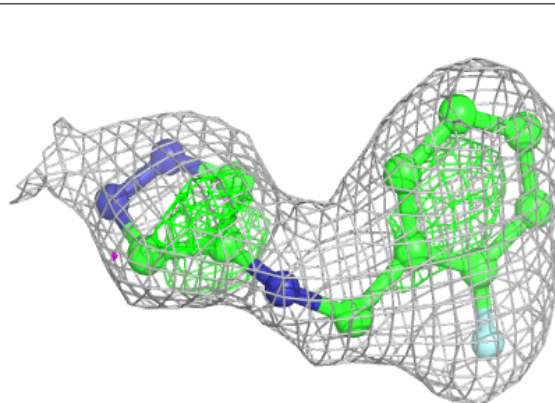


Electron density around UQS B 301:

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

**Electron density around UQS 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.