W O R L D W I D E
wwPDB
P R O T E I N   D A T A   B A N K

Full wwPDB X-ray Structure Validation Report ⓘ

Nov 2, 2023 – 12:13 pm GMT

PDB ID	:	8Q1A
Title	:	The Crystal Structure of Human Carbonic Anhydrase IX in Complex with inhibitor
Authors	:	Leitans, J.; Tars, K.
Deposited on	:	2023-07-31
Resolution	:	2.35 Å(reported)

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

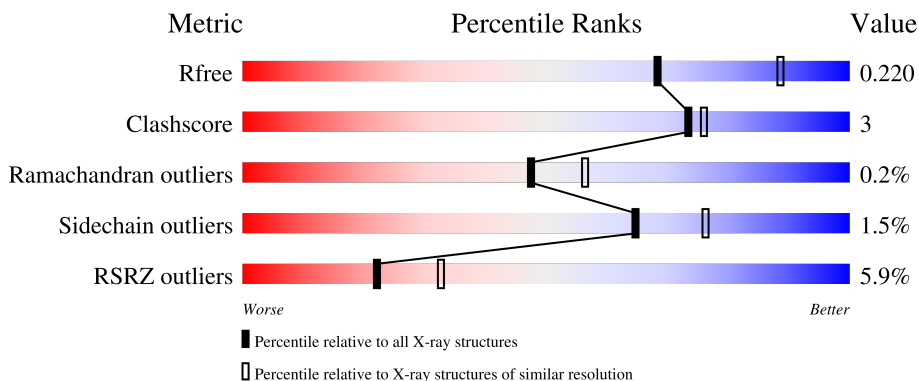|		
MolProbity	:	4.02b-467
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

1   Overall quality at a glance   ⓘ

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.35 Å.

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

Metric	Percentile Ranks	Value
Rfree		0.220
Clashscore		3
Ramachandran outliers		0.2%
Sidechain outliers		1.5%
RSRZ outliers		5.9%

Worse   *Better*

▮ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1164 (2.36-2.36)
Clashscore	141614	1232 (2.36-2.36)
Ramachandran outliers	138981	1211 (2.36-2.36)
Sidechain outliers	138945	1212 (2.36-2.36)
RSRZ outliers	127900	1150 (2.36-2.36)

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	257	9% / 90% / 7% ··
1	B	257	2% / 89% / 8% ·
1	C	257	7% / 86% / 12% ·
1	D	257	5% / 88% / 10% ·

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard

residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	IO6	A	302	-	X	-	-
3	IO6	B	302	-	X	-	-
3	IO6	D	302	-	X	-	-
4	GOL	A	303	-	X	X	-

2 Entry composition ⓘ

There are 5 unique types of molecules in this entry. The entry contains 8452 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 Carbonic anhydrase 9.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	251	Total	C	N	O	S	0	0	0
			1922	1227	339	352	4			
1	B	251	Total	C	N	O	S	0	0	0
			1910	1221	333	352	4			
1	C	251	Total	C	N	O	S	0	0	0
			1920	1226	336	354	4			
1	D	251	Total	C	N	O	S	0	1	0
			1943	1239	343	357	4			

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	3	GLY	-	expression tag	UNP Q16790
A	4	PRO	-	expression tag	UNP Q16790
A	42	SER	CYS	engineered mutation	UNP Q16790
A	214	GLN	ASN	engineered mutation	UNP Q16790
B	3	GLY	-	expression tag	UNP Q16790
B	4	PRO	-	expression tag	UNP Q16790
B	42	SER	CYS	engineered mutation	UNP Q16790
B	214	GLN	ASN	engineered mutation	UNP Q16790
C	3	GLY	-	expression tag	UNP Q16790
C	4	PRO	-	expression tag	UNP Q16790
C	42	SER	CYS	engineered mutation	UNP Q16790
C	214	GLN	ASN	engineered mutation	UNP Q16790
D	3	GLY	-	expression tag	UNP Q16790
D	4	PRO	-	expression tag	UNP Q16790
D	42	SER	CYS	engineered mutation	UNP Q16790
D	214	GLN	ASN	engineered mutation	UNP Q16790

- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total 1	Zn 1	0	0
2	B	1	Total 1	Zn 1	0	0
2	C	1	Total 1	Zn 1	0	0
2	D	1	Total 1	Zn 1	0	0

- Molecule 3 is 1,1,3-tris(oxidanylidene)-2-pentyl-1,2-benzothiazole-6-sulfonamide (three-letter code: IO6) (formula: $C_{12}H_{16}N_2O_5S_2$) (labeled as "Ligand of Interest" by depositor).

IO6
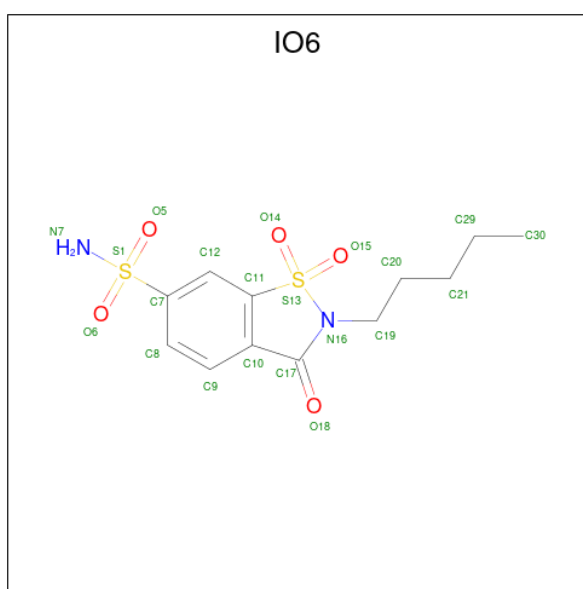
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total 21	C 12	N 2	O 5	S 2	0	0
3	B	1	Total 21	C 12	N 2	O 5	S 2	0	0
3	C	1	Total 21	C 12	N 2	O 5	S 2	0	0
3	D	1	Total 21	C 12	N 2	O 5	S 2	0	0

- Molecule 4 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).

GOL

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total 6	C 3	O 3	0	0
4	B	1	Total 6	C 3	O 3	0	0
4	C	1	Total 6	C 3	O 3	0	0
4	D	1	Total 6	C 3	O 3	0	0

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	124	Total 124	O 124	0	0
5	B	171	Total 171	O 171	0	0
5	C	142	Total 142	O 142	0	0
5	D	208	Total 208	O 208	0	0

3 Residue-property plots ⓘ

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density (RSRZ > 2). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

• Molecule 1: Carbonic anhydrase 9
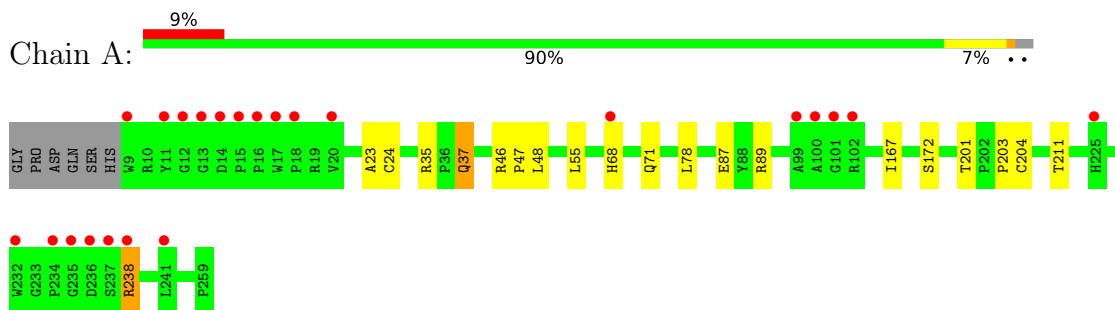
Chain A:

• Molecule 1: Carbonic anhydrase 9

Chain B:

• Molecule 1: Carbonic anhydrase 9

Chain C:

• Molecule 1: Carbonic anhydrase 9

Chain D:
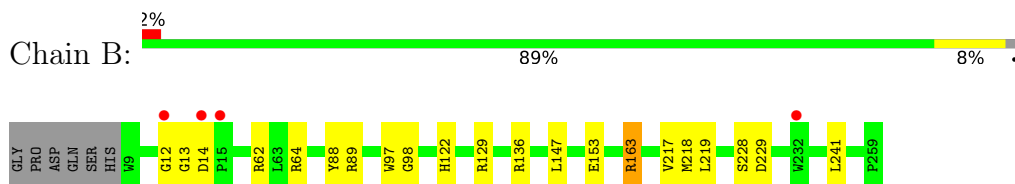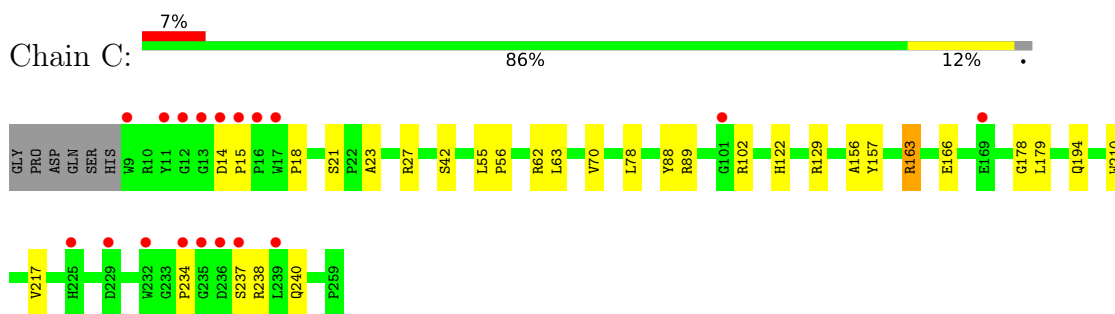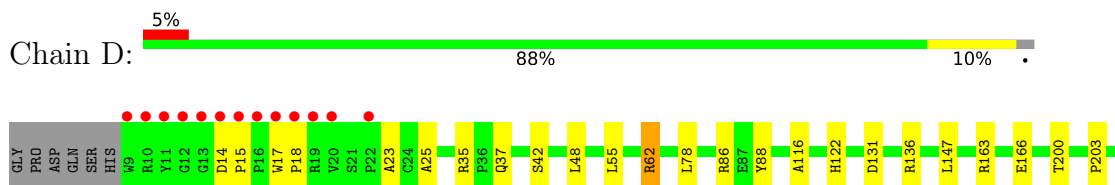
4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	H 3	Depositor
Cell constants a, b, c, α, β, γ	152.63Å　152.63Å　171.06Å 90.00°　90.00°　120.00°	Depositor
Resolution (Å)	61.73　–　2.35 61.65　–　2.35	Depositor EDS
% Data completeness (in resolution range)	97.5 (61.73-2.35) 97.5 (61.65-2.35)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.93 (at 2.34Å)	Xtriage
Refinement program	REFMAC 5.8.0350	Depositor
R, R_{free}	0.165　,　0.217 0.172　,　0.220	Depositor DCC
R_{free} test set	3095 reflections (5.13%)	wwPDB-VP
Wilson B-factor (Å^2)	26.3	Xtriage
Anisotropy	0.038	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.37 , 47.4	EDS
L-test for twinning[2]	$< |L| > = 0.49, < L^2 > = 0.33$	Xtriage
Estimated twinning fraction	0.025 for h,-h-k,-l	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	8452	wwPDB-VP
Average B, all atoms (Å^2)	34.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.74% 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 (i)

5.1   Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: ZN, IO6, GOL

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	0.40	0/1980	0.69	0/2708
1	B	0.44	0/1968	0.70	0/2694
1	C	0.41	0/1978	0.68	0/2706
1	D	0.45	0/2004	0.77	4/2738 (0.1%)
All	All	0.43	0/7930	0.71	4/10846 (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	2
1	B	0	4
1	C	0	4
1	D	0	3
All	All	0	13

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	D	62	ARG	NE-CZ-NH2	-6.99	116.80	120.30
1	D	86	ARG	NE-CZ-NH1	5.83	123.22	120.30
1	D	42[A]	SER	N-CA-CB	5.54	118.81	110.50
1	D	42[B]	SER	N-CA-CB	5.54	118.81	110.50

There are no chirality outliers.

All (13) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	238	ARG	Sidechain
1	A	35	ARG	Sidechain
1	B	129	ARG	Sidechain
1	B	136	ARG	Sidechain
1	B	163	ARG	Sidechain
1	B	62	ARG	Sidechain
1	C	102	ARG	Sidechain
1	C	129	ARG	Sidechain
1	C	163	ARG	Sidechain
1	C	62	ARG	Sidechain
1	D	136	ARG	Sidechain
1	D	163	ARG	Sidechain
1	D	62	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	1922	0	1858	12	0
1	B	1910	0	1836	8	0
1	C	1920	0	1851	16	0
1	D	1943	0	1893	11	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
3	A	21	0	0	1	0
3	B	21	0	0	0	0
3	C	21	0	0	0	0
3	D	21	0	0	1	0
4	A	6	0	8	5	0
4	B	6	0	8	0	0
4	C	6	0	8	0	0
4	D	6	0	8	0	0
5	A	124	0	0	0	0
5	B	171	0	0	3	0
5	C	142	0	0	2	0
5	D	208	0	0	2	0
All	All	8452	0	7470	50	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 3.

All (50) 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:37:GLN:HE21	1:A:37:GLN:HA	1.54	0.72
4:A:303:GOL:O3	4:A:303:GOL:H2	1.90	0.71
4:A:303:GOL:O3	4:A:303:GOL:C3	2.42	0.68
1:B:147:LEU:HD22	1:B:217:VAL:CG2	2.30	0.61
1:D:23:ALA:HB3	1:D:203:PRO:O	2.00	0.61
4:A:303:GOL:H2	4:A:303:GOL:HO3	1.65	0.60
1:D:48:LEU:HD21	1:D:211:THR:HG21	1.83	0.60
1:D:166:GLU:HG3	5:D:557:HOH:O	2.01	0.59
1:C:55:LEU:HD21	1:C:78:LEU:HD11	1.86	0.58
1:D:37:GLN:NE2	5:D:401:HOH:O	2.29	0.58
4:A:303:GOL:O3	4:A:303:GOL:C2	2.52	0.57
1:A:37:GLN:HA	1:A:37:GLN:NE2	2.19	0.56
1:D:55:LEU:HD21	1:D:78:LEU:HD11	1.86	0.56
1:B:153:GLU:HG3	5:B:470:HOH:O	2.04	0.56
1:B:98:GLY:HA2	1:B:241:LEU:HD23	1.87	0.56
1:A:23:ALA:HB3	1:A:203:PRO:O	2.06	0.55
1:D:88:TYR:HB3	1:D:122:HIS:HB3	1.89	0.54
1:A:71:GLN:HE22	4:A:303:GOL:H31	1.72	0.54
1:C:63:LEU:HD11	1:C:70:VAL:HG22	1.91	0.53
1:C:238:ARG:HD3	1:C:240:GLN:NE2	2.25	0.52
1:A:48:LEU:HD11	1:A:211:THR:HG21	1.93	0.51
1:D:14:ASP:HB3	1:D:15:PRO:HA	1.92	0.51
1:C:23:ALA:HB1	5:C:461:HOH:O	2.12	0.48
1:C:89:ARG:HD2	5:C:450:HOH:O	2.13	0.48
1:C:88:TYR:HB3	1:C:122:HIS:HB3	1.94	0.48
1:A:55:LEU:HD21	1:A:78:LEU:HD11	1.95	0.48
1:A:201:THR:OG1	3:A:302:IO6:C9	2.61	0.48
1:C:27:ARG:HH11	1:C:27:ARG:HG2	1.80	0.47
1:B:97:TRP:CD1	1:B:228:SER:HA	2.51	0.46
1:A:78:LEU:O	1:A:89:ARG:HA	2.15	0.46
1:B:88:TYR:HB3	1:B:122:HIS:HB3	1.98	0.45
1:B:218:MET:C	1:B:219:LEU:HD12	2.36	0.45
1:C:14:ASP:HB3	1:C:15:PRO:HA	2.00	0.44
1:C:63:LEU:HD11	1:C:70:VAL:CG2	2.48	0.44
1:C:194:GLN:HA	1:C:210:TRP:O	2.18	0.44
1:C:18:PRO:HA	1:C:21:SER:O	2.19	0.43
1:A:46:ARG:HB3	1:A:47:PRO:CD	2.49	0.42

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:200:THR:OG1	3:D:302:IO6:N7	2.53	0.42
1:A:37:GLN:HE21	1:A:37:GLN:CA	2.28	0.42
1:C:157:TYR:CE1	1:C:217:VAL:HG11	2.54	0.42
1:D:17:TRP:N	1:D:18:PRO:CD	2.83	0.42
1:C:56:PRO:O	1:C:178:GLY:HA3	2.21	0.41
1:C:163:ARG:HH11	1:C:166:GLU:CD	2.24	0.41
1:A:24:CYS:HA	1:A:204:CYS:CB	2.51	0.41
1:B:89:ARG:HB3	5:B:543:HOH:O	2.19	0.41
1:C:234:PRO:O	1:C:237:SER:HB3	2.21	0.41
1:B:64:ARG:NH1	5:B:407:HOH:O	2.54	0.41
1:C:156:ALA:HA	1:D:25:ALA:HB1	2.03	0.40
1:D:116:ALA:HB3	1:D:147:LEU:HB2	2.03	0.40
1:A:167:ILE:HA	1:A:172:SER:OG	2.21	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	249/257 (97%)	240 (96%)	9 (4%)	0	100	100
1	B	249/257 (97%)	241 (97%)	6 (2%)	2 (1%)	19	20
1	C	249/257 (97%)	241 (97%)	8 (3%)	0	100	100
1	D	250/257 (97%)	243 (97%)	7 (3%)	0	100	100
All	All	997/1028 (97%)	965 (97%)	30 (3%)	2 (0%)	47	56

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	12	GLY
1	B	13	GLY

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	199/210 (95%)	195 (98%)	4 (2%)	55	66
1	B	197/210 (94%)	194 (98%)	3 (2%)	65	76
1	C	199/210 (95%)	197 (99%)	2 (1%)	76	85
1	D	204/210 (97%)	201 (98%)	3 (2%)	65	76
All	All	799/840 (95%)	787 (98%)	12 (2%)	65	76

All (12) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	37	GLN
1	A	68	HIS
1	A	87	GLU
1	A	238	ARG
1	B	14	ASP
1	B	163	ARG
1	B	229	ASP
1	C	42	SER
1	C	179	LEU
1	D	35	ARG
1	D	131	ASP
1	D	246	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	37	GLN
1	A	71	GLN
1	B	37	GLN
1	B	71	GLN
1	B	159	GLN
1	C	71	GLN
1	C	240	GLN

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	D	159	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 monosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 12 ligands modelled in this entry, 4 are monoatomic - leaving 8 for Mogul analysis.

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
4	GOL	D	303	-	5,5,5	0.23	0	5,5,5	0.54	0
3	IO6	B	302	2	22,22,22	3.22	11 (50%)	32,34,34	6.83	22 (68%)
4	GOL	A	303	-	5,5,5	10.56	1 (20%)	5,5,5	3.21	1 (20%)
3	IO6	A	302	2	22,22,22	3.13	8 (36%)	32,34,34	6.97	23 (71%)
3	IO6	D	302	2	22,22,22	3.49	9 (40%)	32,34,34	6.71	20 (62%)
4	GOL	B	303	-	5,5,5	0.17	0	5,5,5	0.45	0
4	GOL	C	303	-	5,5,5	0.18	0	5,5,5	0.42	0
3	IO6	C	302	2	22,22,22	3.26	8 (36%)	32,34,34	6.44	21 (65%)

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
4	GOL	D	303	-	-	2/4/4/4	-
3	IO6	B	302	2	-	7/11/31/31	0/2/2/2
4	GOL	A	303	-	-	4/4/4/4	-
3	IO6	A	302	2	-	7/11/31/31	0/2/2/2
3	IO6	D	302	2	-	7/11/31/31	0/2/2/2
4	GOL	B	303	-	-	3/4/4/4	-
4	GOL	C	303	-	-	4/4/4/4	-
3	IO6	C	302	2	-	6/11/31/31	0/2/2/2

All (37) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	303	GOL	O3-C3	23.61	2.42	1.42
3	D	302	IO6	C10-C11	10.19	1.51	1.38
3	C	302	IO6	C10-C11	9.13	1.49	1.38
3	A	302	IO6	C10-C11	8.84	1.49	1.38
3	B	302	IO6	C10-C11	8.36	1.48	1.38
3	B	302	IO6	C11-S13	-7.77	1.66	1.76
3	C	302	IO6	C7-S1	-6.81	1.66	1.77
3	C	302	IO6	C11-S13	-6.73	1.67	1.76
3	D	302	IO6	C11-S13	-6.37	1.67	1.76
3	A	302	IO6	C11-S13	-5.85	1.68	1.76
3	D	302	IO6	C7-S1	-5.46	1.68	1.77
3	B	302	IO6	C7-S1	-5.11	1.69	1.77
3	D	302	IO6	C12-C11	4.58	1.46	1.39
3	A	302	IO6	C12-C7	4.56	1.47	1.39
3	A	302	IO6	C12-C11	4.43	1.46	1.39
3	A	302	IO6	C7-S1	-4.38	1.70	1.77
3	D	302	IO6	O18-C17	3.98	1.30	1.22
3	C	302	IO6	O18-C17	3.86	1.30	1.22
3	D	302	IO6	C12-C7	3.82	1.46	1.39
3	A	302	IO6	O18-C17	3.62	1.29	1.22
3	C	302	IO6	C12-C11	3.59	1.44	1.39
3	D	302	IO6	C8-C7	3.55	1.44	1.38
3	B	302	IO6	C12-C7	3.38	1.45	1.39
3	D	302	IO6	O14-S13	3.31	1.47	1.43
3	B	302	IO6	O18-C17	3.23	1.28	1.22
3	A	302	IO6	S1-N7	2.99	1.66	1.60
3	B	302	IO6	C12-C11	2.98	1.43	1.39
3	B	302	IO6	C10-C17	2.85	1.53	1.48

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	302	IO6	O14-S13	2.81	1.46	1.43
3	C	302	IO6	C12-C7	2.77	1.44	1.39
3	A	302	IO6	C8-C7	2.76	1.43	1.38
3	D	302	IO6	S1-N7	2.60	1.65	1.60
3	B	302	IO6	S1-N7	2.45	1.65	1.60
3	B	302	IO6	O14-S13	2.38	1.46	1.43
3	C	302	IO6	S13-N16	-2.17	1.64	1.66
3	B	302	IO6	S13-N16	-2.05	1.64	1.66
3	B	302	IO6	O15-S13	2.05	1.45	1.43

All (87) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	A	302	IO6	C12-C11-C10	-21.61	113.96	123.79
3	C	302	IO6	C12-C11-C10	-19.28	115.02	123.79
3	D	302	IO6	C12-C11-C10	-18.48	115.38	123.79
3	B	302	IO6	C12-C11-C10	-15.10	116.92	123.79
3	D	302	IO6	O5-S1-C7	-15.06	90.55	107.35
3	B	302	IO6	O6-S1-N7	14.53	128.90	107.36
3	B	302	IO6	O5-S1-O6	-14.22	95.38	118.76
3	C	302	IO6	O5-S1-C7	-13.06	92.78	107.35
3	B	302	IO6	O5-S1-C7	-12.77	93.10	107.35
3	B	302	IO6	C17-N16-S13	-12.37	107.97	115.16
3	B	302	IO6	C11-S13-N16	12.33	100.86	92.53
3	A	302	IO6	O5-S1-C7	-12.15	93.80	107.35
3	A	302	IO6	O5-S1-O6	-11.89	99.22	118.76
3	C	302	IO6	O6-S1-N7	11.76	124.80	107.36
3	D	302	IO6	O5-S1-O6	-11.73	99.49	118.76
3	C	302	IO6	O5-S1-O6	-11.59	99.72	118.76
3	D	302	IO6	O6-S1-N7	11.14	123.87	107.36
3	A	302	IO6	O6-S1-N7	10.64	123.14	107.36
3	A	302	IO6	C17-N16-S13	-10.52	109.05	115.16
3	D	302	IO6	O14-S13-C11	9.71	123.96	111.16
3	A	302	IO6	O6-S1-C7	9.41	117.85	107.35
3	D	302	IO6	O6-S1-C7	9.39	117.82	107.35
3	A	302	IO6	C11-S13-N16	9.16	98.72	92.53
3	A	302	IO6	O15-S13-C11	8.75	122.71	111.16
3	B	302	IO6	O14-S13-C11	8.56	122.45	111.16
3	C	302	IO6	O14-S13-C11	8.37	122.20	111.16
3	A	302	IO6	O15-S13-O14	-8.35	104.43	116.30
3	D	302	IO6	C17-N16-S13	-8.27	110.36	115.16
3	D	302	IO6	O15-S13-O14	-8.05	104.86	116.30

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	302	IO6	C11-S13-N16	7.50	97.59	92.53
3	D	302	IO6	O15-S13-N16	-7.47	103.54	109.98
3	D	302	IO6	C11-S13-N16	7.34	97.49	92.53
3	C	302	IO6	C17-N16-S13	-7.27	110.94	115.16
3	C	302	IO6	C7-S1-N7	7.20	118.57	108.38
4	A	303	GOL	O3-C3-C2	-7.15	75.94	110.20
3	A	302	IO6	C10-C17-N16	7.11	116.88	108.67
3	B	302	IO6	C10-C17-N16	6.93	116.68	108.67
3	D	302	IO6	C11-C10-C17	-6.68	105.02	112.24
3	B	302	IO6	C11-C10-C17	-6.56	105.15	112.24
3	C	302	IO6	O14-S13-N16	-6.47	104.40	109.98
3	B	302	IO6	O14-S13-N16	-6.45	104.42	109.98
3	A	302	IO6	C11-C10-C17	-6.40	105.32	112.24
3	C	302	IO6	C11-C10-C17	-6.38	105.35	112.24
3	D	302	IO6	C10-C17-N16	6.28	115.92	108.67
3	C	302	IO6	O15-S13-O14	-6.12	107.59	116.30
3	C	302	IO6	C10-C17-N16	5.73	115.29	108.67
3	B	302	IO6	O15-S13-N16	-5.41	105.31	109.98
3	B	302	IO6	C7-S1-N7	5.23	115.78	108.38
3	C	302	IO6	O5-S1-N7	-4.99	99.96	107.36
3	D	302	IO6	O18-C17-C10	-4.92	119.12	128.68
3	C	302	IO6	O18-C17-C10	-4.91	119.13	128.68
3	A	302	IO6	O18-C17-C10	-4.81	119.33	128.68
3	A	302	IO6	C7-C12-C11	4.32	125.09	120.29
3	A	302	IO6	C12-C7-S1	4.31	127.88	119.31
3	A	302	IO6	C12-C11-S13	4.24	136.00	127.95
3	A	302	IO6	C8-C7-C12	-4.21	115.45	120.62
3	B	302	IO6	O15-S13-O14	-4.16	110.39	116.30
3	B	302	IO6	C8-C7-C12	-4.14	115.53	120.62
3	A	302	IO6	O14-S13-N16	-4.09	106.45	109.98
3	D	302	IO6	C9-C8-C7	3.96	123.55	119.45
3	B	302	IO6	C9-C8-C7	3.95	123.54	119.45
3	C	302	IO6	C9-C8-C7	3.84	123.42	119.45
3	A	302	IO6	O14-S13-C11	3.72	116.06	111.16
3	D	302	IO6	C8-C7-C12	-3.68	116.11	120.62
3	C	302	IO6	O6-S1-C7	3.56	111.33	107.35
3	B	302	IO6	C9-C10-C17	3.54	135.41	129.63
3	A	302	IO6	O15-S13-N16	-3.47	106.99	109.98
3	B	302	IO6	O5-S1-N7	-3.33	102.43	107.36
3	C	302	IO6	C12-C11-S13	3.26	134.14	127.95
3	B	302	IO6	O18-C17-C10	-3.13	122.59	128.68
3	D	302	IO6	C12-C7-S1	3.07	125.41	119.31

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	B	302	IO6	C12-C11-S13	3.01	133.66	127.95
3	D	302	IO6	C7-C12-C11	2.97	123.60	120.29
3	D	302	IO6	C12-C11-S13	2.89	133.44	127.95
3	A	302	IO6	C9-C8-C7	2.88	122.43	119.45
3	B	302	IO6	C7-C12-C11	2.83	123.43	120.29
3	B	302	IO6	O6-S1-C7	2.82	110.50	107.35
3	C	302	IO6	O15-S13-C11	2.74	114.77	111.16
3	C	302	IO6	C8-C7-C12	-2.48	117.58	120.62
3	D	302	IO6	C9-C10-C17	2.47	133.66	129.63
3	B	302	IO6	C12-C7-S1	2.41	124.09	119.31
3	A	302	IO6	O5-S1-N7	2.35	110.85	107.36
3	C	302	IO6	C12-C7-S1	2.35	123.98	119.31
3	D	302	IO6	O15-S13-C11	2.33	114.23	111.16
3	A	302	IO6	C9-C10-C17	2.16	133.16	129.63
3	A	302	IO6	C8-C7-S1	-2.13	116.65	119.73
3	C	302	IO6	C9-C10-C11	2.03	122.02	119.91

There are no chirality outliers.

All (40) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	302	IO6	C20-C19-N16-S13
3	A	302	IO6	C20-C19-N16-C17
3	B	302	IO6	C20-C19-N16-S13
3	B	302	IO6	C20-C19-N16-C17
3	D	302	IO6	C20-C19-N16-C17
4	A	303	GOL	O1-C1-C2-C3
4	A	303	GOL	C1-C2-C3-O3
4	A	303	GOL	O2-C2-C3-O3
4	B	303	GOL	C1-C2-C3-O3
4	C	303	GOL	O1-C1-C2-O2
4	C	303	GOL	O1-C1-C2-C3
4	D	303	GOL	C1-C2-C3-O3
4	B	303	GOL	O1-C1-C2-C3
3	D	302	IO6	C8-C7-S1-N7
3	D	302	IO6	C19-C20-C21-C29
3	B	302	IO6	C8-C7-S1-N7
3	C	302	IO6	N16-C19-C20-C21
3	D	302	IO6	N16-C19-C20-C21
3	B	302	IO6	C12-C7-S1-N7
3	C	302	IO6	C8-C7-S1-N7
3	C	302	IO6	C12-C7-S1-N7

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms
3	D	302	IO6	C12-C7-S1-N7
3	C	302	IO6	C12-C7-S1-O5
3	D	302	IO6	C12-C7-S1-O5
3	B	302	IO6	C8-C7-S1-O5
3	B	302	IO6	C12-C7-S1-O5
3	D	302	IO6	C8-C7-S1-O5
3	C	302	IO6	C8-C7-S1-O5
3	C	302	IO6	C20-C21-C29-C30
3	A	302	IO6	C8-C7-S1-O5
3	A	302	IO6	C12-C7-S1-O5
4	C	303	GOL	O2-C2-C3-O3
3	A	302	IO6	C8-C7-S1-N7
3	B	302	IO6	C20-C21-C29-C30
3	A	302	IO6	C12-C7-S1-N7
4	C	303	GOL	C1-C2-C3-O3
3	A	302	IO6	C20-C21-C29-C30
4	A	303	GOL	O1-C1-C2-O2
4	D	303	GOL	O2-C2-C3-O3
4	B	303	GOL	O2-C2-C3-O3

There are no ring outliers.

3 monomers are involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	303	GOL	5	0
3	A	302	IO6	1	0
3	D	302	IO6	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 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 IO6 B 302

Bond lengths

Bond angles

Torsions

Rings

Ligand IO6 A 302

Bond lengths

Bond angles

Torsions

Rings

Ligand IO6 D 302

Bond lengths

Bond angles

Torsions

Rings

Ligand IO6 C 302

Bond lengths

Bond angles

Torsions

Rings
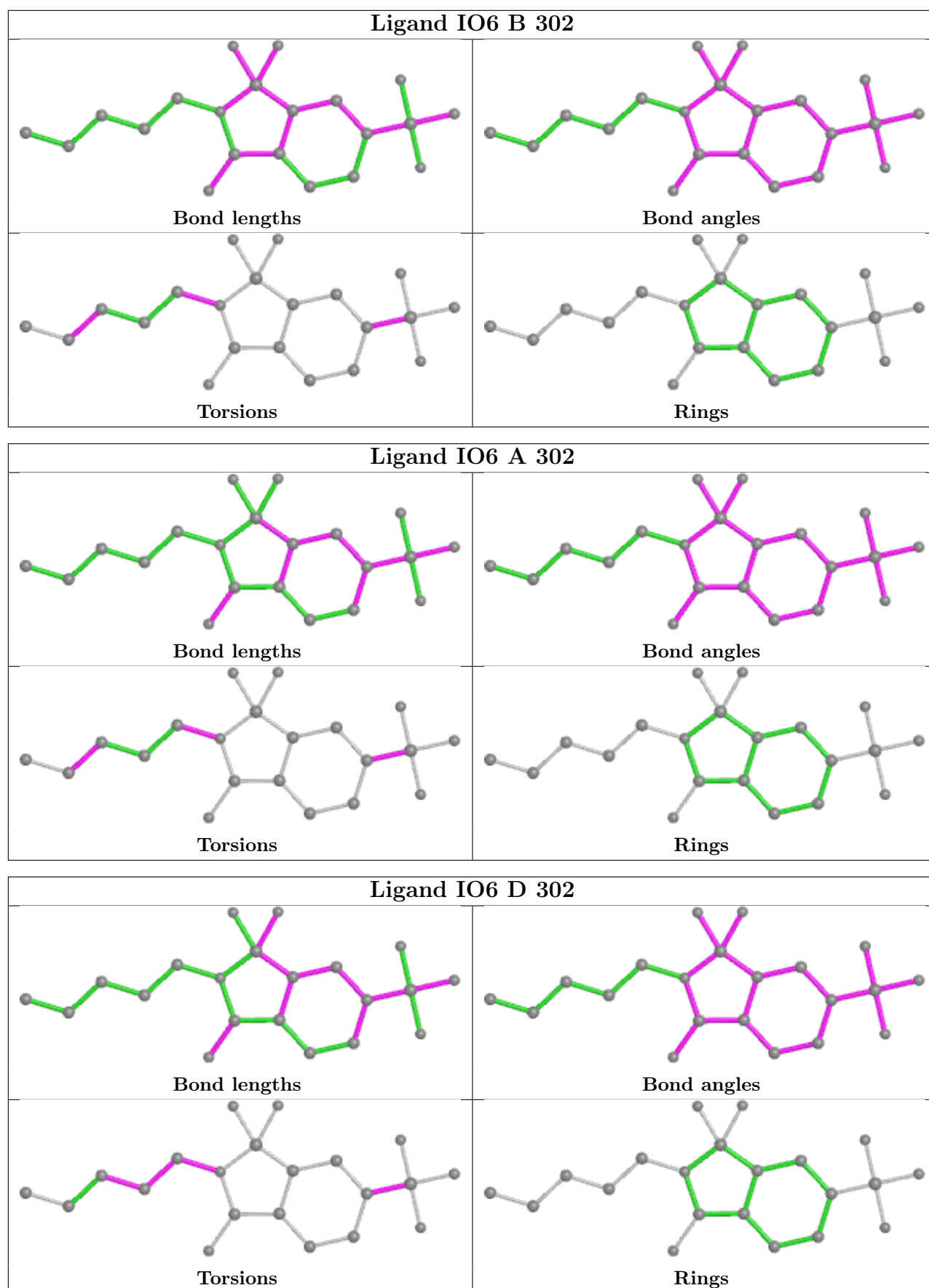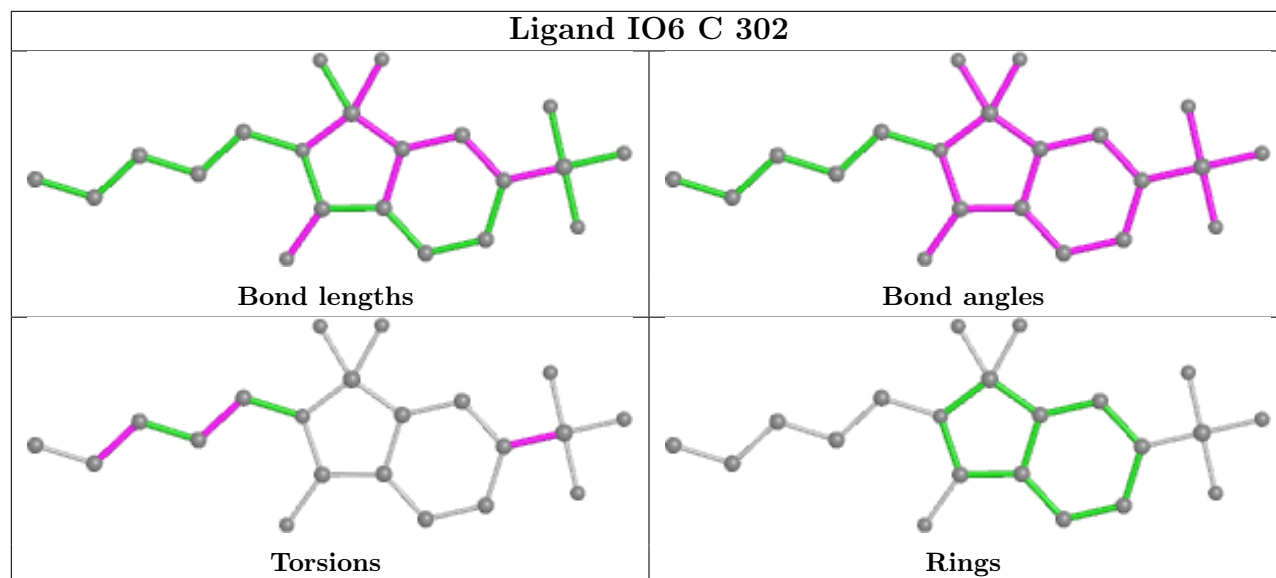
5.7　Other polymers ⓘ

There are no such residues in this entry.

5.8　Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å²)	Q<0.9
1	A	251/257 (97%)	-0.02	23 (9%)	9	14	19, 34, 74, 114	0
1	B	251/257 (97%)	-0.18	4 (1%)	72	80	12, 25, 68, 135	0
1	C	251/257 (97%)	-0.04	18 (7%)	15	23	18, 34, 69, 94	0
1	D	251/257 (97%)	-0.03	14 (5%)	24	35	13, 21, 82, 137	0
All	All	1004/1028 (97%)	-0.07	59 (5%)	22	33	12, 29, 73, 137	0

All (59) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	14	ASP	7.2
1	B	12	GLY	7.0
1	D	13	GLY	6.7
1	B	15	PRO	6.6
1	A	14	ASP	5.9
1	A	13	GLY	5.9
1	C	235	GLY	5.7
1	C	232	TRP	5.2
1	D	20	VAL	5.2
1	A	20	VAL	5.1
1	D	12	GLY	5.0
1	C	12	GLY	4.8
1	A	12	GLY	4.4
1	D	16	PRO	4.3
1	B	14	ASP	4.3
1	D	19	ARG	3.8
1	D	10	ARG	3.8
1	A	9	TRP	3.8
1	A	235	GLY	3.7
1	A	11	TYR	3.5
1	C	14	ASP	3.5

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	C	13	GLY	3.4
1	A	15	PRO	3.3
1	D	235	GLY	3.3
1	D	9	TRP	3.3
1	C	229	ASP	3.3
1	A	232	TRP	3.2
1	A	236	ASP	3.2
1	A	100	ALA	3.1
1	D	17	TRP	3.1
1	D	15	PRO	3.0
1	A	101	GLY	3.0
1	A	238	ARG	2.9
1	A	99	ALA	2.9
1	C	237	SER	2.8
1	D	18	PRO	2.7
1	A	102	ARG	2.7
1	C	236	ASP	2.7
1	A	16	PRO	2.7
1	A	237	SER	2.6
1	C	101	GLY	2.5
1	A	18	PRO	2.5
1	C	239	LEU	2.5
1	A	17	TRP	2.5
1	A	225	HIS	2.4
1	D	22	PRO	2.4
1	C	17	TRP	2.4
1	A	241	LEU	2.4
1	A	234	PRO	2.3
1	C	9	TRP	2.3
1	C	15	PRO	2.2
1	C	16	PRO	2.2
1	B	232	TRP	2.2
1	A	68	HIS	2.2
1	C	11	TYR	2.1
1	C	225	HIS	2.1
1	D	11	TYR	2.1
1	C	234	PRO	2.1
1	C	169	GLU	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 ⓘ

There are no monosaccharides in this entry.

6.4 Ligands ⓘ

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
4	GOL	D	303	6/6	0.72	0.22	57,61,64,65	0
4	GOL	A	303	6/6	0.86	0.18	38,61,68,70	0
4	GOL	B	303	6/6	0.90	0.25	47,53,58,60	0
4	GOL	C	303	6/6	0.93	0.18	51,57,62,62	0
3	IO6	A	302	21/21	0.94	0.23	43,66,73,73	0
3	IO6	D	302	21/21	0.95	0.20	41,63,80,83	0
3	IO6	C	302	21/21	0.97	0.20	38,56,85,88	0
3	IO6	B	302	21/21	0.97	0.17	31,47,62,66	0
2	ZN	A	301	1/1	0.99	0.09	27,27,27,27	0
2	ZN	B	301	1/1	0.99	0.10	23,23,23,23	0
2	ZN	C	301	1/1	0.99	0.07	29,29,29,29	0
2	ZN	D	301	1/1	0.99	0.09	21,21,21,21	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 IO6 A 302:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
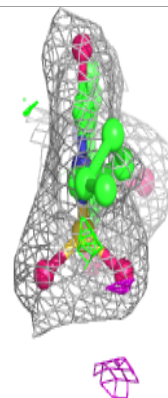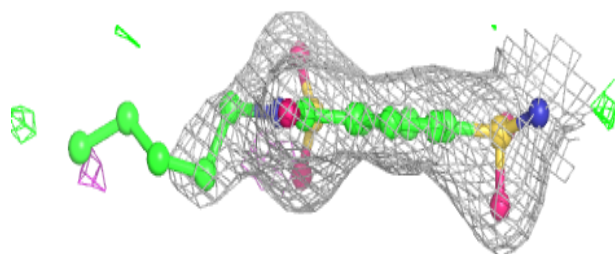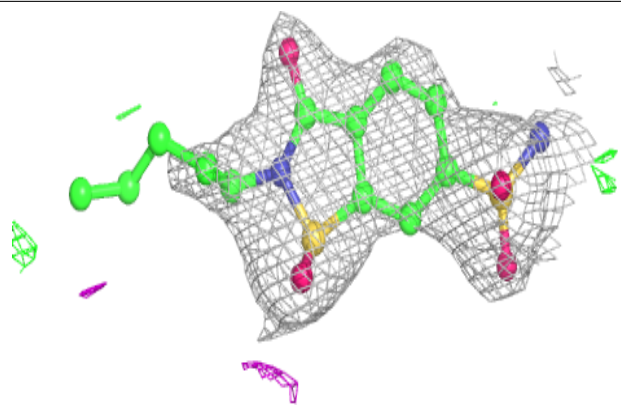mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
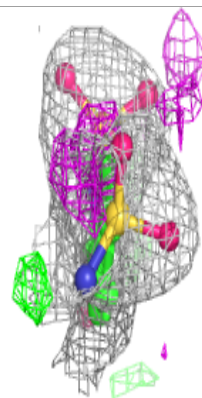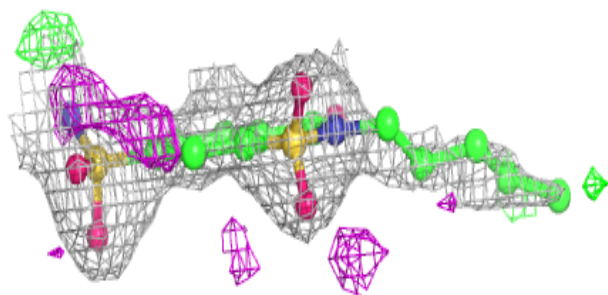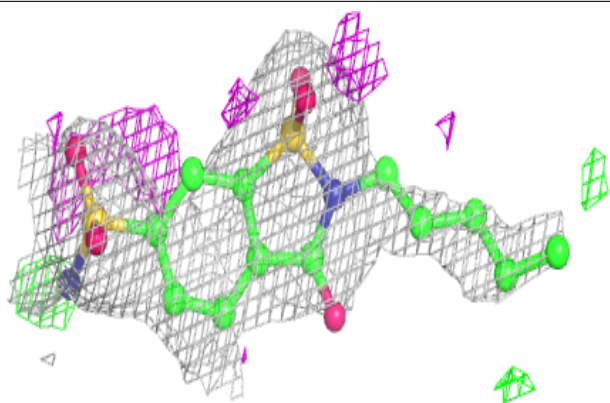
Electron density around IO6 D 302:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
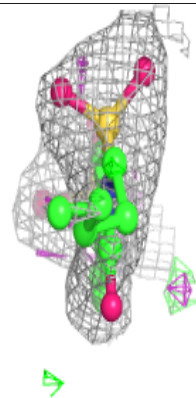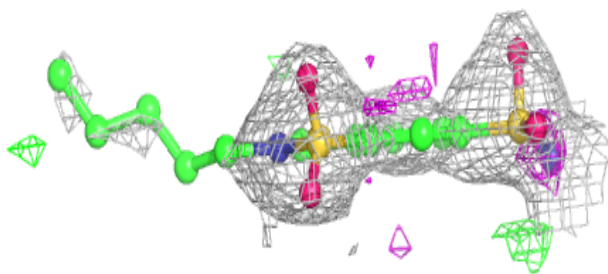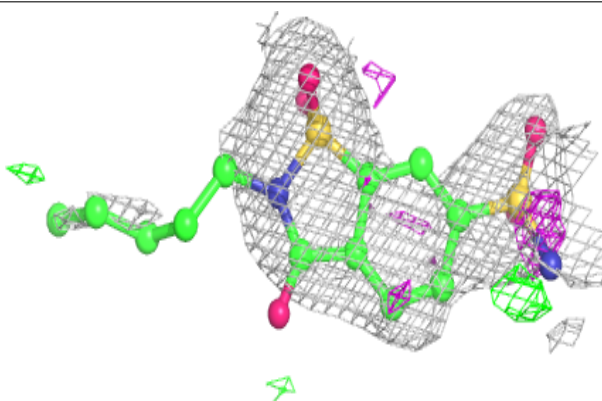
Electron density around IO6 C 302:

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 IO6 B 302:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)
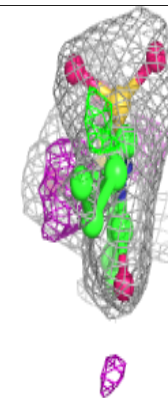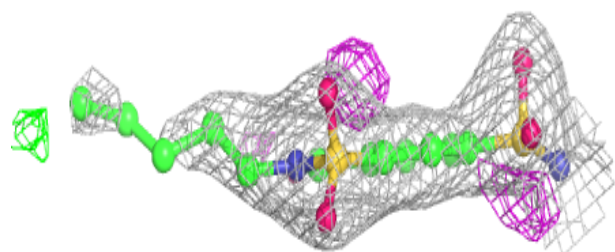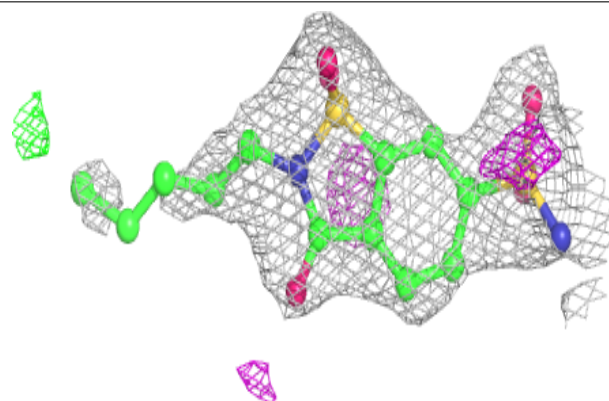
6.5 Other polymers (i)

There are no such residues in this entry.