Full wwPDB X-ray Structure Validation Report ⓘ

Oct 2, 2025 – 04:09 pm BST

PDB ID	:	9R8Y / pdb_00009r8y
Title	:	Three dimensional structure of human carbonic anhydrase IX in complex with sulfonamide
Authors	:	Leitans, J.; Tars, K.
Deposited on	:	2025-05-18
Resolution	:	1.95 Å(reported)

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

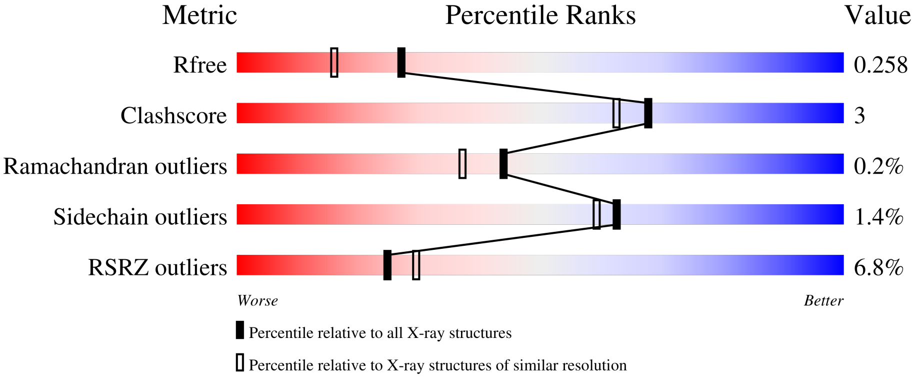
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.46

1 Overall quality at a glance ⓘ

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

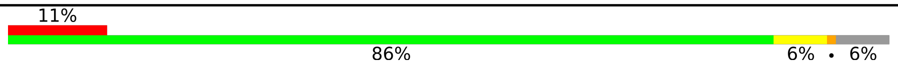
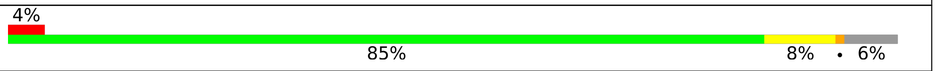
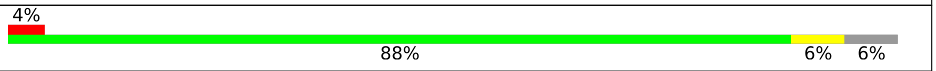
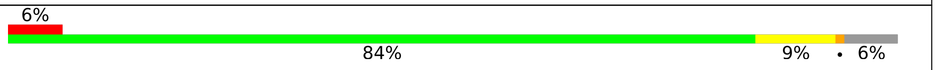
The reported resolution of this entry is 1.95 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	3187 (1.96-1.96)
Clashscore	180529	3412 (1.96-1.96)
Ramachandran outliers	177936	3390 (1.96-1.96)
Sidechain outliers	177891	3390 (1.96-1.96)
RSRZ outliers	164620	3186 (1.96-1.96)

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	256	
1	B	256	
1	C	256	
1	D	256	

2 Entry composition ⓘ

There are 4 unique types of molecules in this entry. The entry contains 8172 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	240	Total C N O S 1847 1174 327 342 4	0	0	0
1	B	240	Total C N O S 1850 1175 327 344 4	0	0	0
1	C	240	Total C N O S 1847 1174 327 342 4	0	0	0
1	D	240	Total C N O S 1837 1168 323 342 4	0	0	0

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	3	GLY	-	expression tag	UNP Q16790
A	41	SER	CYS	engineered mutation	UNP Q16790
A	213	GLN	ASN	engineered mutation	UNP Q16790
B	3	GLY	-	expression tag	UNP Q16790
B	41	SER	CYS	engineered mutation	UNP Q16790
B	213	GLN	ASN	engineered mutation	UNP Q16790
C	3	GLY	-	expression tag	UNP Q16790
C	41	SER	CYS	engineered mutation	UNP Q16790
C	213	GLN	ASN	engineered mutation	UNP Q16790
D	3	GLY	-	expression tag	UNP Q16790
D	41	SER	CYS	engineered mutation	UNP Q16790
D	213	GLN	ASN	engineered mutation	UNP Q16790

- Molecule 2 is ZINC ION (CCD ID: ZN) (formula: Zn).

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

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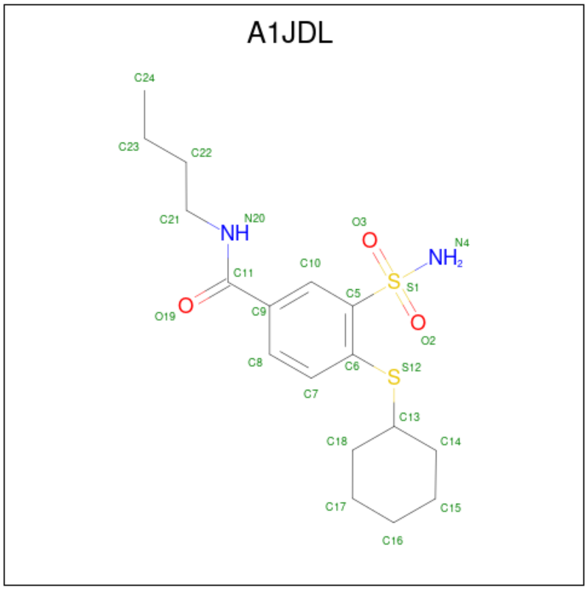
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	C	1	Total 1	Zn 1	0	0
2	D	1	Total 1	Zn 1	0	0

- Molecule 3 is {N}-butyl-4-cyclohexylsulfanyl-3-sulfamoyl-benzamide (CCD ID: A1JDL) (formula: $C_{17}H_{26}N_2O_3S_2$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total 24	C 17	N 2	O 3	S 2	0	0
3	B	1	Total 24	C 17	N 2	O 3	S 2	0	0
3	C	1	Total 24	C 17	N 2	O 3	S 2	0	0
3	D	1	Total 24	C 17	N 2	O 3	S 2	0	0

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	161	Total 161	O 161	0	0
4	B	232	Total 232	O 232	0	0
4	C	164	Total 164	O 164	0	0

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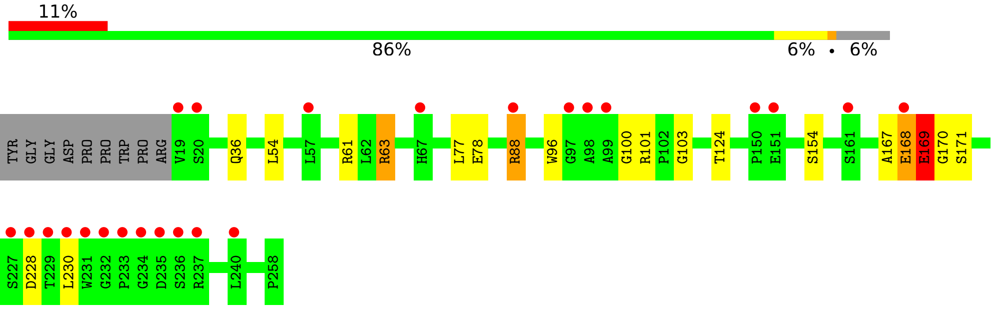
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	D	134	Total O 134 134	0	0

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.

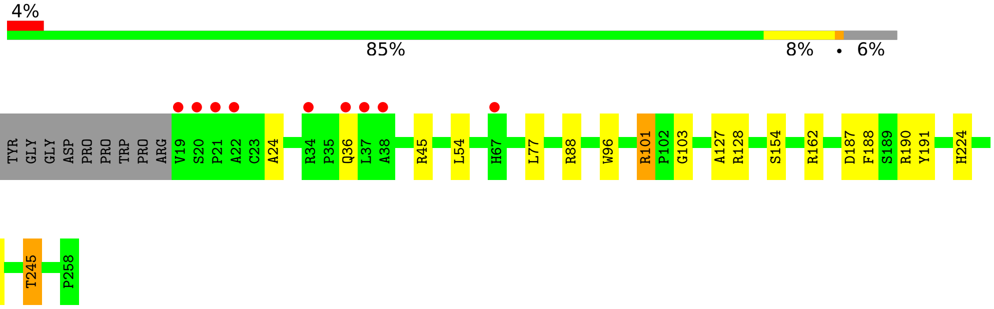
- Molecule 1: Carbonic anhydrase 9

Chain A:



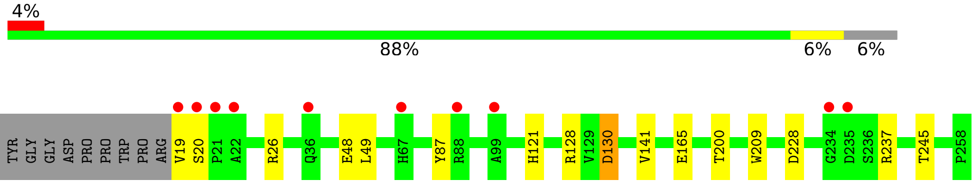
- Molecule 1: Carbonic anhydrase 9

Chain B:



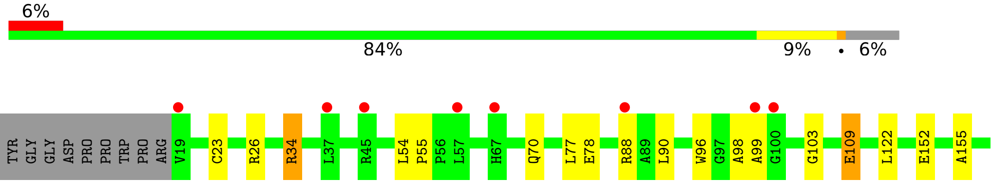
- Molecule 1: Carbonic anhydrase 9

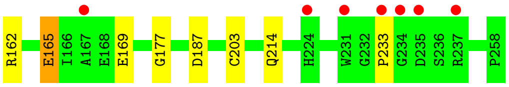
Chain C:



- Molecule 1: Carbonic anhydrase 9

Chain D:




R162
E165
I166
A167
E168
E169
G177
D187
C203
Q214
H224
W231
G232
P233
G234
D235
S236
R237
P258

4 Data and refinement statistics

Property	Value	Source
Space group	H 3	Depositor
Cell constants a, b, c, α, β, γ	151.92Å 151.92Å 173.68Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	47.81 – 1.95 47.81 – 1.95	Depositor EDS
% Data completeness (in resolution range)	96.1 (47.81-1.95) 96.1 (47.81-1.95)	Depositor EDS
R_{merge}	0.22	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.87 (at 1.95Å)	Xtriage
Refinement program	REFMAC 5.8.0425	Depositor
R, R_{free}	0.213 , 0.254 0.221 , 0.258	Depositor DCC
R_{free} test set	5484 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å^2)	24.4	Xtriage
Anisotropy	0.024	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 45.2	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.34$	Xtriage
Estimated twinning fraction	0.016 for h,-h-k,-l	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	8172	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 4.68% of the height of the origin peak. No significant pseudotranslation is detected.*

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[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: A1JDL, ZN

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	0.70	0/1897	1.07	2/2587 (0.1%)
1	B	0.77	0/1900	1.18	3/2591 (0.1%)
1	C	0.67	1/1897 (0.1%)	1.04	2/2587 (0.1%)
1	D	0.65	0/1887	1.04	1/2576 (0.0%)
All	All	0.70	1/7581 (0.0%)	1.08	8/10341 (0.1%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand.A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1
1	B	0	1
1	D	0	1
All	All	0	3

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	26	ARG	C-N	-6.45	1.25	1.33

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	245	THR	CA-CB-OG1	-7.68	98.09	109.60
1	D	109	GLU	CB-CG-CD	6.35	123.40	112.60
1	C	26	ARG	O-C-N	-6.18	114.15	122.43
1	A	170	GLY	N-CA-C	-5.64	107.97	114.69
1	C	165	GLU	CB-CA-C	-5.45	100.55	110.63

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	169	GLU	N-CA-C	-5.16	99.80	110.80
1	B	36	GLN	N-CA-CB	5.14	117.67	110.12
1	B	36	GLN	CB-CA-C	-5.10	102.33	110.79

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	63	ARG	Sidechain
1	B	162	ARG	Sidechain
1	D	34	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	1847	0	1813	10	0
1	B	1850	0	1815	15	0
1	C	1847	0	1813	8	0
1	D	1837	0	1791	18	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	24	0	0	0	0
3	B	24	0	0	0	0
3	C	24	0	0	0	0
3	D	24	0	0	0	0
4	A	161	0	0	2	0
4	B	232	0	0	2	0
4	C	164	0	0	1	0
4	D	134	0	0	3	0
All	All	8172	0	7232	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:B:224:HIS:CD2	1:B:228:ASP:OD2	2.51	0.64
1:D:187:ASP:CB	1:D:214:GLN:OE1	2.47	0.63
1:C:19:VAL:HG13	1:C:20:SER:H	1.66	0.61
1:A:168:GLU:O	1:A:169:GLU:HB2	2.02	0.59
1:A:54:LEU:HD21	1:A:77:LEU:HD11	1.84	0.58
1:B:101:ARG:HH21	1:B:101:ARG:HG2	1.72	0.55
1:A:36:GLN:NE2	4:A:404:HOH:O	2.40	0.54
1:D:187:ASP:N	1:D:214:GLN:OE1	2.41	0.53
1:A:61:ARG:HH11	1:A:63:ARG:HD2	1.73	0.53
1:B:224:HIS:NE2	1:B:228:ASP:OD2	2.42	0.53
1:D:187:ASP:HB3	1:D:214:GLN:OE1	2.09	0.52
1:D:26:ARG:HH11	1:D:26:ARG:HG2	1.76	0.51
1:D:98:ALA:O	1:D:99:ALA:C	2.54	0.49
1:B:233:PRO:O	1:B:236:SER:HB3	2.13	0.49
1:D:152:GLU:HG2	4:D:522:HOH:O	2.12	0.49
1:A:78:GLU:HG2	1:A:88:ARG:HD2	1.93	0.49
1:B:187:ASP:OD2	1:B:190:ARG:HD3	2.13	0.48
1:B:54:LEU:HD21	1:B:77:LEU:HD11	1.96	0.48
1:B:101:ARG:HG2	1:B:101:ARG:NH2	2.29	0.48
1:A:88:ARG:HG2	4:A:501:HOH:O	2.13	0.48
1:B:127:ALA:C	1:B:128:ARG:HG3	2.38	0.48
1:C:128:ARG:NH1	1:C:130:ASP:OD2	2.47	0.48
1:B:24:ALA:HB1	1:D:155:ALA:HA	1.96	0.46
1:A:96:TRP:C	1:A:103:GLY:HA3	2.41	0.46
1:D:214:GLN:HG2	4:D:462:HOH:O	2.17	0.45
1:C:228:ASP:OD1	1:C:237:ARG:NH1	2.50	0.45
1:B:45:ARG:NH2	4:B:409:HOH:O	2.50	0.45
1:D:54:LEU:HD21	1:D:77:LEU:HD11	1.99	0.44
1:D:34:ARG:NH2	1:D:109:GLU:HG2	2.32	0.44
1:D:90:LEU:HD11	1:D:122:LEU:HB2	2.00	0.44
1:A:88:ARG:NH1	1:A:124:THR:HG22	2.33	0.44
1:B:45:ARG:O	1:B:191:TYR:OH	2.32	0.44
1:D:96:TRP:C	1:D:103:GLY:HA3	2.42	0.44
1:D:70:GLN:NE2	4:D:406:HOH:O	2.47	0.44
1:D:162:ARG:O	1:D:165:GLU:HG3	2.18	0.44
1:B:188:PHE:HB2	4:B:530:HOH:O	2.17	0.43
1:B:228:ASP:O	1:B:237:ARG:NH2	2.52	0.43
1:A:167:ALA:HA	1:A:230:LEU:HD23	2.00	0.43
1:D:23:CYS:SG	1:D:203:CYS:CB	3.07	0.42
1:D:55:PRO:O	1:D:177:GLY:HA3	2.19	0.42
1:B:96:TRP:C	1:B:103:GLY:HA3	2.45	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:87:TYR:HB3	1:C:121:HIS:HB3	2.02	0.42
1:D:169:GLU:OE1	1:D:233:PRO:HA	2.19	0.42
1:C:141:VAL:HG11	1:C:209:TRP:CZ3	2.55	0.41
1:C:48:GLU:C	1:C:49:LEU:HD12	2.46	0.41
1:C:245:THR:HG21	4:C:409:HOH:O	2.21	0.41
1:D:78:GLU:HG2	1:D:88:ARG:CD	2.51	0.41
1:A:100:GLY:C	1:A:101:ARG:HG2	2.46	0.40
1:B:88:ARG:HG2	1:B:88:ARG:HH11	1.86	0.40
1:C:19:VAL:O	1:C:20:SER:C	2.64	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	238/256 (93%)	226 (95%)	10 (4%)	2 (1%)	16	8
1	B	238/256 (93%)	232 (98%)	6 (2%)	0	100	100
1	C	238/256 (93%)	233 (98%)	5 (2%)	0	100	100
1	D	238/256 (93%)	230 (97%)	8 (3%)	0	100	100
All	All	952/1024 (93%)	921 (97%)	29 (3%)	2 (0%)	44	37

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	168	GLU
1	A	169	GLU

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	195/209 (93%)	190 (97%)	5 (3%)	41	33
1	B	196/209 (94%)	193 (98%)	3 (2%)	60	57
1	C	195/209 (93%)	193 (99%)	2 (1%)	73	72
1	D	193/209 (92%)	192 (100%)	1 (0%)	86	86
All	All	779/836 (93%)	768 (99%)	11 (1%)	62	59

All (11) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	88	ARG
1	A	154	SER
1	A	169	GLU
1	A	171	SER
1	A	228	ASP
1	B	101	ARG
1	B	154	SER
1	B	245	THR
1	C	130	ASP
1	C	200	THR
1	D	165	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	36	GLN
1	A	70	GLN
1	A	224	HIS
1	A	239	GLN
1	A	246	GLN
1	B	70	GLN
1	C	224	HIS
1	D	53	GLN

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Mol	Chain	Res	Type
1	D	70	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 ⓘ

Of 8 ligands modelled in this entry, 4 are monoatomic - leaving 4 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	$\#\|Z\| > 2$
3	A1JDL	C	302	2	24,25,25	2.53	5 (20%)	34,34,34	2.63	10 (29%)
3	A1JDL	B	302	2	24,25,25	2.73	6 (25%)	34,34,34	2.76	10 (29%)
3	A1JDL	A	302	2	24,25,25	2.97	4 (16%)	34,34,34	2.25	9 (26%)
3	A1JDL	D	302	2	24,25,25	2.96	4 (16%)	34,34,34	2.87	9 (26%)

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	A1JDL	C	302	2	-	2/19/27/27	0/2/2/2
3	A1JDL	B	302	2	-	4/19/27/27	0/2/2/2
3	A1JDL	A	302	2	-	2/19/27/27	0/2/2/2
3	A1JDL	D	302	2	-	5/19/27/27	0/2/2/2

All (19) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	D	302	A1JDL	C5-S1	-12.15	1.62	1.77
3	A	302	A1JDL	C5-S1	-11.60	1.63	1.77
3	C	302	A1JDL	C5-S1	-8.08	1.67	1.77
3	C	302	A1JDL	C6-C5	7.79	1.53	1.40
3	B	302	A1JDL	C5-S1	-7.75	1.67	1.77
3	B	302	A1JDL	C6-C5	7.51	1.52	1.40
3	A	302	A1JDL	C6-C5	6.39	1.50	1.40
3	D	302	A1JDL	C6-S12	-4.97	1.69	1.77
3	D	302	A1JDL	C6-C5	4.51	1.47	1.40
3	A	302	A1JDL	C6-S12	-4.41	1.70	1.77
3	B	302	A1JDL	C6-S12	-3.77	1.71	1.77
3	B	302	A1JDL	C10-C9	3.70	1.44	1.39
3	B	302	A1JDL	C10-C5	2.74	1.43	1.39
3	A	302	A1JDL	C10-C9	2.62	1.43	1.39
3	C	302	A1JDL	C10-C5	2.55	1.43	1.39
3	C	302	A1JDL	C6-S12	-2.52	1.73	1.77
3	D	302	A1JDL	C10-C5	2.21	1.42	1.39
3	C	302	A1JDL	C10-C9	2.12	1.42	1.39
3	B	302	A1JDL	S1-N4	2.10	1.64	1.60

All (38) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	D	302	A1JDL	O2-S1-O3	-9.78	102.69	118.76
3	B	302	A1JDL	O2-S1-C5	7.82	118.76	107.29
3	C	302	A1JDL	O2-S1-O3	-7.60	106.27	118.76
3	D	302	A1JDL	C6-S12-C13	7.55	118.53	103.84
3	B	302	A1JDL	C6-S12-C13	7.48	118.40	103.84
3	C	302	A1JDL	O3-S1-C5	6.55	116.88	107.29
3	D	302	A1JDL	C10-C5-C6	-6.31	115.14	120.61
3	A	302	A1JDL	C10-C5-C6	-6.26	115.19	120.61
3	C	302	A1JDL	O2-S1-N4	6.21	116.58	107.36
3	C	302	A1JDL	C10-C5-C6	-5.84	115.55	120.61
3	B	302	A1JDL	C10-C5-C6	-5.72	115.65	120.61

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	A	302	A1JDL	O2-S1-O3	-5.10	110.38	118.76
3	A	302	A1JDL	O3-S1-N4	4.93	114.67	107.36
3	B	302	A1JDL	O2-S1-O3	-4.57	111.24	118.76
3	D	302	A1JDL	O2-S1-C5	4.43	113.79	107.29
3	D	302	A1JDL	C5-S1-N4	3.94	115.54	108.28
3	C	302	A1JDL	C10-C5-S1	3.82	122.90	118.34
3	B	302	A1JDL	O2-S1-N4	-3.70	101.88	107.36
3	B	302	A1JDL	O3-S1-N4	3.55	112.62	107.36
3	A	302	A1JDL	O3-S1-C5	-3.46	102.21	107.29
3	B	302	A1JDL	C21-N20-C11	3.44	129.92	122.08
3	B	302	A1JDL	C7-C6-C5	3.35	121.44	117.89
3	B	302	A1JDL	C5-S1-N4	-2.89	102.94	108.28
3	C	302	A1JDL	C7-C6-C5	2.79	120.83	117.89
3	A	302	A1JDL	C16-C17-C18	2.75	117.02	111.42
3	C	302	A1JDL	C6-S12-C13	2.66	109.01	103.84
3	A	302	A1JDL	C7-C6-S12	-2.59	116.66	121.84
3	B	302	A1JDL	C5-C6-S12	-2.57	117.76	120.80
3	D	302	A1JDL	C9-C10-C5	2.52	124.26	120.52
3	C	302	A1JDL	C5-C6-S12	-2.41	117.95	120.80
3	C	302	A1JDL	C14-C13-C18	2.30	116.67	110.73
3	D	302	A1JDL	O2-S1-N4	-2.27	103.99	107.36
3	A	302	A1JDL	C5-S1-N4	2.26	112.44	108.28
3	A	302	A1JDL	C7-C6-C5	2.25	120.27	117.89
3	C	302	A1JDL	C8-C9-C10	2.21	121.85	119.24
3	D	302	A1JDL	C15-C16-C17	2.18	117.89	111.18
3	A	302	A1JDL	C6-C5-S1	2.17	124.14	122.42
3	D	302	A1JDL	C10-C5-S1	2.12	120.88	118.34

There are no chirality outliers.

All (13) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	302	A1JDL	C5-C6-S12-C13
3	B	302	A1JDL	C18-C13-S12-C6
3	D	302	A1JDL	C18-C13-S12-C6
3	D	302	A1JDL	C14-C13-S12-C6
3	D	302	A1JDL	C21-C22-C23-C24
3	A	302	A1JDL	N20-C21-C22-C23
3	C	302	A1JDL	C21-C22-C23-C24
3	B	302	A1JDL	C6-C5-S1-O3
3	D	302	A1JDL	C6-C5-S1-O2
3	B	302	A1JDL	C14-C13-S12-C6

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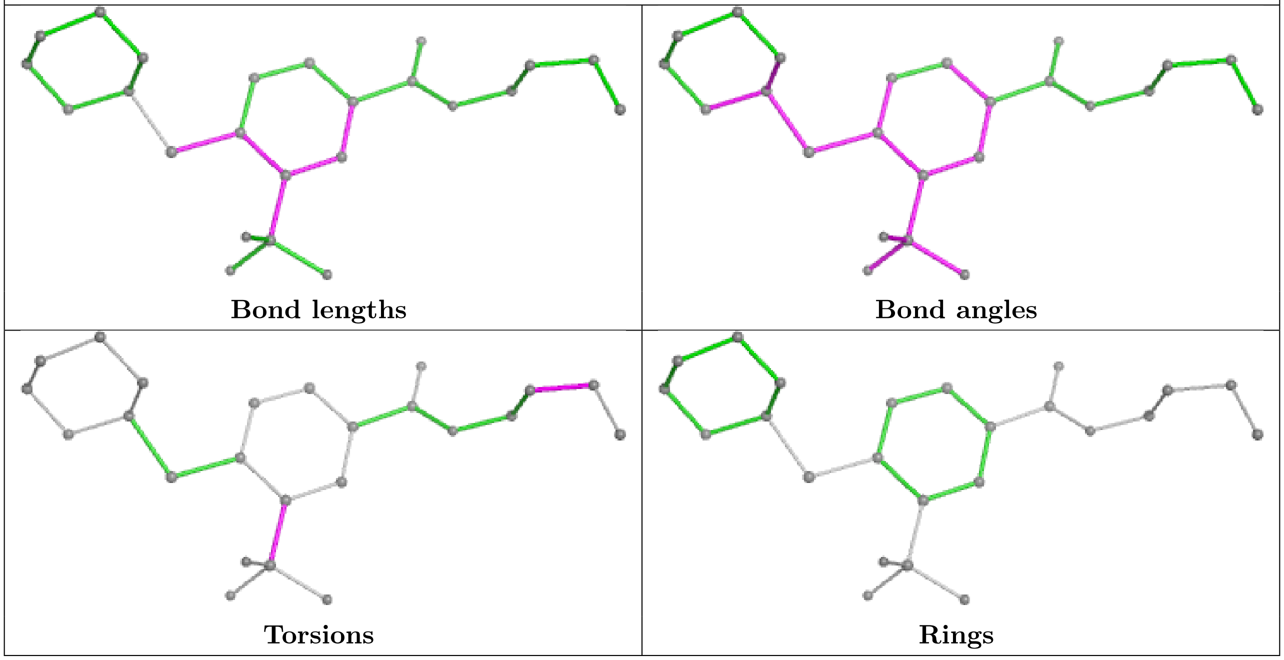
Mol	Chain	Res	Type	Atoms
3	B	302	A1JDL	C6-C5-S1-N4
3	C	302	A1JDL	C6-C5-S1-N4
3	D	302	A1JDL	C6-C5-S1-N4

There are no ring outliers.

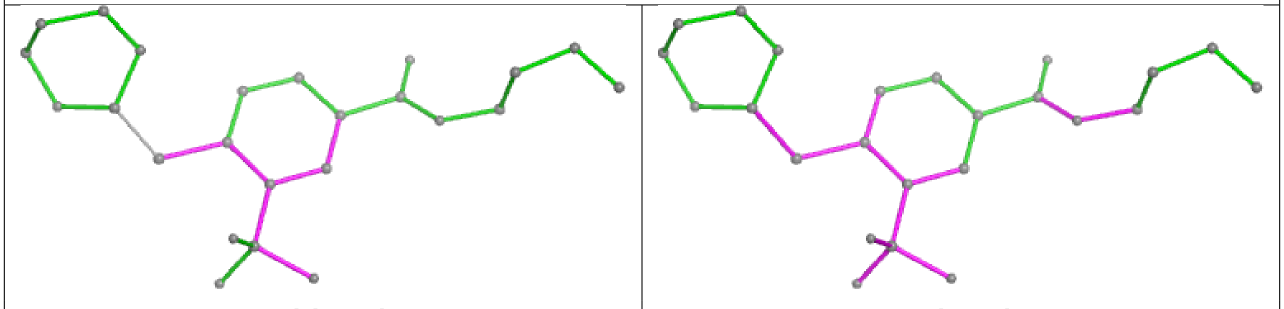
No monomer is involved in short contacts.

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 A1JDL C 302

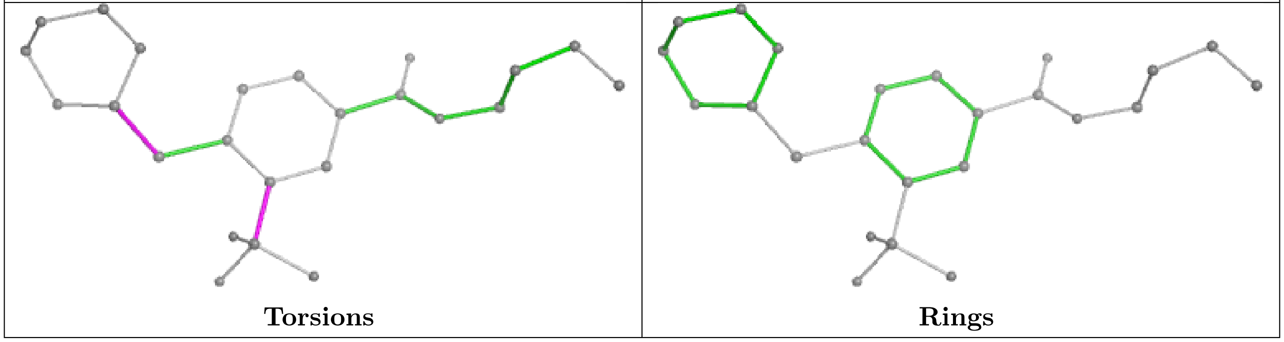


Ligand A1JDL B 302



Bond lengths

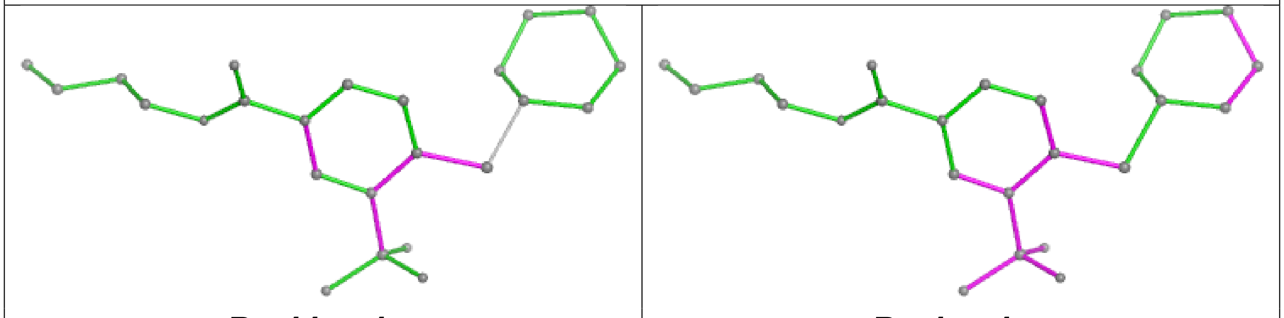
Bond angles



Torsions

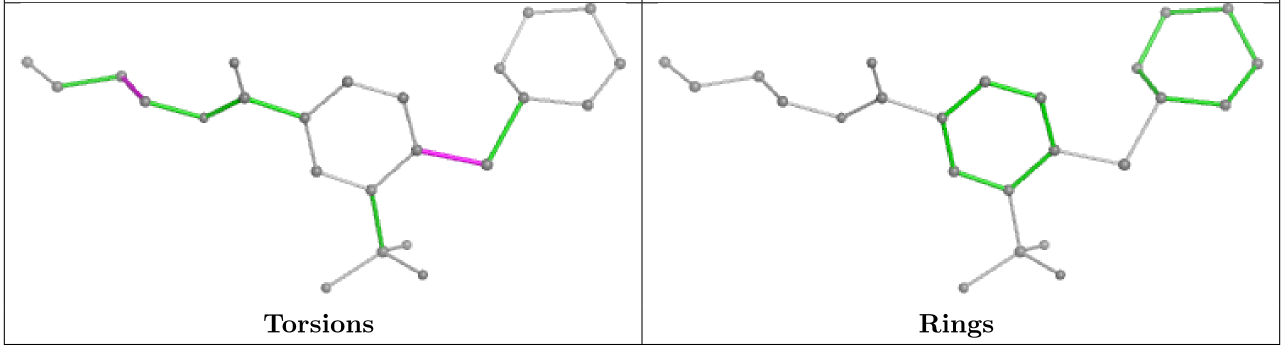
Rings

Ligand A1JDL A 302



Bond lengths

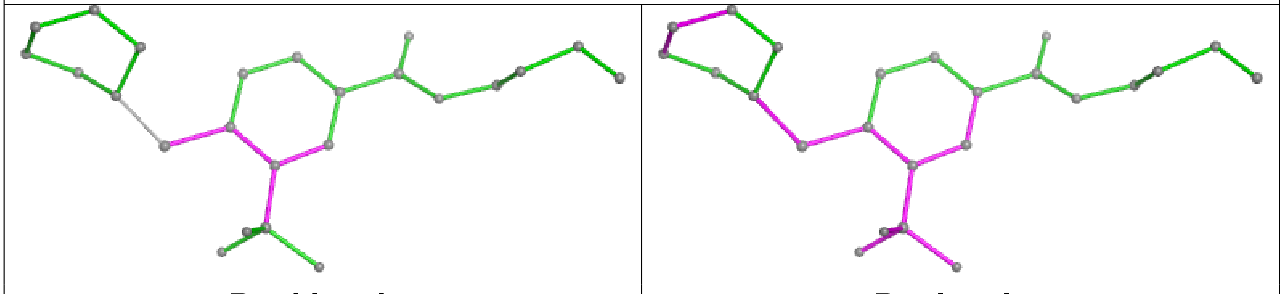
Bond angles



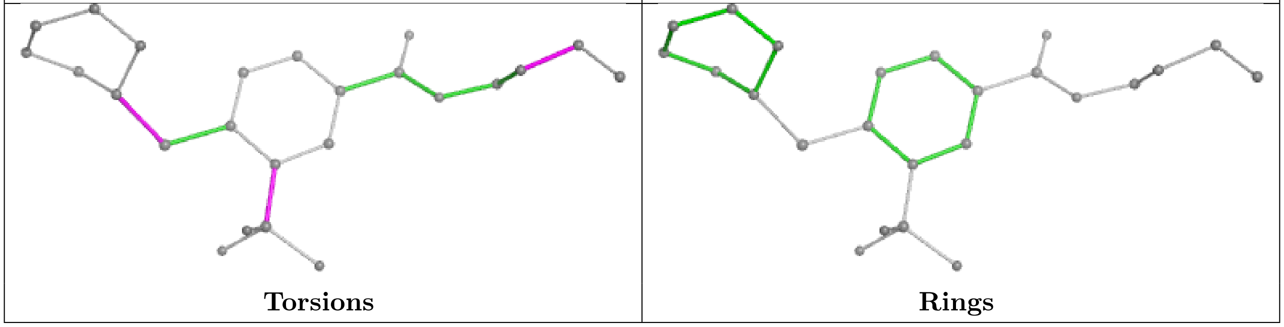
Torsions

Rings

Ligand A1JDL D 302



Bond lengths **Bond angles**



Torsions **Rings**

5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 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	240/256 (93%)	0.62	29 (12%)	10	12	17, 31, 66, 97	0
1	B	240/256 (93%)	0.17	11 (4%)	38	44	14, 24, 50, 100	0
1	C	240/256 (93%)	0.40	10 (4%)	41	48	19, 32, 57, 88	0
1	D	240/256 (93%)	0.58	15 (6%)	27	33	19, 35, 65, 89	0
All	All	960/1024 (93%)	0.44	65 (6%)	25	29	14, 30, 59, 100	0

All (65) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	19	VAL	7.6
1	B	19	VAL	7.2
1	C	19	VAL	6.8
1	D	19	VAL	6.8
1	A	233	PRO	4.9
1	B	22	ALA	4.1
1	A	99	ALA	3.9
1	A	231	TRP	3.9
1	C	22	ALA	3.8
1	B	36	GLN	3.7
1	D	88	ARG	3.6
1	C	21	PRO	3.5
1	A	67	HIS	3.5
1	D	231	TRP	3.4
1	B	21	PRO	3.2
1	A	98	ALA	3.2
1	D	235	ASP	3.1
1	B	37	LEU	3.1
1	C	20	SER	3.1
1	A	232	GLY	3.0
1	B	20	SER	3.0

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Mol	Chain	Res	Type	RSRZ
1	A	234	GLY	2.9
1	B	235	ASP	2.9
1	D	100	GLY	2.8
1	C	67	HIS	2.8
1	D	167	ALA	2.7
1	D	234	GLY	2.7
1	C	99	ALA	2.7
1	A	20	SER	2.7
1	A	161	SER	2.6
1	C	235	ASP	2.6
1	C	234	GLY	2.6
1	A	88	ARG	2.6
1	D	45	ARG	2.5
1	A	217	MET	2.5
1	B	67	HIS	2.5
1	D	237	ARG	2.5
1	D	99	ALA	2.5
1	C	36	GLN	2.5
1	B	236	SER	2.4
1	A	228	ASP	2.4
1	A	236	SER	2.4
1	A	235	ASP	2.4
1	D	67	HIS	2.4
1	D	233	PRO	2.4
1	A	229	THR	2.4
1	A	151	GLU	2.3
1	A	227	SER	2.3
1	A	224	HIS	2.3
1	A	150	PRO	2.2
1	B	34	ARG	2.2
1	A	218	LEU	2.2
1	A	97	GLY	2.2
1	B	38	ALA	2.2
1	A	168	GLU	2.1
1	A	223	LEU	2.1
1	D	224	HIS	2.1
1	A	237	ARG	2.1
1	A	226	LEU	2.1
1	A	240	LEU	2.1
1	A	57	LEU	2.0
1	A	230	LEU	2.0
1	D	37	LEU	2.0

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Mol	Chain	Res	Type	RSRZ
1	C	88	ARG	2.0
1	D	57	LEU	2.0

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

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

6.3 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

6.4 Ligands ⓘ

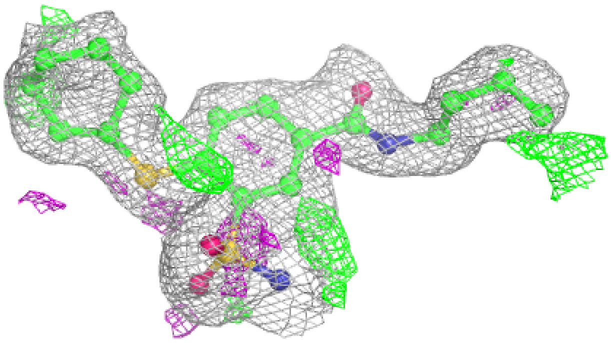
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

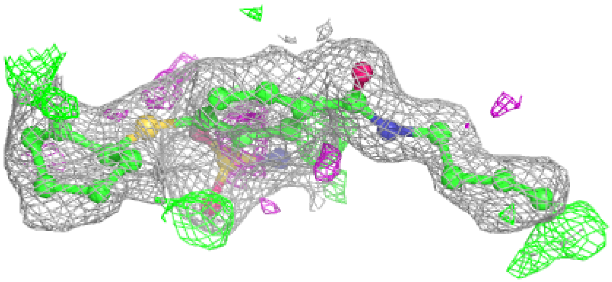
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($Å^2$)	Q<0.9
3	A1JDL	B	302	24/24	0.89	0.16	31,39,44,46	0
3	A1JDL	C	302	24/24	0.92	0.14	35,41,50,58	0
3	A1JDL	D	302	24/24	0.94	0.13	30,38,50,56	0
3	A1JDL	A	302	24/24	0.96	0.11	27,31,46,51	0
2	ZN	C	301	1/1	0.99	0.02	25,25,25,25	0
2	ZN	D	301	1/1	0.99	0.02	26,26,26,26	0
2	ZN	A	301	1/1	0.99	0.03	26,26,26,26	0
2	ZN	B	301	1/1	1.00	0.01	18,18,18,18	0

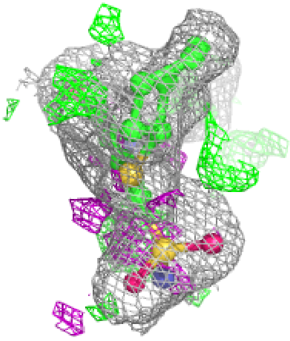
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around A1JDL 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)

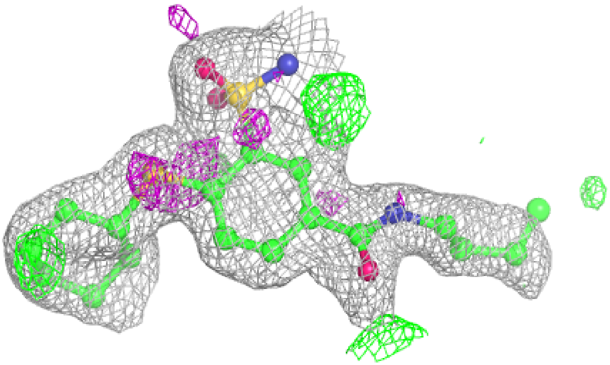


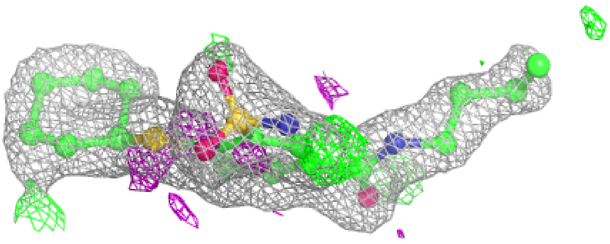


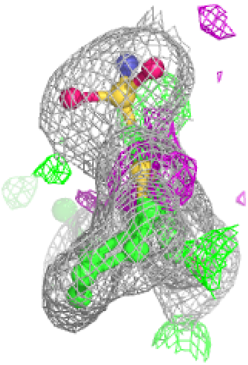


Electron density around A1JDL C 302:

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

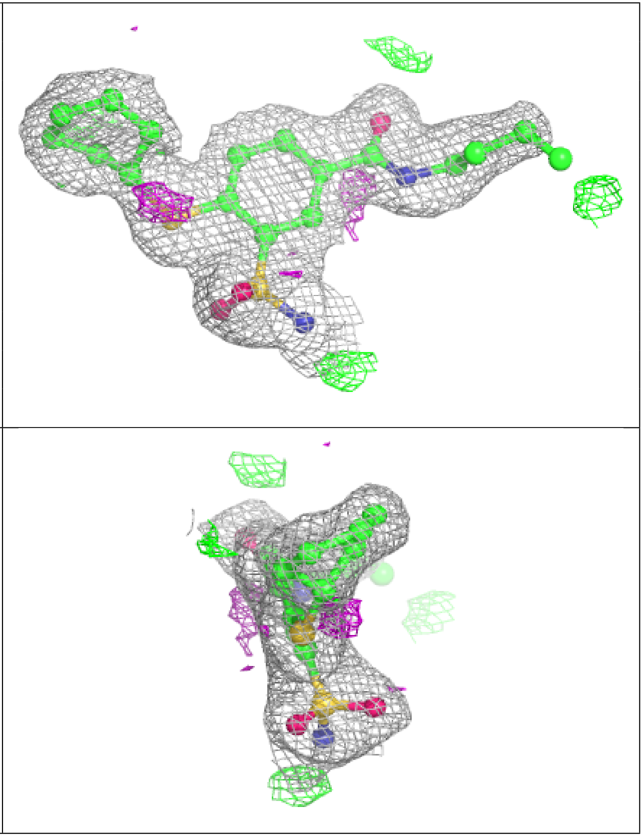






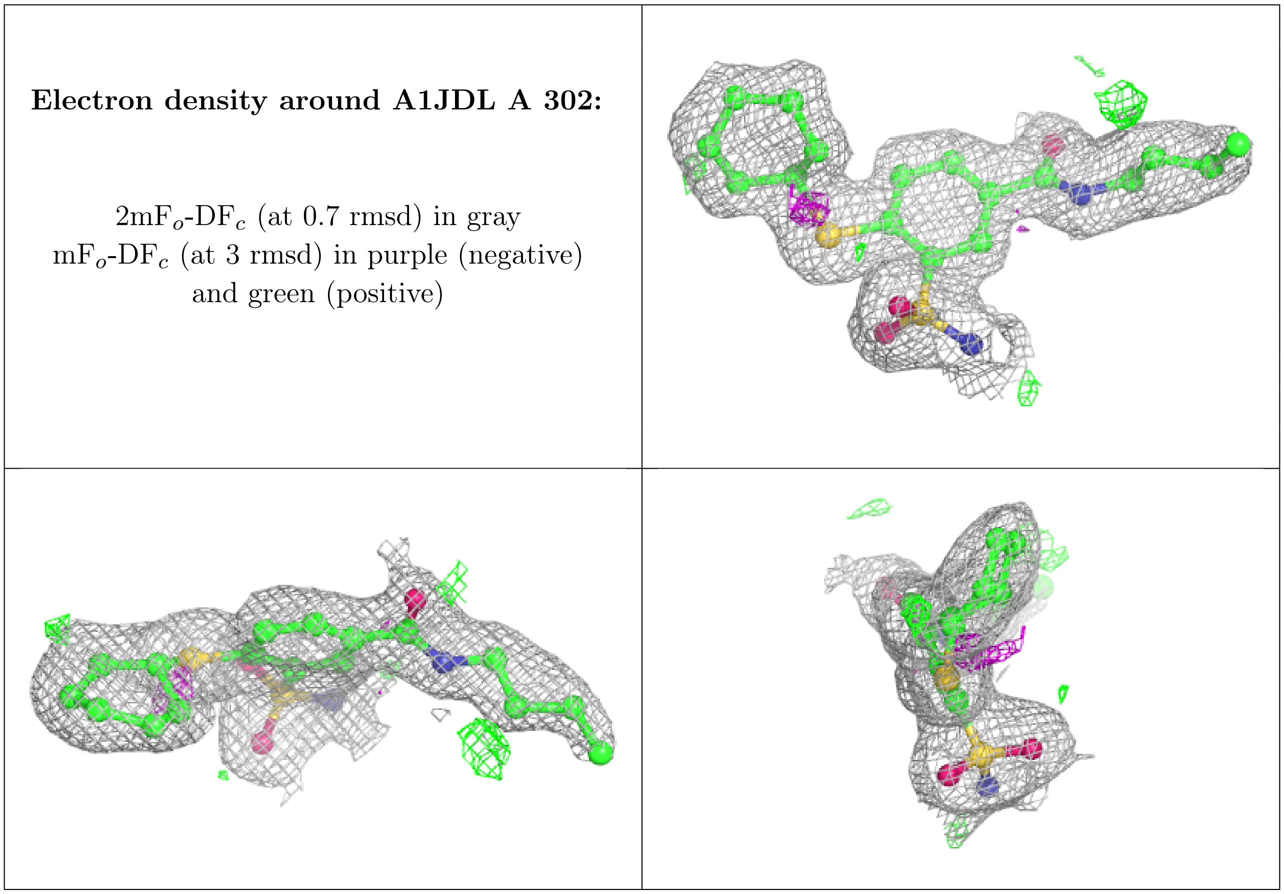
Electron density around A1JDL D 302:

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



Electron density around A1JDL 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)



6.5 Other polymers ⓘ

There are no such residues in this entry.