



Full wwPDB X-ray Structure Validation Report ⓘ

Jul 10, 2024 – 01:16 am BST

PDB ID : 9FMM
Title : Structure of human ACE2 in complex with a fluorinated small molecule inhibitor
Authors : Benoit, R.B.; Rodrigues, M.J.; Wieser, M.M.
Deposited on : 2024-06-06
Resolution : 2.50 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 : 1.8.4, CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.37.1
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) : 2.37.1

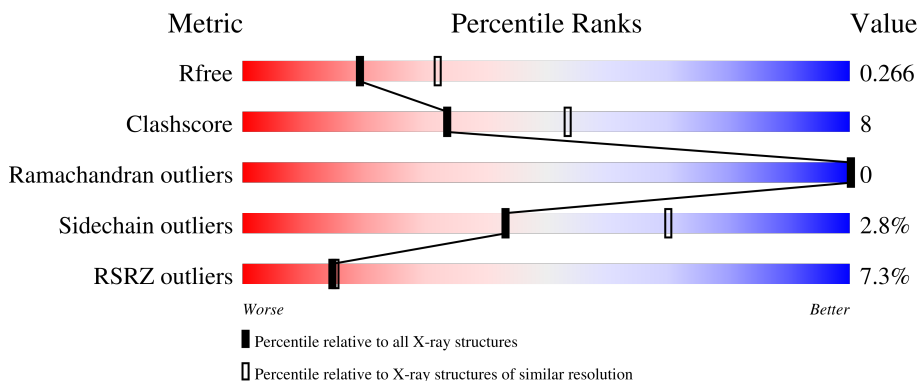
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

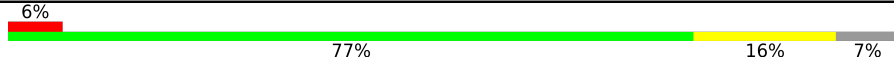
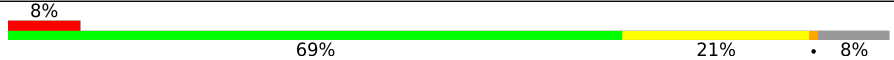
The reported resolution of this entry is 2.50 Å.

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	4661 (2.50-2.50)
Clashscore	141614	5346 (2.50-2.50)
Ramachandran outliers	138981	5231 (2.50-2.50)
Sidechain outliers	138945	5233 (2.50-2.50)
RSRZ outliers	127900	4559 (2.50-2.50)

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	730	
1	B	730	

2 Entry composition i

There are 8 unique types of molecules in this entry. The entry contains 11357 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.

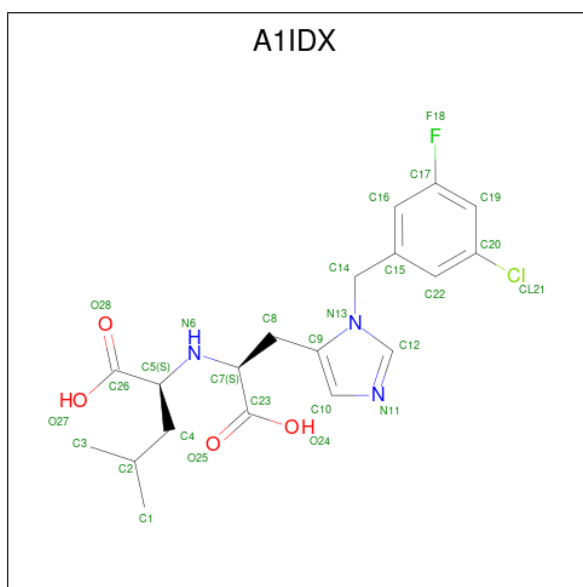
- Molecule 1 is a protein called Angiotensin-converting enzyme 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	677	Total	C	N	O	S	170	0	0
			5541	3545	925	1038	33			
1	B	669	Total	C	N	O	S	248	0	0
			5481	3509	914	1025	33			

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	741	HIS	-	expression tag	UNP Q9BYF1
A	742	HIS	-	expression tag	UNP Q9BYF1
A	743	HIS	-	expression tag	UNP Q9BYF1
A	744	HIS	-	expression tag	UNP Q9BYF1
A	745	HIS	-	expression tag	UNP Q9BYF1
A	746	HIS	-	expression tag	UNP Q9BYF1
A	747	HIS	-	expression tag	UNP Q9BYF1
A	748	HIS	-	expression tag	UNP Q9BYF1
B	741	HIS	-	expression tag	UNP Q9BYF1
B	742	HIS	-	expression tag	UNP Q9BYF1
B	743	HIS	-	expression tag	UNP Q9BYF1
B	744	HIS	-	expression tag	UNP Q9BYF1
B	745	HIS	-	expression tag	UNP Q9BYF1
B	746	HIS	-	expression tag	UNP Q9BYF1
B	747	HIS	-	expression tag	UNP Q9BYF1
B	748	HIS	-	expression tag	UNP Q9BYF1

- Molecule 2 is (2 {S})-2-[[(2 {S})-3-[3-[(3-chloranyl-5-fluoranyl-phenyl)methyl]imidazol-4-yl]-1-oxidanyl-1-oxidanylidene-propan-2-yl]amino]-4-methyl-pentanoic acid (three-letter code: A1IDX) (formula: C₁₉H₂₃ClFN₃O₄) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf		
			Total	C	Cl	F	N			O	
2	A	1	Total	28	19	1	1	3	4	0	0
2	B	1	Total	28	19	1	1	3	4	0	0

- Molecule 3 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).



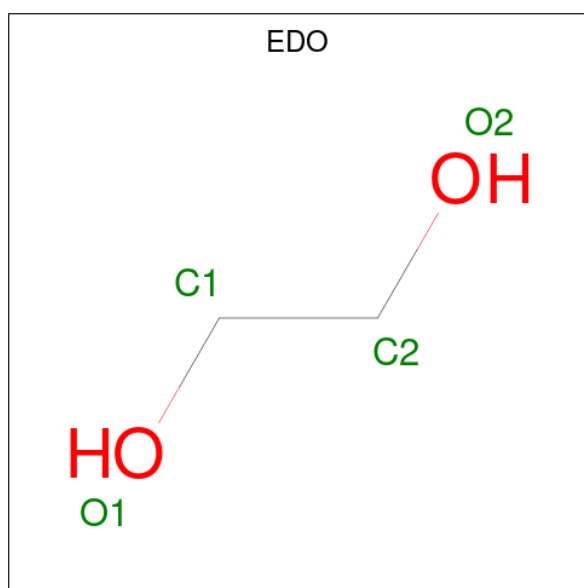
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf		
			Total	C	N			O	
3	A	1	Total	14	8	1	5	0	0

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
3	A	1	Total 14	C 8	N 1	O 5	0	0
3	A	1	Total 14	C 8	N 1	O 5	0	0
3	B	1	Total 14	C 8	N 1	O 5	0	0
3	B	1	Total 14	C 8	N 1	O 5	0	0
3	B	1	Total 14	C 8	N 1	O 5	0	0

- Molecule 4 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C₂H₆O₂).



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

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

- Molecule 5 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

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

- Molecule 6 is SODIUM ION (three-letter code: NA) (formula: Na).

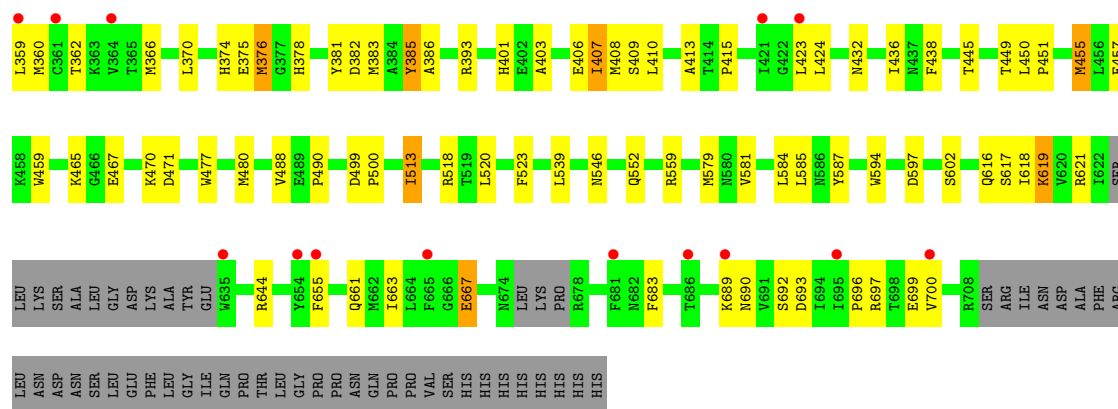
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	1	Total Na 1 1	0	0
6	B	1	Total Na 1 1	0	0

- Molecule 7 is ZINC ION (three-letter code: ZN) (formula: Zn).

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

- Molecule 8 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	A	72	Total O 72 72	0	0
8	B	80	Total O 80 80	0	0



4 Data and refinement statistics i

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	99.30Å 82.90Å 105.50Å 90.00° 104.20° 90.00°	Depositor
Resolution (Å)	48.36 – 2.50 48.36 – 2.50	Depositor EDS
% Data completeness (in resolution range)	98.2 (48.36-2.50) 98.1 (48.36-2.50)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.42 (at 2.51Å)	Xtrriage
Refinement program	PHENIX 1.20_4459, PHENIX 1.20_4459	Depositor
R, R_{free}	0.213 , 0.265 0.214 , 0.266	Depositor DCC
R_{free} test set	2838 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å ²)	53.3	Xtrriage
Anisotropy	0.431	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 44.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	11357	wwPDB-VP
Average B, all atoms (Å ²)	60.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.69% of the height of the origin peak. No significant pseudotranslation is detected.*

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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: A1IDX, ZN, CL, NAG, NA, EDO

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	0.42	0/5689	0.58	0/7717
1	B	0.43	0/5628	0.58	0/7634
All	All	0.43	0/11317	0.58	0/15351

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

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	5541	0	5321	71	0
1	B	5481	0	5259	103	0
2	A	28	0	0	1	0
2	B	28	0	0	0	0
3	A	42	0	39	2	0
3	B	42	0	39	3	0
4	A	20	0	30	2	0
4	B	16	0	24	1	0
5	A	1	0	0	1	0
5	B	2	0	0	1	0
6	A	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	B	1	0	0	0	0
7	A	1	0	0	0	0
7	B	1	0	0	0	0
8	A	72	0	0	1	0
8	B	80	0	0	0	0
All	All	11357	0	10712	176	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 8.

All (176) 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:293:VAL:HG21	1:B:423:LEU:HB3	1.60	0.82
1:A:55:THR:HG21	3:A:802:NAG:H62	1.61	0.82
1:A:104:GLY:HA2	1:A:194:ASN:HD21	1.50	0.75
1:B:315:PHE:CE2	1:B:408:MET:HG3	2.28	0.68
1:B:135:PRO:HB2	1:B:689:LYS:HB3	1.75	0.68
1:B:539:LEU:HD23	1:B:587:TYR:HD2	1.59	0.66
1:A:655:PHE:O	1:A:661:GLN:N	2.28	0.66
1:A:597:ASP:HA	1:A:600:LYS:HE2	1.77	0.66
1:B:445:THR:O	1:B:449:THR:HG23	1.95	0.66
1:B:305:GLN:O	1:B:309:LYS:HB2	1.97	0.64
1:B:162:LEU:HD23	1:B:692:SER:HB3	1.80	0.63
1:B:317:SER:HB3	1:B:546:ASN:H	1.66	0.61
1:B:308:PHE:HE1	1:B:362:THR:HG21	1.66	0.60
1:A:690:ASN:ND2	1:A:693:ASP:HB2	2.16	0.60
1:B:306:ARG:O	1:B:310:GLU:HB2	2.01	0.60
1:A:620:VAL:HG12	1:A:681:PHE:H	1.66	0.60
1:B:370:LEU:HD21	1:B:413:ALA:HB2	1.83	0.60
1:B:375:GLU:O	1:B:378:HIS:HB2	2.03	0.59
1:A:315:PHE:CE2	1:A:408:MET:HG3	2.38	0.58
1:A:104:GLY:O	1:A:106:SER:N	2.32	0.58
1:B:229:THR:HB	1:B:581:VAL:CG2	2.33	0.58
1:B:293:VAL:HG21	1:B:423:LEU:HD13	1.85	0.58
1:B:72:PHE:CE1	1:B:76:GLN:HG3	2.38	0.57
1:A:457:GLU:HG2	1:A:513:ILE:HG23	1.86	0.57
1:B:370:LEU:HG	1:B:409:SER:HB2	1.87	0.57
1:A:96:GLN:HB3	1:A:391:LEU:HD13	1.86	0.57
1:A:273:ARG:HG3	1:A:452:PHE:CE2	2.40	0.56
1:A:617:SER:OG	1:A:682:ASN:HB3	2.05	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:229:THR:HB	1:B:581:VAL:HG21	1.89	0.55
1:A:696:PRO:HB2	1:A:699:GLU:HG2	1.88	0.55
1:A:455:MET:HE3	1:A:480:MET:HB2	1.87	0.55
1:A:142:LEU:HD22	1:A:147:GLY:HA3	1.88	0.55
1:B:308:PHE:CE1	1:B:362:THR:HG21	2.41	0.55
1:B:273:ARG:O	1:B:449:THR:HG22	2.08	0.55
1:B:356:PHE:CE2	1:B:383:MET:HG2	2.42	0.54
1:A:294:THR:HG23	1:A:365:THR:HA	1.89	0.54
1:A:647:VAL:O	1:A:651:MET:HG2	2.07	0.54
1:B:293:VAL:CG2	1:B:423:LEU:HB3	2.34	0.54
1:A:555:PHE:CE2	1:A:559:ARG:HD2	2.42	0.54
1:A:690:ASN:HD22	1:A:693:ASP:HB2	1.73	0.54
1:B:523:PHE:CE2	1:B:584:LEU:HD13	2.43	0.54
1:B:155:SER:O	1:B:161:ARG:HD2	2.09	0.53
3:A:805:NAG:H83	3:A:805:NAG:H3	1.90	0.53
1:B:690:ASN:ND2	1:B:693:ASP:HB2	2.23	0.53
1:B:269:ASP:OD1	1:B:272:GLY:N	2.41	0.52
1:A:104:GLY:HA2	1:A:194:ASN:ND2	2.23	0.52
1:B:294:THR:CG2	1:B:366:MET:H	2.23	0.51
1:A:374:HIS:HA	1:A:405:GLY:HA3	1.92	0.51
1:B:455:MET:HE3	1:B:480:MET:HB2	1.92	0.51
1:A:578:ASN:OD1	1:A:579:MET:N	2.38	0.51
1:B:327:PHE:HD1	1:B:357:ARG:HA	1.76	0.51
1:A:511:SER:HB3	4:A:809:EDO:H12	1.92	0.50
1:B:465:LYS:HG2	1:B:467:GLU:OE2	2.11	0.50
1:A:253:PRO:O	1:A:254:SER:OG	2.26	0.50
1:A:552:GLN:NE2	1:A:556:ASN:OD1	2.45	0.50
1:B:293:VAL:HG22	1:B:293:VAL:O	2.13	0.49
1:B:55:THR:O	1:B:59:VAL:HG23	2.13	0.49
1:B:644:ARG:NH2	1:B:667:GLU:OE1	2.42	0.49
1:B:112:LYS:NZ	1:B:189:GLU:OE2	2.38	0.49
1:A:20:THR:HG23	1:A:23:GLU:H	1.77	0.49
1:A:206:ASP:OD2	1:A:398:GLU:HG2	2.12	0.49
1:A:620:VAL:HG11	1:A:681:PHE:CD2	2.48	0.49
1:B:294:THR:HG22	1:B:366:MET:H	1.78	0.49
1:A:201:ASP:CG	1:A:219:ARG:HE	2.16	0.49
1:A:524:GLN:HG2	1:A:583:PRO:HG2	1.94	0.48
1:A:309:LYS:O	1:A:313:LYS:HG3	2.14	0.48
1:A:170:SER:O	1:A:174:LYS:HD2	2.13	0.48
1:B:92:THR:O	1:B:96:GLN:HG3	2.13	0.48
1:B:20:THR:HG22	1:B:22:GLU:H	1.77	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:198:ASP:OD2	1:A:465:LYS:HA	2.13	0.48
1:A:459:TRP:CH2	1:A:500:PRO:HG2	2.48	0.48
1:B:291:ILE:HG22	1:B:424:LEU:HD11	1.96	0.48
1:B:477:TRP:CE3	1:B:500:PRO:HG3	2.49	0.48
1:B:330:ASN:HB2	1:B:357:ARG:CZ	2.44	0.47
1:B:123:MET:HG2	1:B:176:LEU:HD23	1.95	0.47
1:B:297:MET:HG2	1:B:302:TRP:CE3	2.49	0.47
1:A:446:ILE:HD13	1:A:523:PHE:HZ	1.78	0.47
1:B:57:GLU:OE2	1:B:58:ASN:ND2	2.48	0.47
1:B:78:THR:O	1:B:81:GLN:HB2	2.15	0.47
1:B:382:ASP:HA	1:B:385:TYR:CE1	2.50	0.47
1:B:351:LEU:HD13	1:B:355:ASP:OD1	2.15	0.47
1:A:97:LEU:O	1:A:101:GLN:HG3	2.14	0.47
1:A:671:ARG:HD2	8:A:932:HOH:O	2.15	0.46
1:B:126:ILE:HG22	1:B:172:VAL:HG13	1.97	0.46
1:B:432:ASN:HB2	3:B:801:NAG:H2	1.97	0.46
1:B:457:GLU:HG2	1:B:513:ILE:HB	1.97	0.46
1:A:55:THR:O	1:A:59:VAL:HG23	2.16	0.46
1:A:478:TRP:CD2	1:A:489:GLU:HB3	2.51	0.46
1:A:50:TYR:CE1	1:A:59:VAL:HG22	2.50	0.46
1:A:592:PHE:CZ	1:A:596:LYS:HE3	2.51	0.46
1:B:285:PHE:HZ	3:B:801:NAG:H82	1.81	0.45
1:B:293:VAL:HG21	1:B:423:LEU:CB	2.39	0.45
1:A:349:TRP:HA	4:A:807:EDO:H11	1.98	0.45
1:B:165:TRP:CH2	1:B:490:PRO:HD2	2.51	0.45
1:A:142:LEU:HD12	1:A:163:TRP:HH2	1.81	0.45
1:B:95:LEU:O	1:B:98:GLN:HB3	2.16	0.45
1:B:360:MET:SD	1:B:362:THR:HG22	2.56	0.45
1:B:697:ARG:HA	1:B:700:VAL:HG12	1.98	0.45
1:B:233:ILE:HD13	1:B:450:LEU:HD13	1.98	0.45
1:B:581:VAL:HG12	1:B:585:LEU:HG	1.98	0.45
1:B:351:LEU:HD12	1:B:351:LEU:H	1.82	0.45
1:A:525:PHE:O	1:A:529:LEU:HG	2.16	0.45
1:B:196:TYR:CD2	1:B:202:TYR:HA	2.51	0.45
1:B:165:TRP:CZ3	1:B:490:PRO:HD2	2.52	0.45
1:B:459:TRP:CH2	1:B:500:PRO:HG2	2.51	0.45
1:B:52:THR:HG22	1:B:359:LEU:HD13	1.99	0.45
1:A:455:MET:HE1	1:A:477:TRP:CE3	2.52	0.44
1:B:346:PRO:HG3	1:B:360:MET:HG3	2.00	0.44
1:B:513:ILE:HD12	1:B:513:ILE:HA	1.80	0.44
1:A:165:TRP:CH2	1:A:490:PRO:HD2	2.53	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:320:LEU:HB3	1:A:380:GLN:OE1	2.18	0.44
1:B:284:PRO:HB3	1:B:594:TRP:CZ2	2.52	0.44
1:A:197:GLU:HG3	1:A:201:ASP:OD2	2.16	0.44
1:A:346:PRO:HA	1:A:359:LEU:O	2.17	0.44
1:A:314:PHE:HE1	1:A:545:SER:HB2	1.82	0.44
1:B:132:VAL:O	1:B:141:CYS:HA	2.18	0.44
1:B:432:ASN:OD1	1:B:432:ASN:N	2.50	0.44
1:B:618:ILE:HD11	1:B:700:VAL:HG13	1.99	0.44
1:A:478:TRP:CE3	1:A:489:GLU:HB3	2.53	0.44
1:A:652:ARG:HG2	1:A:663:ILE:O	2.18	0.43
1:B:274:PHE:CD1	1:B:449:THR:HG21	2.53	0.43
1:A:371:THR:HG23	2:A:801:A1IDX:C10	2.48	0.43
1:A:146:PRO:HD2	5:A:810:CL:CL	2.56	0.43
1:B:39:LEU:HD12	1:B:72:PHE:CD2	2.54	0.43
1:B:201:ASP:CG	1:B:219:ARG:HE	2.20	0.43
1:B:284:PRO:HG2	1:B:436:ILE:HG22	2.01	0.43
1:A:92:THR:O	1:A:96:GLN:HG3	2.19	0.42
1:A:635:TRP:HA	1:A:639:GLU:HG3	2.01	0.42
1:B:28:PHE:HE2	1:B:79:LEU:HG	1.84	0.42
1:A:690:ASN:O	1:A:692:SER:N	2.47	0.42
1:B:45:LEU:HD13	1:B:45:LEU:HA	1.89	0.42
1:B:386:ALA:HA	1:B:393:ARG:HD3	2.01	0.42
1:A:292:ASP:HA	1:A:366:MET:CE	2.49	0.42
1:B:66:GLY:O	1:B:70:SER:N	2.44	0.42
1:B:697:ARG:NH2	4:B:807:EDO:H21	2.33	0.42
3:B:801:NAG:O7	3:B:801:NAG:H3	2.20	0.42
1:A:523:PHE:CD2	1:A:584:LEU:HB2	2.55	0.42
1:B:499:ASP:HB3	5:B:809:CL:CL	2.57	0.42
1:A:234:LYS:HB2	1:A:235:PRO:HD3	2.01	0.42
1:B:48:TRP:CH2	1:B:359:LEU:HB2	2.55	0.41
1:B:83:TYR:O	1:B:101:GLN:NE2	2.51	0.41
1:B:261:CYS:HB2	1:B:488:VAL:HB	2.01	0.41
1:A:580:ASN:OD1	1:A:582:ARG:HB3	2.20	0.41
1:B:410:LEU:HA	1:B:410:LEU:HD23	1.81	0.41
1:B:690:ASN:HD22	1:B:693:ASP:HB2	1.84	0.41
1:B:696:PRO:HB2	1:B:699:GLU:HG3	2.02	0.41
1:B:274:PHE:CE1	1:B:449:THR:HG21	2.56	0.41
1:B:352:GLY:O	1:B:355:ASP:N	2.41	0.41
1:A:655:PHE:HA	1:A:659:LYS:HB2	2.03	0.41
1:B:403:ALA:O	1:B:407:ILE:HG23	2.21	0.41
1:A:90:ASN:O	1:A:93:VAL:N	2.45	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:584:LEU:O	1:A:584:LEU:HD12	2.20	0.41
1:B:520:LEU:HD12	1:B:579:MET:SD	2.61	0.41
1:B:655:PHE:HB3	1:B:661:GLN:HB2	2.02	0.41
1:A:375:GLU:HA	1:A:375:GLU:OE1	2.20	0.41
1:B:263:PRO:HB2	1:B:266:LEU:HD12	2.02	0.41
1:B:321:PRO:HB2	1:B:383:MET:HE1	2.01	0.41
1:B:415:PRO:HD3	1:B:438:PHE:CD1	2.56	0.41
1:A:263:PRO:HB2	1:A:266:LEU:HD12	2.03	0.41
1:A:636:ASN:H	1:A:639:GLU:HG2	1.85	0.41
1:A:652:ARG:NH1	1:A:664:LEU:HD22	2.36	0.41
1:B:330:ASN:HB2	1:B:357:ARG:NH1	2.35	0.41
1:B:348:ALA:HA	1:B:358:ILE:HG12	2.03	0.41
1:B:351:LEU:HB2	1:B:355:ASP:HB3	2.02	0.41
1:A:636:ASN:OD1	1:A:639:GLU:HG2	2.21	0.41
1:B:44:SER:HB3	1:B:351:LEU:HG	2.03	0.41
1:B:315:PHE:CE1	1:B:376:MET:HG2	2.56	0.41
1:A:133:CYS:HA	1:A:141:CYS:HA	2.03	0.40
1:B:237:TYR:CZ	1:B:451:PRO:HG2	2.55	0.40
1:B:374:HIS:ND1	1:B:406:GLU:OE2	2.54	0.40
1:B:294:THR:O	1:B:298:VAL:HG23	2.21	0.40
1:A:651:MET:O	1:A:655:PHE:HD1	2.03	0.40
1:B:69:TRP:CZ2	1:B:73:LEU:HD21	2.57	0.40
1:B:313:LYS:O	1:B:316:VAL:HG22	2.20	0.40
1:B:618:ILE:HG22	1:B:619:LYS:O	2.21	0.40
1:B:697:ARG:HA	1:B:700:VAL:CG1	2.51	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	671/730 (92%)	642 (96%)	29 (4%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	661/730 (90%)	633 (96%)	28 (4%)	0	100	100
All	All	1332/1460 (91%)	1275 (96%)	57 (4%)	0	100	100

There are no Ramachandran outliers to report.

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	601/648 (93%)	593 (99%)	8 (1%)	69	87
1	B	594/648 (92%)	568 (96%)	26 (4%)	28	52
All	All	1195/1296 (92%)	1161 (97%)	34 (3%)	43	70

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

Mol	Chain	Res	Type
1	A	100	LEU
1	A	128	SER
1	A	171	GLU
1	A	190	MET
1	A	381	TYR
1	A	385	TYR
1	A	518	ARG
1	A	584	LEU
1	B	45	LEU
1	B	57	GLU
1	B	190	MET
1	B	213	ASP
1	B	330	ASN
1	B	376	MET
1	B	381	TYR
1	B	385	TYR
1	B	401	HIS
1	B	407	ILE

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Mol	Chain	Res	Type
1	B	455	MET
1	B	470	LYS
1	B	471	ASP
1	B	513	ILE
1	B	518	ARG
1	B	552	GLN
1	B	559	ARG
1	B	597	ASP
1	B	602	SER
1	B	616	GLN
1	B	617	SER
1	B	619	LYS
1	B	621	ARG
1	B	663	ILE
1	B	667	GLU
1	B	683	PHE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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](#)

Of 24 ligands modelled in this entry, 7 are monoatomic - leaving 17 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$
2	A1IDX	B	802	7	26,29,29	0.67	0	35,40,40	0.61	0
3	NAG	B	801	1	14,14,15	0.56	0	17,19,21	0.90	0
4	EDO	A	808	-	3,3,3	0.57	0	2,2,2	0.18	0
4	EDO	B	808	-	3,3,3	0.56	0	2,2,2	0.21	0
4	EDO	A	806	-	3,3,3	0.43	0	2,2,2	0.46	0
3	NAG	A	803	1	14,14,15	1.02	1 (7%)	17,19,21	0.60	0
4	EDO	A	807	-	3,3,3	0.57	0	2,2,2	0.08	0
4	EDO	B	807	-	3,3,3	0.45	0	2,2,2	0.35	0
4	EDO	B	806	-	3,3,3	0.44	0	2,2,2	0.44	0
2	A1IDX	A	801	7	26,29,29	0.72	0	35,40,40	0.71	1 (2%)
4	EDO	A	809	-	3,3,3	0.68	0	2,2,2	0.27	0
4	EDO	B	804	-	3,3,3	0.44	0	2,2,2	0.46	0
3	NAG	B	803	1	14,14,15	0.44	0	17,19,21	0.44	0
3	NAG	A	802	1	14,14,15	0.75	1 (7%)	17,19,21	0.80	1 (5%)
4	EDO	A	804	-	3,3,3	0.59	0	2,2,2	0.19	0
3	NAG	B	805	1	14,14,15	0.41	0	17,19,21	0.57	0
3	NAG	A	805	1	14,14,15	0.43	0	17,19,21	1.32	1 (5%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	A1IDX	B	802	7	-	7/24/24/24	0/2/2/2
3	NAG	B	801	1	-	3/6/23/26	0/1/1/1
4	EDO	A	808	-	-	0/1/1/1	-
4	EDO	B	808	-	-	0/1/1/1	-
4	EDO	A	806	-	-	0/1/1/1	-
3	NAG	A	803	1	-	3/6/23/26	0/1/1/1
4	EDO	A	807	-	-	0/1/1/1	-
4	EDO	B	807	-	-	0/1/1/1	-
4	EDO	B	806	-	-	1/1/1/1	-
2	A1IDX	A	801	7	-	8/24/24/24	0/2/2/2
4	EDO	A	809	-	-	0/1/1/1	-
4	EDO	B	804	-	-	0/1/1/1	-
3	NAG	B	803	1	-	1/6/23/26	0/1/1/1
3	NAG	A	802	1	-	0/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	EDO	A	804	-	-	0/1/1/1	-
3	NAG	B	805	1	-	3/6/23/26	0/1/1/1
3	NAG	A	805	1	-	5/6/23/26	0/1/1/1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	803	NAG	O5-C1	3.33	1.49	1.43
3	A	802	NAG	O5-C1	2.55	1.47	1.43

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	805	NAG	C2-N2-C7	4.44	129.22	122.90
2	A	801	A1IDX	C9-C8-C7	-2.94	106.55	114.18
3	A	802	NAG	C1-O5-C5	2.67	115.81	112.19

There are no chirality outliers.

All (31) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	801	A1IDX	C2-C4-C5-C26
2	B	802	A1IDX	C26-C5-N6-C7
3	B	805	NAG	O5-C5-C6-O6
2	A	801	A1IDX	C2-C4-C5-N6
3	B	805	NAG	C4-C5-C6-O6
3	B	801	NAG	C1-C2-N2-C7
3	A	803	NAG	C8-C7-N2-C2
3	A	803	NAG	O7-C7-N2-C2
3	A	805	NAG	C8-C7-N2-C2
3	A	805	NAG	O7-C7-N2-C2
3	A	805	NAG	O5-C5-C6-O6
3	A	803	NAG	O5-C5-C6-O6
3	B	803	NAG	O5-C5-C6-O6
3	B	801	NAG	O5-C5-C6-O6
3	B	801	NAG	C3-C2-N2-C7
2	B	802	A1IDX	O27-C26-C5-N6
2	A	801	A1IDX	O27-C26-C5-N6
2	B	802	A1IDX	O28-C26-C5-N6
2	B	802	A1IDX	N13-C14-C15-C22
2	B	802	A1IDX	N13-C14-C15-C16

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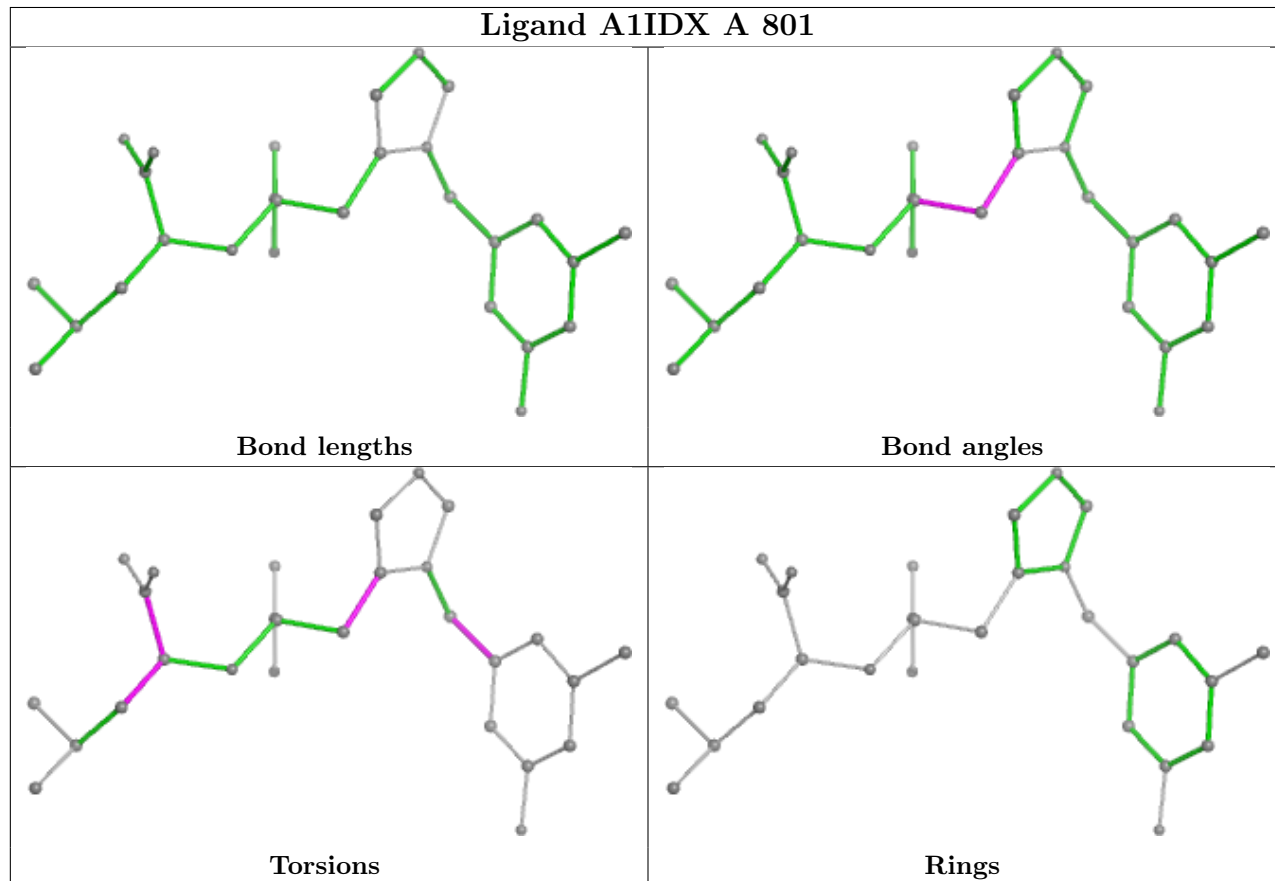
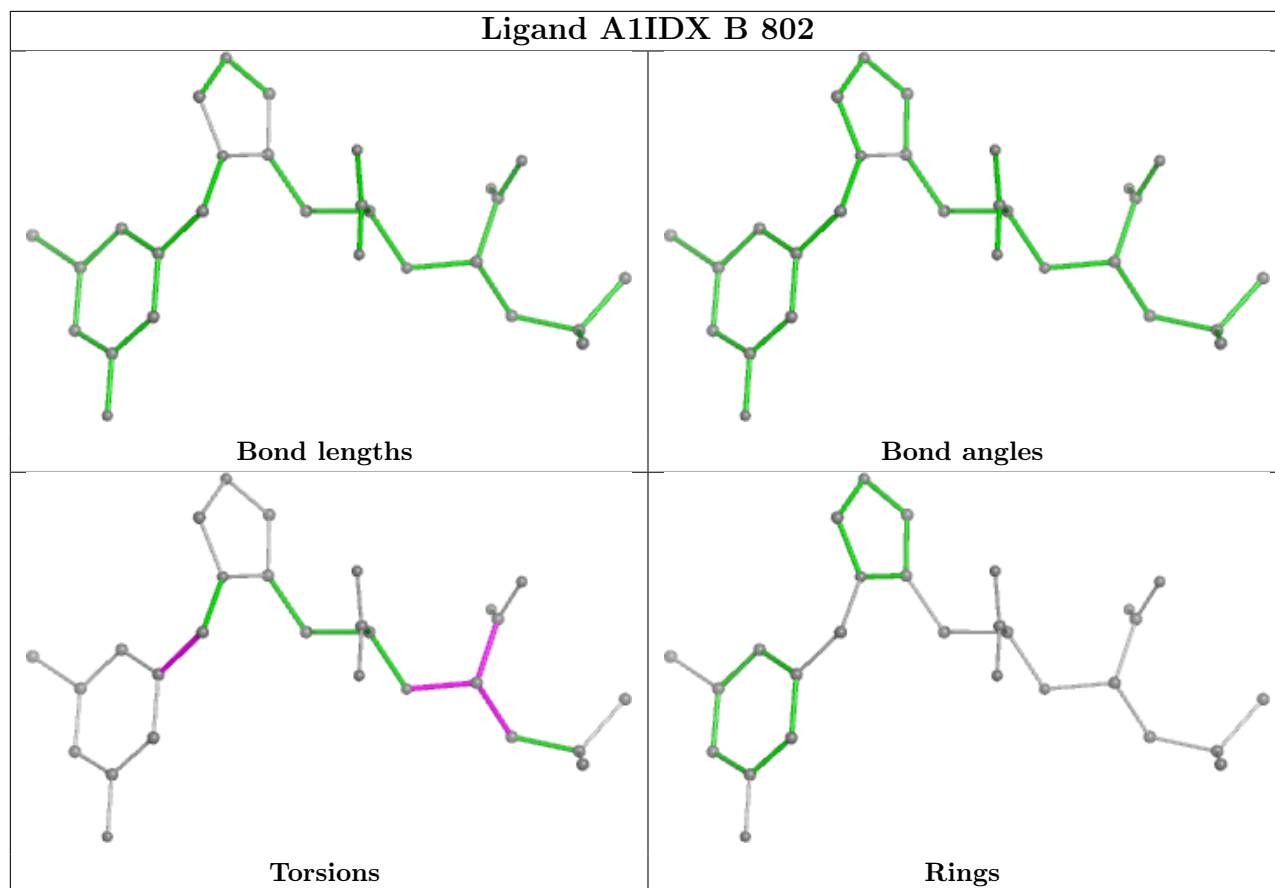
Mol	Chain	Res	Type	Atoms
4	B	806	EDO	O1-C1-C2-O2
2	A	801	A1IDX	N13-C14-C15-C22
2	A	801	A1IDX	O28-C26-C5-N6
2	A	801	A1IDX	N13-C14-C15-C16
2	A	801	A1IDX	C7-C8-C9-C10
2	A	801	A1IDX	C7-C8-C9-N13
2	B	802	A1IDX	C2-C4-C5-N6
2	B	802	A1IDX	C2-C4-C5-C26
3	A	805	NAG	C3-C2-N2-C7
3	B	805	NAG	C3-C2-N2-C7
3	A	805	NAG	C4-C5-C6-O6

There are no ring outliers.

7 monomers are involved in 9 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	801	NAG	3	0
4	A	807	EDO	1	0
4	B	807	EDO	1	0
2	A	801	A1IDX	1	0
4	A	809	EDO	1	0
3	A	802	NAG	1	0
3	A	805	NAG	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	674/730 (92%)	0.45	41 (6%) 21 22	37, 55, 92, 115	41 (6%)
1	B	669/730 (91%)	0.49	57 (8%) 10 10	37, 58, 89, 109	67 (10%)
All	All	1343/1460 (91%)	0.47	98 (7%) 15 15	37, 56, 92, 115	108 (8%)

All (98) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	82	MET	4.6
1	A	93	VAL	4.6
1	B	83	TYR	4.6
1	B	323	MET	4.5
1	A	80	ALA	4.5
1	A	709	SER	4.4
1	B	332	MET	4.3
1	A	82	MET	4.2
1	B	93	VAL	4.2
1	B	328	TRP	4.2
1	A	97	LEU	4.2
1	B	364	VAL	4.2
1	A	706	MET	4.0
1	B	301	ALA	4.0
1	A	654	TYR	3.9
1	B	88	ILE	3.8
1	A	710	ARG	3.7
1	B	312	GLU	3.7
1	A	83	TYR	3.6
1	B	104	GLY	3.6
1	A	700	VAL	3.6
1	A	704	ILE	3.5
1	A	620	VAL	3.5
1	A	92	THR	3.5

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Mol	Chain	Res	Type	RSRZ
1	B	635	TRP	3.5
1	A	707	SER	3.4
1	B	303	ASP	3.4
1	A	662	MET	3.4
1	A	100	LEU	3.3
1	B	59	VAL	3.3
1	B	665	PHE	3.3
1	B	298	VAL	3.3
1	A	695	ILE	3.3
1	B	336	PRO	3.2
1	B	423	LEU	3.2
1	B	349	TRP	3.1
1	A	339	VAL	3.1
1	B	53	ASN	3.1
1	B	84	PRO	3.0
1	B	55	THR	3.0
1	B	333	LEU	3.0
1	A	643	PHE	3.0
1	B	421	ILE	2.9
1	B	89	GLN	2.9
1	B	359	LEU	2.9
1	A	698	THR	2.9
1	A	674	ASN	2.9
1	B	654	TYR	2.9
1	A	299	ASP	2.8
1	B	307	ILE	2.8
1	B	655	PHE	2.8
1	B	335	ASP	2.8
1	B	21	ILE	2.7
1	B	302	TRP	2.7
1	B	41	TYR	2.7
1	B	211	GLY	2.7
1	B	700	VAL	2.6
1	B	299	ASP	2.6
1	B	357	ARG	2.6
1	B	308	PHE	2.6
1	B	311	ALA	2.6
1	B	22	GLU	2.6
1	A	99	ALA	2.5
1	B	321	PRO	2.5
1	B	92	THR	2.5
1	B	689	LYS	2.5

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Mol	Chain	Res	Type	RSRZ
1	A	195	HIS	2.5
1	B	361	CYS	2.5
1	A	212	VAL	2.5
1	B	87	GLU	2.5
1	A	332	MET	2.4
1	A	635	TRP	2.3
1	A	681	PHE	2.3
1	A	338	ASN	2.3
1	A	89	GLN	2.3
1	A	701	GLU	2.3
1	A	301	ALA	2.3
1	A	528	ALA	2.2
1	B	297	MET	2.2
1	B	695	ILE	2.2
1	B	111	ASP	2.2
1	B	306	ARG	2.2
1	B	98	GLN	2.2
1	B	681	PHE	2.1
1	A	81	GLN	2.1
1	A	101	GLN	2.1
1	A	649	TYR	2.1
1	B	29	LEU	2.1
1	B	326	GLY	2.1
1	A	564	GLU	2.1
1	A	694	ILE	2.1
1	B	52	THR	2.1
1	B	97	LEU	2.1
1	B	310	GLU	2.1
1	A	672	VAL	2.0
1	A	691	VAL	2.0
1	B	686	THR	2.0
1	A	685	VAL	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

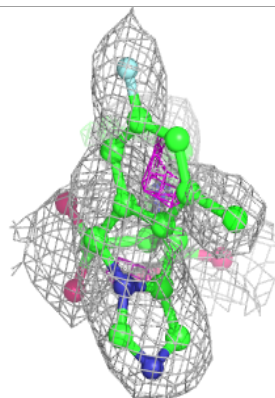
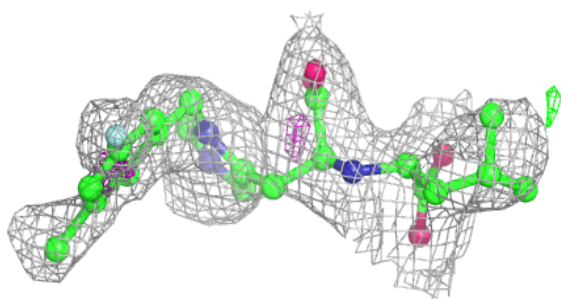
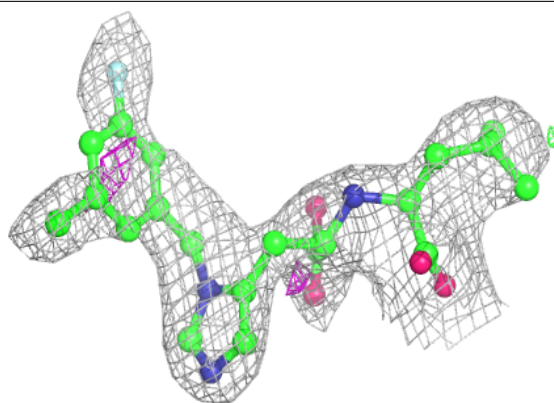
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists 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	NAG	B	801	14/15	0.73	0.23	68,83,89,94	0
3	NAG	B	803	14/15	0.75	0.31	81,88,94,97	0
3	NAG	A	805	14/15	0.76	0.25	63,82,93,96	0
3	NAG	A	803	14/15	0.78	0.24	82,86,92,92	0
2	A1IDX	B	802	28/28	0.78	0.26	53,67,82,98	0
4	EDO	B	807	4/4	0.78	0.14	81,85,85,89	0
4	EDO	A	807	4/4	0.80	0.40	65,68,68,71	0
4	EDO	A	809	4/4	0.81	0.29	53,56,56,58	0
4	EDO	A	804	4/4	0.82	0.36	60,65,66,70	0
3	NAG	B	805	14/15	0.84	0.32	93,101,104,107	0
4	EDO	B	808	4/4	0.85	0.25	55,55,57,61	0
7	ZN	A	812	1/1	0.85	0.23	45,45,45,45	1
3	NAG	A	802	14/15	0.87	0.32	82,86,89,94	0
5	CL	B	810	1/1	0.91	0.23	74,74,74,74	0
2	A1IDX	A	801	28/28	0.92	0.19	44,54,68,86	0
4	EDO	B	804	4/4	0.92	0.14	54,55,56,57	0
6	NA	A	811	1/1	0.94	0.12	45,45,45,45	0
4	EDO	B	806	4/4	0.95	0.16	53,57,58,58	0
4	EDO	A	808	4/4	0.95	0.14	53,53,53,54	0
5	CL	A	810	1/1	0.96	0.11	58,58,58,58	0
4	EDO	A	806	4/4	0.96	0.13	51,53,55,56	0
7	ZN	B	812	1/1	0.96	0.21	56,56,56,56	1
5	CL	B	809	1/1	0.97	0.14	46,46,46,46	0
6	NA	B	811	1/1	0.97	0.12	37,37,37,37	0

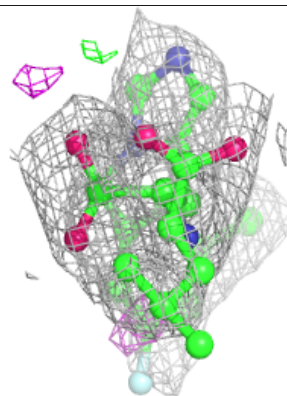
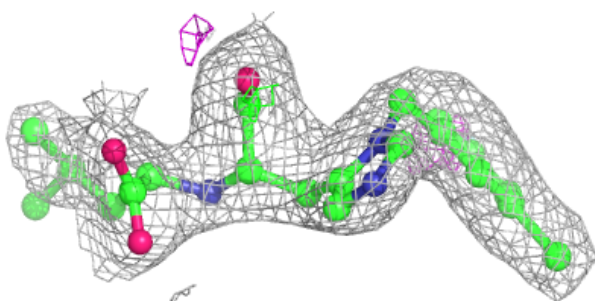
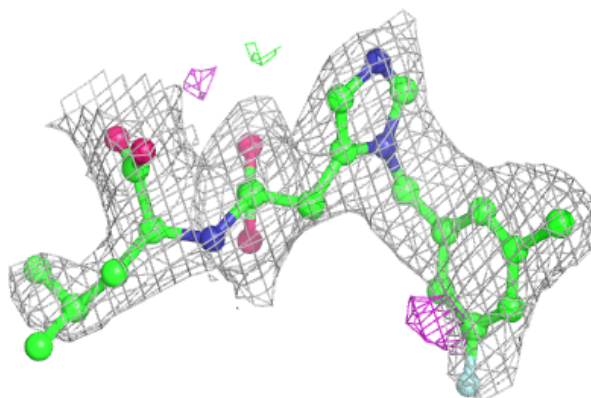
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around A1IDX B 802:

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

**Electron density around A1IDX A 801:**

$2mF_o-DF_c$ (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.