Full wwPDB X-ray Structure Validation Report (i)

Sep 22, 2022 – 04:31 pm BST

PDB ID	:	7AYR
Title	:	Crystal structure of DPP8 in complex with a 4-oxo-b-lactam based inhibitor, B115
Authors	:	Ross, B.H.; Huber, R.
Deposited on	:	2020-11-13
Resolution	:	2.69 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 (i) 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 (i)) were used in the production of this report:

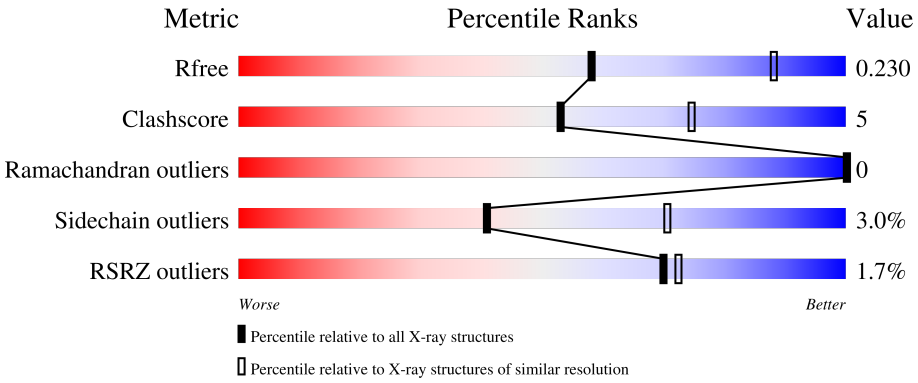
MolProbity	:	4.02b-467
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.30
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0267
CCP4	:	7.1.010 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.30

1 Overall quality at a glance (i)

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

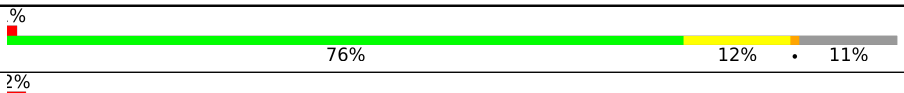
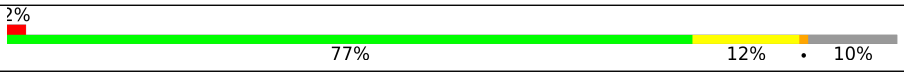
The reported resolution of this entry is 2.69 Å.

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	2808 (2.70-2.70)
Clashscore	141614	3122 (2.70-2.70)
Ramachandran outliers	138981	3069 (2.70-2.70)
Sidechain outliers	138945	3069 (2.70-2.70)
RSRZ outliers	127900	2737 (2.70-2.70)

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	898	
1	B	898	

2 Entry composition

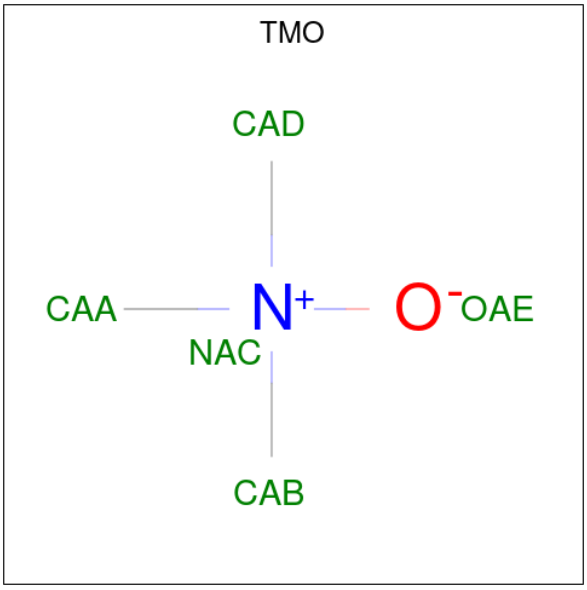
There are 5 unique types of molecules in this entry. The entry contains 13131 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Dipeptidyl peptidase 8.

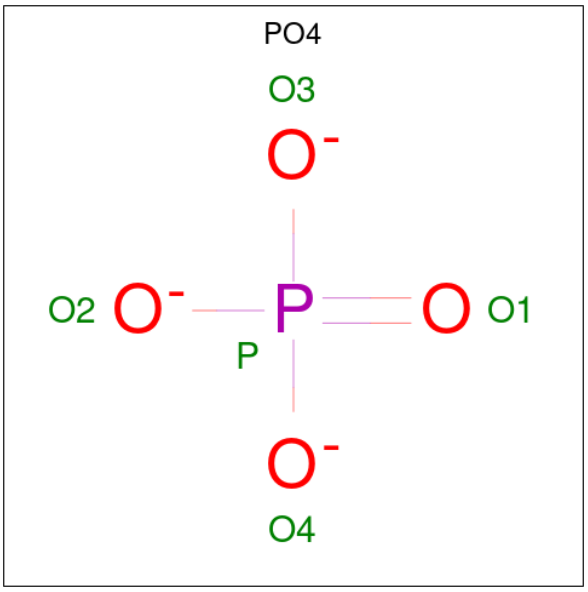
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	802	Total	C	N	O	S	0	1	0
			6519	4197	1086	1211	25			
1	B	804	Total	C	N	O	S	0	0	0
			6521	4199	1084	1212	26			

- Molecule 2 is trimethylamine oxide (three-letter code: TMO) (formula: C_3H_9NO).



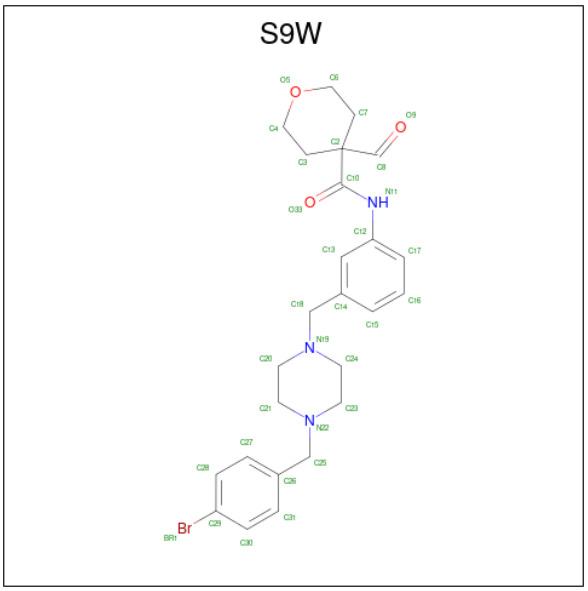
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			5	3	1	1		
2	B	1	Total	C	N	O	0	0
			5	3	1	1		

- Molecule 3 is PHOSPHATE ION (three-letter code: PO4) (formula: O_4P).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	O	P	0	0
			5	4	1		
3	B	1	Total	O	P	0	0
			5	4	1		

- Molecule 4 is {N}-[3-[[4-[(4-bromophenyl)methyl]piperazin-1-yl]methyl]phenyl]-4-metha noyl-oxane-4-carboxamide (three-letter code: S9W) (formula: $C_{25}H_{30}BrN_3O_3$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total	Br	C	N	O	0	0
			32	1	25	3	3		

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	B	1	Total	Br	C	N	O	0	0
			32	1	25	3	3		

- Molecule 5 is water.

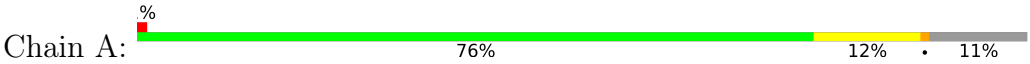
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	4	Total	O	0	0
			4	4		
5	B	3	Total	O	0	0
			3	3		

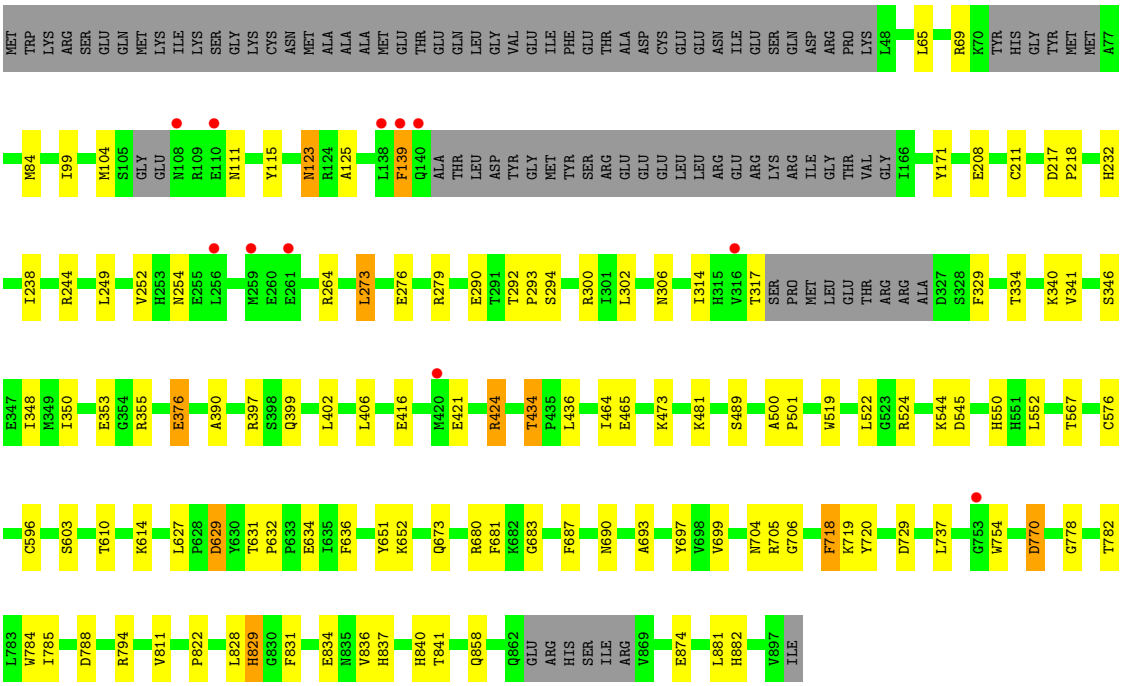
3 Residue-property plots (i)

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

• Molecule 1: Dipeptidyl peptidase 8

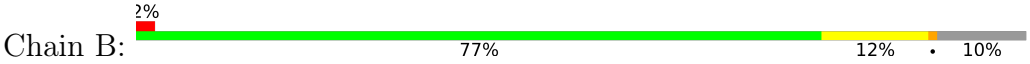
Chain A:

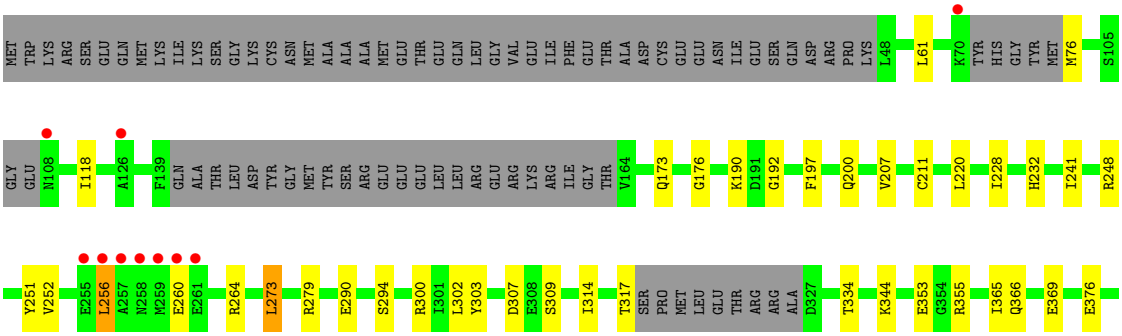


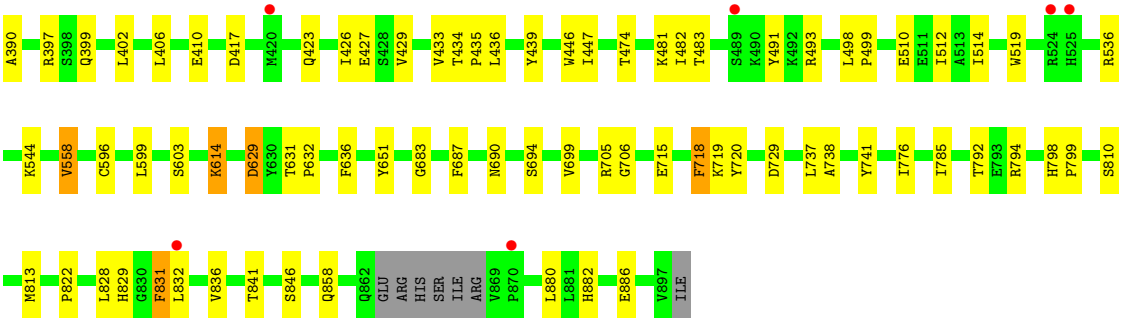


• Molecule 1: Dipeptidyl peptidase 8

Chain B:






A390 R397 S398 Q399 L402 L406 E410 D417 M420 Q423 I426 E427 S428 V429 V433 T434 P435 L436 Y439 W446 I447 T474 K481 I482 T483 S489 K490 Y491 K492 R493 L498 P499 E510 E511 I512 A513 I514 W519 R524 H525 R536
K544 V558 C596 L599 S603 K614 D629 Y630 T631 P632 F636 Y651 G683 F687 N690 S694 V699 R705 G706 E715 F718 K719 Y720 D729 L737 A738 Y741 I776 I785 T792 E793 R794 H798 P799 S810
M813 P822 L828 H829 G830 F831 L832 V836 T841 S846 Q858 Q862 GLU ARG HIS SER ILE ARG V869 P870 L880 L881 H882 E886 V897 ILE

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 61	Depositor
Cell constants a, b, c, α, β, γ	149.56Å 149.56Å 269.63Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	48.96 – 2.69 48.96 – 2.69	Depositor EDS
% Data completeness (in resolution range)	100.0 (48.96-2.69) 100.0 (48.96-2.69)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.07 (at 2.69Å)	Xtriage
Refinement program	REFMAC 5.8.0258	Depositor
R, R_{free}	0.187 , 0.230 0.191 , 0.230	Depositor DCC
R_{free} test set	4718 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å^2)	75.8	Xtriage
Anisotropy	0.330	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	(Not available) , (Not available)	EDS
L-test for twinning[2]	$< \|L\| > = 0.51$, $< L^2 > = 0.34$	Xtriage
Estimated twinning fraction	0.029 for h,-h-k,-l	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	13131	wwPDB-VP
Average B, all atoms (Å^2)	83.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.08% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: PO4, TMO, S9W

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	0/6702	0.84	0/9092
1	B	0.69	0/6701	0.84	0/9091
All	All	0.69	0/13403	0.84	0/18183

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	6519	0	6340	72	0
1	B	6521	0	6340	71	0
2	A	5	0	9	0	0
2	B	5	0	9	0	0
3	A	5	0	0	0	0
3	B	5	0	0	0	0
4	A	32	0	0	0	0
4	B	32	0	0	0	0
5	A	4	0	0	1	0
5	B	3	0	0	0	0
All	All	13131	0	12698	140	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 5.

All (140) 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:705:ARG:HD3	1:B:729:ASP:OD2	1.77	0.83
1:A:829:HIS:HD2	1:A:841:THR:OG1	1.65	0.78
1:A:882:HIS:CE1	1:B:822:PRO:HG3	2.18	0.78
1:B:365:ILE:HD12	1:B:429:VAL:HG21	1.66	0.75
1:B:434:THR:HG22	1:B:435:PRO:HD2	1.70	0.71
1:A:683:GLY:O	1:A:687:PHE:HB2	1.90	0.70
1:B:252:VAL:HG13	1:B:264:ARG:HB3	1.73	0.69
1:A:705:ARG:HD3	1:A:729:ASP:OD2	1.93	0.69
1:A:334:THR:CG2	1:A:785:ILE:HA	2.24	0.68
1:A:376:GLU:HG3	1:A:397:ARG:HB2	1.74	0.68
1:B:423:GLN:HA	1:B:426:ILE:HD12	1.76	0.68
1:A:290:GLU:OE2	1:A:300:ARG:NH2	2.27	0.66
1:A:828:LEU:HD23	1:A:858:GLN:HB2	1.76	0.65
1:B:211:CYS:HB3	1:B:232:HIS:CD2	2.31	0.65
1:B:399:GLN:OE1	1:B:794:ARG:HD3	1.97	0.65
1:A:273:LEU:HD22	1:A:279:ARG:NH2	2.12	0.64
1:A:822:PRO:HG3	1:B:882:HIS:CE1	2.33	0.62
1:A:399:GLN:OE1	1:A:794:ARG:HD3	1.99	0.61
1:A:139:PHE:HD1	1:A:139:PHE:H	1.48	0.61
1:B:651:TYR:HB2	1:B:699:VAL:HB	1.82	0.61
1:A:104:MET:HG3	1:A:111:ASN:HD22	1.66	0.60
1:A:123:ASN:HD21	1:A:125:ALA:HB3	1.65	0.60
1:B:776:ILE:HD13	1:B:880:LEU:CD1	2.32	0.60
1:A:552:LEU:HB3	1:A:567:THR:HG23	1.83	0.60
1:B:683:GLY:O	1:B:687:PHE:HB2	2.02	0.60
1:A:317:THR:HG1	1:A:831:PHE:HE2	1.50	0.59
1:B:260:GLU:N	1:B:260:GLU:OE2	2.34	0.58
1:A:719:LYS:HG3	1:A:720:TYR:CD2	2.39	0.58
1:B:302:LEU:HD22	1:B:390:ALA:HB1	1.86	0.57
1:B:446:TRP:HZ2	1:B:715:GLU:HG2	1.68	0.57
1:B:402:LEU:HD12	1:B:447:ILE:HG21	1.87	0.57
1:B:614:LYS:HG3	1:B:614:LYS:O	2.04	0.57
1:A:627:LEU:HD12	1:A:681:PHE:HZ	1.69	0.56
1:B:828:LEU:HD23	1:B:858:GLN:HB2	1.87	0.56
1:A:211:CYS:HB3	1:A:232:HIS:CD2	2.42	0.54
1:B:220:LEU:HD23	1:B:228:ILE:HG22	1.88	0.54
1:A:434:THR:HG21	1:A:489:SER:HB2	1.90	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:434:THR:HG22	1:B:435:PRO:CD	2.37	0.53
1:B:491:TYR:CD2	1:B:499:PRO:HA	2.43	0.53
1:B:481:LYS:HB2	1:B:514:ILE:HD11	1.90	0.53
1:A:139:PHE:CD1	1:A:139:PHE:N	2.78	0.52
1:A:238:ILE:HG23	1:A:249:LEU:HD11	1.90	0.52
1:A:348:ILE:HG22	1:A:350:ILE:CD1	2.39	0.52
1:B:705:ARG:NH1	1:B:729:ASP:OD1	2.42	0.52
1:A:292:THR:HB	1:A:293:PRO:CD	2.40	0.52
1:B:118:ILE:HD12	1:B:599:LEU:CD2	2.40	0.52
1:A:629:ASP:OD1	1:A:629:ASP:N	2.26	0.52
1:B:252:VAL:CG1	1:B:264:ARG:HB3	2.41	0.51
1:B:303:TYR:CZ	1:B:344:LYS:HB2	2.45	0.51
1:B:687:PHE:O	1:B:690:ASN:HB3	2.11	0.51
1:B:290:GLU:OE2	1:B:300:ARG:NH2	2.44	0.50
1:B:629:ASP:OD1	1:B:629:ASP:N	2.22	0.50
1:B:248:ARG:HH21	1:B:251:TYR:HA	1.77	0.49
1:A:65:LEU:HD21	1:A:881:LEU:HD12	1.93	0.49
1:B:798:HIS:ND1	1:B:799:PRO:HD2	2.28	0.49
1:A:465:GLU:OE2	1:A:481:LYS:NZ	2.44	0.49
1:A:680:ARG:HD3	5:A:1004:HOH:O	2.12	0.49
1:B:353:GLU:HG3	1:B:355:ARG:NH1	2.28	0.48
1:B:317:THR:HB	1:B:832:LEU:HD21	1.96	0.48
1:B:536:ARG:CZ	1:B:558:VAL:HG21	2.42	0.48
1:A:634:GLU:OE1	1:A:652:LYS:HE2	2.13	0.48
1:A:636:PHE:CZ	1:A:737:LEU:HD11	2.48	0.48
1:B:776:ILE:HD13	1:B:880:LEU:HD11	1.95	0.48
1:A:782:THR:H	1:A:840:HIS:HD2	1.62	0.47
1:B:334:THR:CG2	1:B:785:ILE:HA	2.44	0.47
1:B:176:GLY:O	1:B:190:LYS:HA	2.14	0.47
1:B:307:ASP:OD1	1:B:309:SER:OG	2.33	0.47
1:B:410:GLU:HB3	1:B:433:VAL:HG11	1.96	0.47
1:B:510:GLU:OE2	1:B:512:ILE:HD11	2.13	0.47
1:B:829:HIS:HD2	1:B:841:THR:OG1	1.98	0.47
1:A:314:ILE:HD11	1:A:329:PHE:CZ	2.50	0.47
1:B:406:LEU:HB2	1:B:436:LEU:HB2	1.96	0.47
1:A:292:THR:HB	1:A:293:PRO:HD2	1.97	0.46
1:A:719:LYS:HE3	1:A:720:TYR:CE2	2.51	0.46
1:A:424:ARG:HB3	1:A:424:ARG:NH1	2.30	0.46
1:B:882:HIS:CE1	1:B:886:GLU:HG3	2.51	0.46
1:A:69:ARG:CZ	1:A:874:GLU:HG2	2.45	0.46
1:A:302:LEU:HD22	1:A:390:ALA:HB1	1.96	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:782:THR:H	1:A:840:HIS:CD2	2.33	0.46
1:B:207:VAL:HG22	1:B:241:ILE:HG22	1.98	0.46
1:B:256:LEU:N	1:B:256:LEU:HD13	2.30	0.46
1:A:65:LEU:HD21	1:A:881:LEU:CD1	2.46	0.45
1:B:376:GLU:HG2	1:B:397:ARG:HB2	1.97	0.45
1:A:687:PHE:O	1:A:690:ASN:HB3	2.17	0.45
1:B:810:SER:HB2	1:B:813:MET:HG3	1.99	0.45
1:A:651:TYR:HB2	1:A:699:VAL:HB	1.99	0.44
1:A:273:LEU:HD22	1:A:279:ARG:HH21	1.81	0.44
1:A:69:ARG:NH1	1:A:874:GLU:HG2	2.33	0.44
1:B:376:GLU:CG	1:B:397:ARG:HB2	2.48	0.44
1:A:631:THR:HA	1:A:632:PRO:HD2	1.77	0.44
1:B:536:ARG:NH1	1:B:558:VAL:HG21	2.33	0.44
1:A:706:GLY:HA3	1:A:718:PHE:CE2	2.53	0.43
1:B:719:LYS:HG2	1:B:720:TYR:CD2	2.52	0.43
1:A:217:ASP:N	1:A:218:PRO:CD	2.81	0.43
1:B:273:LEU:HD22	1:B:279:ARG:NH1	2.33	0.43
1:B:76:MET:HG2	1:B:76:MET:O	2.17	0.43
1:A:208:GLU:HG3	1:A:244:ARG:NH2	2.33	0.43
1:A:754:TRP:HA	1:A:778:GLY:O	2.17	0.43
1:B:439:TYR:CD1	1:B:482:ILE:HD13	2.54	0.43
1:B:491:TYR:CE2	1:B:499:PRO:N	2.87	0.43
1:A:252:VAL:HG13	1:A:264:ARG:HB3	2.01	0.43
1:A:306:ASN:OD1	1:A:341:VAL:HG12	2.18	0.43
1:A:770:ASP:OD1	1:A:770:ASP:N	2.51	0.43
1:B:519:TRP:CG	1:B:544:LYS:HA	2.54	0.43
1:B:831:PHE:HD1	1:B:831:PHE:O	2.01	0.43
1:A:421:GLU:OE1	1:A:424:ARG:NH1	2.52	0.42
1:A:829:HIS:HD2	1:A:841:THR:CB	2.30	0.42
1:A:500:ALA:HB1	1:A:501:PRO:HD2	2.01	0.42
1:A:84:MET:SD	1:A:171:TYR:CD2	3.12	0.42
1:A:882:HIS:CE1	1:B:822:PRO:CG	2.97	0.42
1:A:353:GLU:HG2	1:A:355:ARG:HG2	2.01	0.42
1:A:524:ARG:HH12	1:A:673:GLN:HG2	1.84	0.42
1:A:406:LEU:HB2	1:A:436:LEU:HB2	2.01	0.42
1:B:314:ILE:C	1:B:314:ILE:HD12	2.39	0.42
1:A:416:GLU:HG3	1:A:421:GLU:HG2	2.02	0.42
1:A:522:LEU:HD13	1:A:550:HIS:CD2	2.55	0.42
1:A:829:HIS:HE1	1:A:836:VAL:O	2.02	0.42
1:B:631:THR:HA	1:B:632:PRO:HD3	1.82	0.42
1:A:519:TRP:CG	1:A:544:LYS:HA	2.54	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:99:ILE:O	1:A:115:TYR:HA	2.19	0.41
1:A:276:GLU:OE2	1:A:788:ASP:OD2	2.37	0.41
1:A:627:LEU:HD12	1:A:681:PHE:CZ	2.52	0.41
1:B:192:GLY:HA2	1:B:197:PHE:CE2	2.55	0.41
1:B:706:GLY:HA3	1:B:718:PHE:CE2	2.56	0.41
1:B:636:PHE:CZ	1:B:737:LEU:HD11	2.55	0.41
1:A:693:ALA:HA	1:A:697:TYR:O	2.20	0.41
1:B:433:VAL:O	1:B:433:VAL:HG12	2.21	0.41
1:B:61:LEU:HD23	1:B:61:LEU:HA	1.84	0.41
1:A:334:THR:HG21	1:A:784:TRP:O	2.21	0.41
1:B:738:ALA:O	1:B:741:TYR:O	2.39	0.41
1:B:836:VAL:O	1:B:836:VAL:HG12	2.20	0.41
1:A:402:LEU:HD23	1:A:402:LEU:C	2.41	0.41
1:B:173:GLN:HE21	1:B:173:GLN:HB3	1.66	0.41
1:B:365:ILE:HG23	1:B:366:GLN:HG3	2.04	0.40
1:B:369:GLU:H	1:B:369:GLU:CD	2.25	0.40
1:B:491:TYR:HE2	1:B:498:LEU:C	2.24	0.40
1:A:314:ILE:CD1	1:A:837:HIS:CE1	3.05	0.40
1:A:465:GLU:OE2	1:A:481:LYS:CE	2.69	0.40
1:A:829:HIS:CD2	1:A:841:THR:OG1	2.57	0.40
1:B:433:VAL:O	1:B:493:ARG:NH2	2.54	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	791/898 (88%)	764 (97%)	27 (3%)	0	100	100
1	B	792/898 (88%)	758 (96%)	34 (4%)	0	100	100
All	All	1583/1796 (88%)	1522 (96%)	61 (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	713/795 (90%)	688 (96%)	25 (4%)	36	65
1	B	713/795 (90%)	695 (98%)	18 (2%)	47	76
All	All	1426/1590 (90%)	1383 (97%)	43 (3%)	41	70

All (43) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	123	ASN
1	A	139	PHE
1	A	254	ASN
1	A	273	LEU
1	A	294	SER
1	A	340	LYS
1	A	346	SER
1	A	376	GLU
1	A	424	ARG
1	A	434	THR
1	A	464	ILE
1	A	473	LYS
1	A	545	ASP
1	A	576	CYS
1	A	596	CYS
1	A	603	SER
1	A	610	THR
1	A	614	LYS
1	A	629	ASP
1	A	704	ASN
1	A	718	PHE
1	A	770	ASP
1	A	811	VAL
1	A	829	HIS
1	A	834	GLU

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Mol	Chain	Res	Type
1	B	200	GLN
1	B	256	LEU
1	B	273	LEU
1	B	294	SER
1	B	417	ASP
1	B	427	GLU
1	B	474	THR
1	B	483	THR
1	B	558	VAL
1	B	596	CYS
1	B	603	SER
1	B	614	LYS
1	B	629	ASP
1	B	694	SER
1	B	718	PHE
1	B	792	THR
1	B	831	PHE
1	B	846	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (17) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	111	ASN
1	A	123	ASN
1	A	200	GLN
1	A	213	ASN
1	A	460	HIS
1	A	829	HIS
1	A	837	HIS
1	A	840	HIS
1	A	882	HIS
1	B	111	ASN
1	B	200	GLN
1	B	423	GLN
1	B	829	HIS
1	B	840	HIS
1	B	862	GLN
1	B	879	HIS
1	B	882	HIS

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)

6 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
4	S9W	B	903	1	33,35,35	0.86	1 (3%)	44,48,48	1.92	11 (25%)
2	TMO	B	901	-	4,4,4	1.24	0	6,6,6	0.51	0
2	TMO	A	901	-	4,4,4	1.12	0	6,6,6	0.49	0
3	PO4	A	902	-	4,4,4	0.99	0	6,6,6	0.38	0
4	S9W	A	903	1	33,35,35	0.98	2 (6%)	44,48,48	1.86	12 (27%)
3	PO4	B	902	-	4,4,4	0.76	0	6,6,6	0.54	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	S9W	B	903	1	-	3/20/41/41	0/4/4/4
4	S9W	A	903	1	-	3/20/41/41	0/4/4/4

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	903	S9W	O33-C10	-2.77	1.18	1.22
4	B	903	S9W	C13-C12	2.75	1.43	1.39
4	A	903	S9W	C12-N11	-2.13	1.37	1.41

All (23) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	A	903	S9W	BR1-C29-C30	5.45	127.21	119.30
4	B	903	S9W	O33-C10-C2	-4.89	113.34	121.21
4	B	903	S9W	BR1-C29-C28	-4.61	112.61	119.30
4	B	903	S9W	C2-C10-N11	4.60	122.25	115.43
4	A	903	S9W	BR1-C29-C28	-4.48	112.79	119.30
4	A	903	S9W	C2-C10-N11	4.06	121.45	115.43
4	B	903	S9W	BR1-C29-C30	4.04	125.18	119.30
4	B	903	S9W	O5-C6-C7	-3.52	107.84	111.56
4	A	903	S9W	C25-C26-C27	-3.11	114.93	120.77
4	B	903	S9W	C31-C30-C29	-2.72	115.66	119.19
4	B	903	S9W	C7-C2-C3	2.50	111.32	108.15
4	B	903	S9W	C25-C26-C27	-2.24	116.55	120.77
4	A	903	S9W	C27-C28-C29	2.24	122.10	119.19
4	A	903	S9W	C20-C21-N22	2.24	115.23	110.64
4	A	903	S9W	C7-C2-C3	-2.24	105.33	108.15
4	A	903	S9W	C17-C12-N11	-2.12	113.26	120.40
4	A	903	S9W	O33-C10-C2	-2.12	117.80	121.21
4	A	903	S9W	C18-N19-C24	-2.11	106.36	111.06
4	B	903	S9W	C18-C14-C15	-2.08	116.86	120.77
4	B	903	S9W	C13-C12-N11	2.07	126.95	120.18
4	A	903	S9W	C25-C26-C31	2.05	124.62	120.77
4	A	903	S9W	C13-C12-N11	2.04	126.84	120.18
4	B	903	S9W	C17-C12-N11	-2.00	113.68	120.40

There are no chirality outliers.

All (6) torsion outliers are listed below:

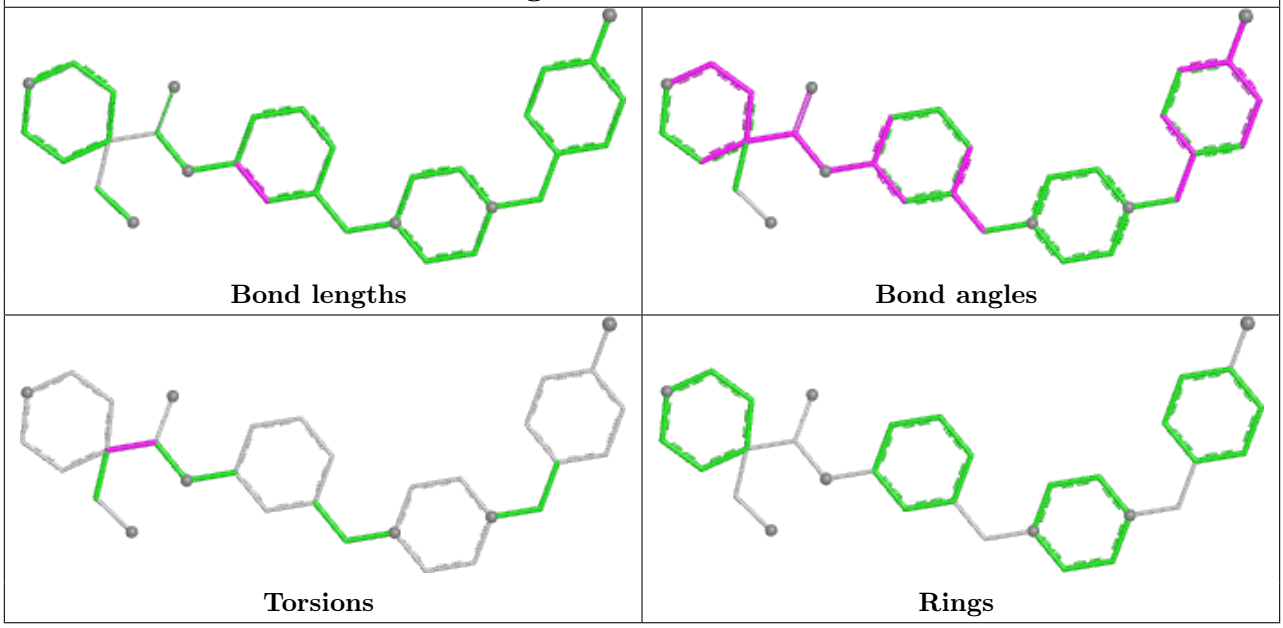
Mol	Chain	Res	Type	Atoms
4	A	903	S9W	N11-C10-C2-C8
4	B	903	S9W	N11-C10-C2-C8
4	A	903	S9W	N11-C10-C2-C7
4	B	903	S9W	N11-C10-C2-C7
4	A	903	S9W	O33-C10-C2-C7
4	B	903	S9W	O33-C10-C2-C7

There are no ring outliers.

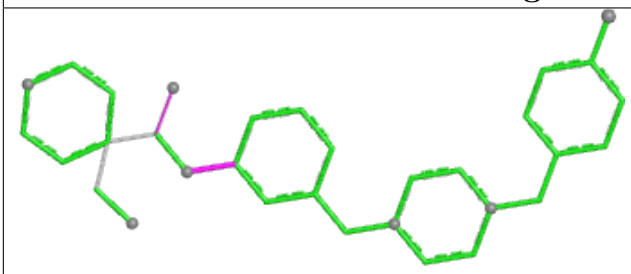
No monomer is involved in short contacts.

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.

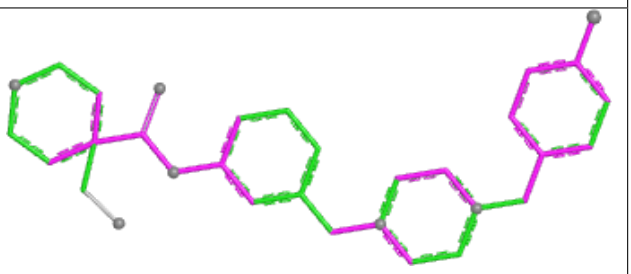
Ligand S9W B 903



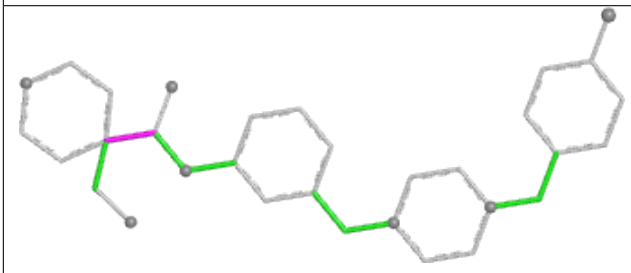
Ligand S9W A 903



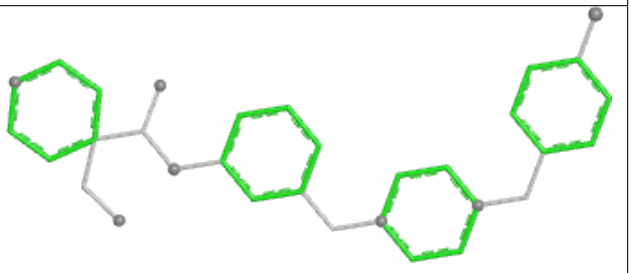
Bond lengths



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, 95^{th} 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	802/898 (89%)	0.07	11 (1%)	75	77	48, 74, 120, 174	0
1	B	804/898 (89%)	0.13	16 (1%)	65	67	58, 81, 128, 175	0
All	All	1606/1796 (89%)	0.10	27 (1%)	70	72	48, 78, 125, 175	0

All (27) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	420	MET	4.9
1	A	139	PHE	4.9
1	B	256	LEU	4.7
1	B	260	GLU	3.6
1	B	70	LYS	3.4
1	B	108	ASN	3.3
1	B	258	ASN	3.3
1	B	126	ALA	3.2
1	A	110	GLU	3.2
1	A	420	MET	3.2
1	A	138	LEU	3.1
1	A	316	VAL	2.9
1	A	261	GLU	2.9
1	B	524	ARG	2.9
1	A	108	ASN	2.6
1	B	257	ALA	2.6
1	B	259	MET	2.6
1	B	870	PRO	2.6
1	B	261	GLU	2.5
1	B	255	GLU	2.5
1	A	256	LEU	2.4
1	B	525	HIS	2.3
1	A	259	MET	2.2
1	B	489	SER	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	753	GLY	2.1
1	A	140	GLN	2.1
1	B	832	LEU	2.1

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

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

6.3 Carbohydrates (i)

There are no monosaccharides in this entry.

6.4 Ligands (i)

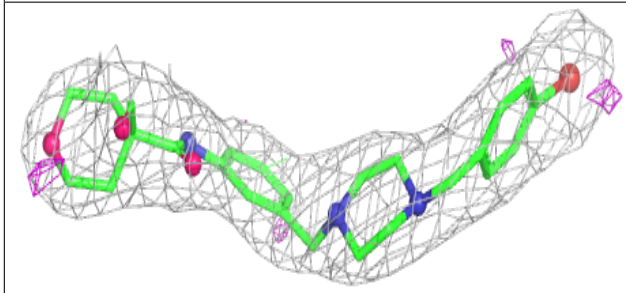
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9'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

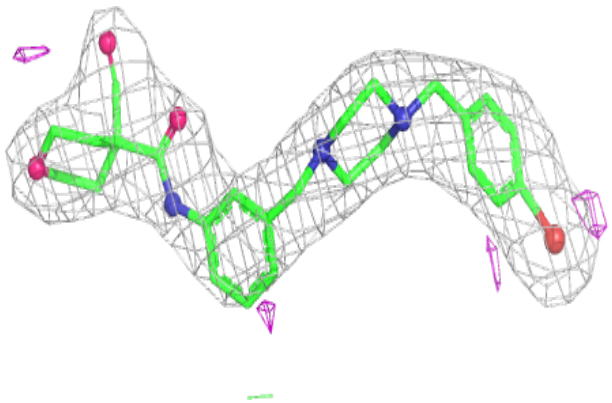
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	PO4	A	902	5/5	0.88	0.26	103,108,126,129	0
3	PO4	B	902	5/5	0.93	0.32	91,99,111,132	0
4	S9W	A	903	32/32	0.95	0.20	61,81,97,127	0
4	S9W	B	903	32/32	0.96	0.16	62,79,96,113	0
2	TMO	A	901	5/5	0.98	0.36	73,77,79,80	0
2	TMO	B	901	5/5	0.98	0.28	71,76,82,82	0

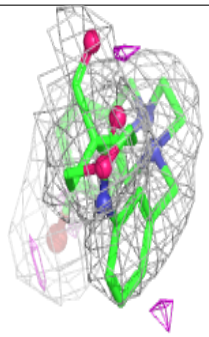
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around S9W A 903:

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

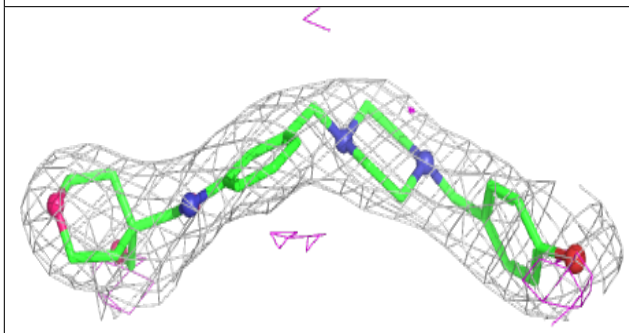


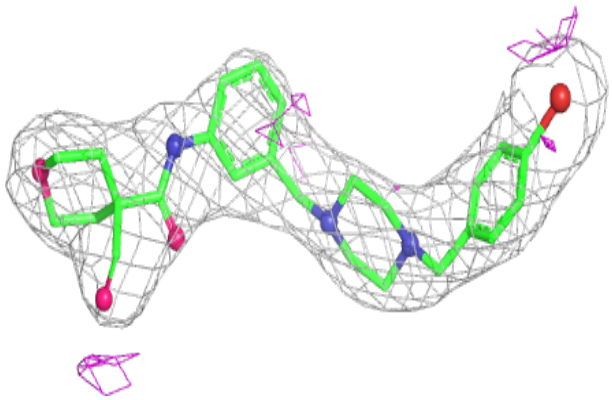


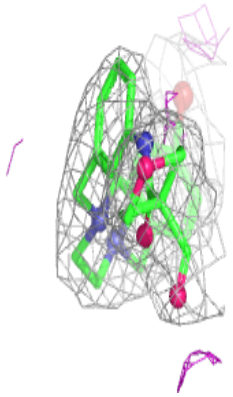


Electron density around S9W B 903:

$2mF_o$-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.