



# Full wwPDB X-ray Structure Validation Report ⓘ

Sep 10, 2023 – 02:49 AM EDT

PDB ID : 4H2E  
Title : Crystal structure of an MMP twin inhibitor complexing two MMP-9 catalytic domains  
Authors : Stura, E.A.; Vera, L.; Cassar-Lajeunesse, E.; Nuti, E.; Catalani, M.P.; Dive, V.; Rossello, A.  
Deposited on : 2012-09-12  
Resolution : 2.90 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](mailto: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>.

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

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtrriage (Phenix) : 1.13  
EDS : 2.35.1  
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) : 2.35.1

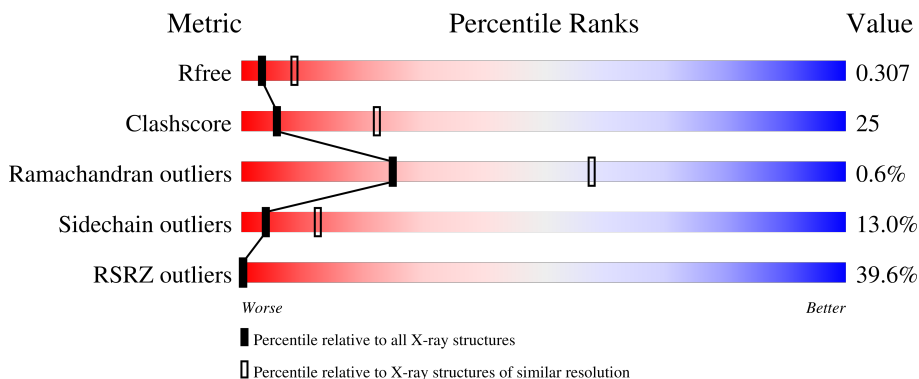
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.90 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	1957 (2.90-2.90)
Clashscore	141614	2172 (2.90-2.90)
Ramachandran outliers	138981	2115 (2.90-2.90)
Sidechain outliers	138945	2117 (2.90-2.90)
RSRZ outliers	127900	1906 (2.90-2.90)

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  $\geq 3$ , 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	164	
1	B	164	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	PEG	A	306	-	-	-	X
6	BCN	B	311	-	-	X	-
7	0Y3	B	306	-	-	-	X

## 2 Entry composition [i](#)

There are 8 unique types of molecules in this entry. The entry contains 2977 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 Matrix metalloproteinase-9.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	164	1315	850	223	240	2	0	1	0
1	B	164	1315	850	223	240	2	0	1	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	106	GLY	-	expression tag	UNP P14780
B	106	GLY	-	expression tag	UNP P14780

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

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

- Molecule 3 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	2	Total	Ca	0	0
			2	2		
3	B	3	Total	Ca	0	0
			3	3		

- Molecule 4 is DI(HYDROXYETHYL)ETHER (three-letter code: PEG) (formula: C<sub>4</sub>H<sub>10</sub>O<sub>3</sub>).



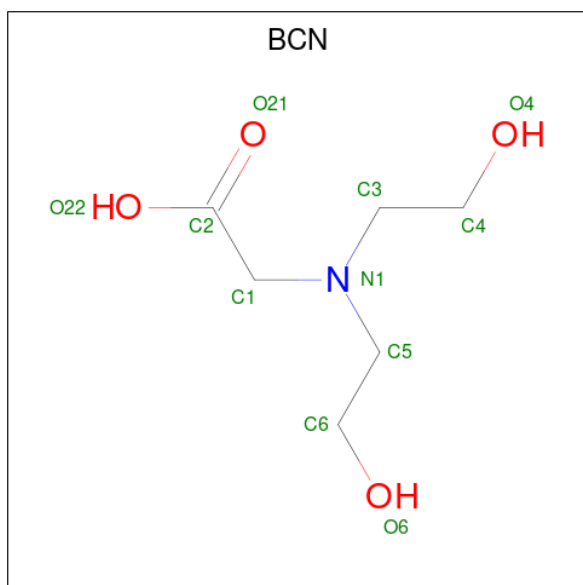
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C O 7 4 3	0	0
4	A	1	Total C O 7 4 3	0	0
4	A	1	Total C O 7 4 3	0	0
4	A	1	Total C O 7 4 3	0	0
4	A	1	Total C O 7 4 3	0	0
4	A	1	Total C O 7 4 3	0	0
4	B	1	Total C O 7 4 3	0	0
4	B	1	Total C O 7 4 3	0	0
4	B	1	Total C O 7 4 3	0	0

- Molecule 5 is ACETATE ION (three-letter code: ACT) (formula: C<sub>2</sub>H<sub>3</sub>O<sub>2</sub>).



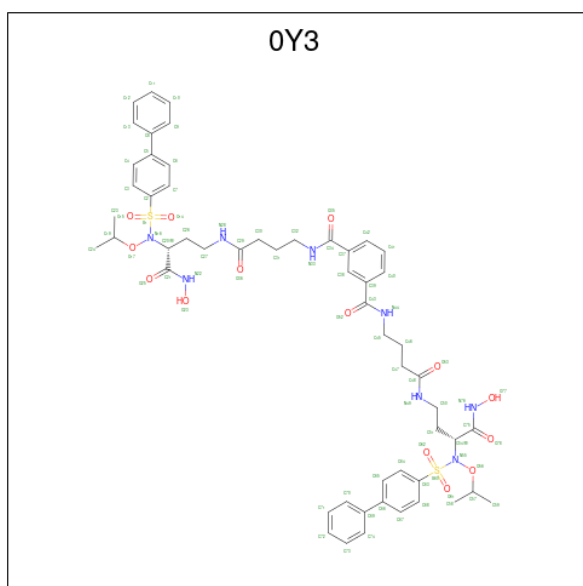
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total C O 4 2 2	0	0
5	A	1	Total C O 4 2 2	0	0
5	A	1	Total C O 4 2 2	0	0
5	B	1	Total C O 4 2 2	0	0

- Molecule 6 is BICINE (three-letter code: BCN) (formula: C<sub>6</sub>H<sub>13</sub>NO<sub>4</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
6	A	1	Total	C	N	O	0	0
			11	6	1	4		
6	A	1	Total	C	N	O	0	0
			11	6	1	4		
6	B	1	Total	C	N	O	0	0
			11	6	1	4		

- Molecule 7 is N,N'-bis(4-[[[(3R)-3-[(biphenyl-4-ylsulfonyl)(propan-2-yloxy)amino]-4-(hydroxylamino)-4-oxobutyl]amino]-4-oxobutyl]benzene-1,3-dicarboxamide (three-letter code: 0Y3) (formula: C<sub>54</sub>H<sub>66</sub>N<sub>8</sub>O<sub>14</sub>S<sub>2</sub>).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
7	B	1	Total	C	N	O	S	0	0
			78	54	8	14	2		

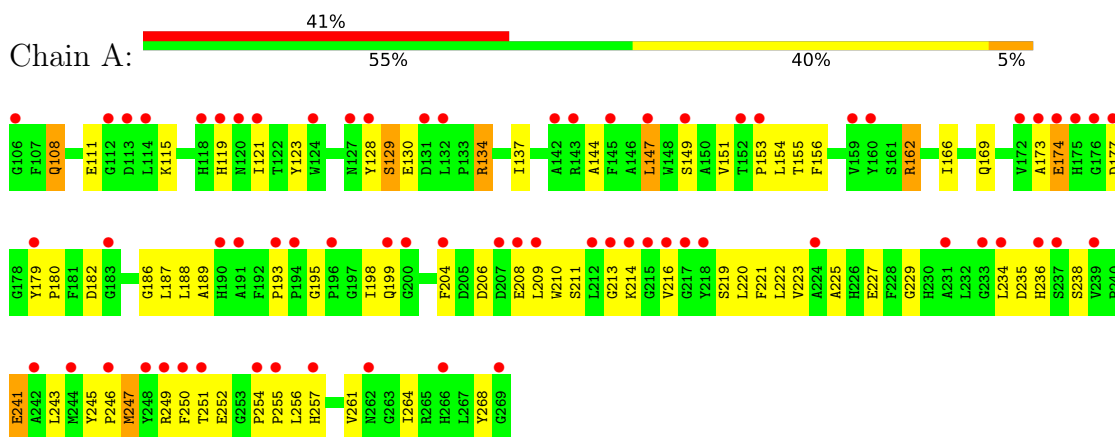
- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	84	Total	O	0	0
			84	84		
8	B	64	Total	O	0	0
			64	64		

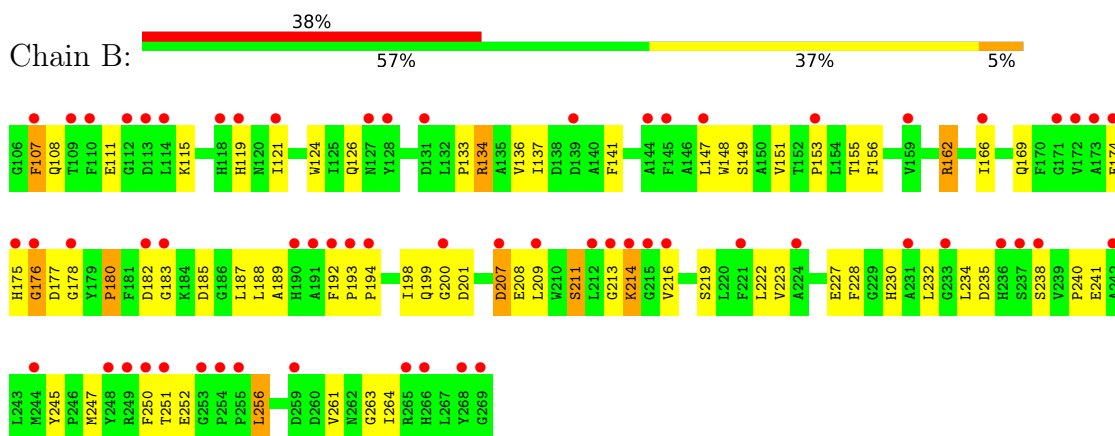
### 3 Residue-property plots

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: Matrix metalloproteinase-9



- Molecule 1: Matrix metalloproteinase-9





## 4 Data and refinement statistics i

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	40.18Å 97.40Å 45.69Å 90.00° 111.99° 90.00°	Depositor
Resolution (Å)	38.85 – 2.90 38.85 – 2.90	Depositor EDS
% Data completeness (in resolution range)	98.0 (38.85-2.90) 98.4 (38.85-2.90)	Depositor EDS
$R_{merge}$	0.20	Depositor
$R_{sym}$	0.17	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.44 (at 2.90Å)	Xtrriage
Refinement program	PHENIX (phenix.refine: 1.8_1069)/REFMAC	Depositor
R, $R_{free}$	0.277 , 0.311 0.278 , 0.307	Depositor DCC
$R_{free}$ test set	358 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	27.4	Xtrriage
Anisotropy	0.036	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.32 , 78.3	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.84	EDS
Total number of atoms	2977	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	16.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 47.35 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 1.0045e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

<sup>1</sup>Intensities estimated from amplitudes.

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

## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: CA, BCN, ACT, PEG, ZN, 0Y3

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	0.31	0/1363	0.52	0/1856
1	B	0.33	0/1363	0.57	1/1856 (0.1%)
All	All	0.32	0/2726	0.54	1/3712 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	176	GLY	N-CA-C	5.46	126.75	113.10

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1315	0	1211	57	0
1	B	1315	0	1211	74	0
2	A	2	0	0	0	0
2	B	2	0	0	0	0
3	A	2	0	0	0	0
3	B	3	0	0	0	0
4	A	42	0	60	3	0
4	B	21	0	30	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	A	12	0	9	0	0
5	B	4	0	3	0	0
6	A	22	0	24	3	0
6	B	11	0	12	7	0
7	B	78	0	64	12	0
8	A	84	0	0	1	0
8	B	64	0	0	0	0
All	All	2977	0	2624	137	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 25.

All (137) 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:214:LYS:HE2	1:B:214:LYS:HA	1.21	1.11
1:B:174:GLU:HB3	6:B:311:BCN:H12	1.04	1.04
1:B:177:ASP:HB3	1:B:198:ILE:HD11	1.42	1.02
1:B:216:VAL:HG12	1:B:216:VAL:O	1.60	1.01
1:B:174:GLU:HB3	6:B:311:BCN:C1	1.91	0.99
1:B:174:GLU:CB	6:B:311:BCN:H12	1.96	0.96
1:B:214:LYS:HE2	1:B:214:LYS:CA	1.93	0.95
1:B:177:ASP:HB3	1:B:198:ILE:CD1	1.99	0.92
1:B:137:ILE:HG22	1:B:141:PHE:CE2	2.09	0.88
1:A:257:HIS:O	1:A:261:VAL:HG23	1.79	0.82
1:A:213:GLY:HA3	1:A:250:PHE:CE2	2.15	0.82
1:B:214:LYS:HA	1:B:214:LYS:CE	2.08	0.81
1:A:119:HIS:NE2	1:A:153:PRO:HB2	1.96	0.81
1:A:219:SER:HB3	1:A:222:LEU:HB2	1.66	0.76
1:A:222:LEU:HD11	1:A:251:THR:HG22	1.68	0.76
1:B:107:PHE:O	7:B:306:OY3:H42	1.88	0.74
4:A:306:PEG:H31	4:B:308:PEG:H22	1.71	0.73
1:B:175:HIS:CD2	1:B:176:GLY:H	2.05	0.73
6:B:311:BCN:O21	6:B:311:BCN:H31	1.87	0.72
1:B:216:VAL:O	1:B:216:VAL:CG1	2.35	0.70
1:B:209:LEU:HD23	1:B:216:VAL:O	1.92	0.69
1:B:227:GLU:OE1	1:B:227:GLU:HA	1.92	0.69
1:B:137:ILE:HG22	1:B:141:PHE:HE2	1.57	0.68
1:A:189:ALA:O	7:B:306:OY3:H56	1.95	0.67
1:A:119:HIS:CD2	1:A:153:PRO:HB2	2.30	0.66
1:A:108:GLN:OE1	1:B:107:PHE:CD2	2.49	0.65

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:A:315:BCN:O21	6:A:315:BCN:H31	1.96	0.65
1:A:245:TYR:CD2	1:A:247:MET:HB3	2.33	0.64
1:A:129:SER:HB3	1:A:206:ASP:OD1	1.99	0.63
1:B:134[A]:ARG:HB3	1:B:134[A]:ARG:CZ	2.28	0.63
1:B:148:TRP:CZ3	1:B:264:ILE:HG21	2.34	0.62
1:B:192:PHE:HB3	1:B:199:GLN:HA	1.82	0.61
1:B:198:ILE:O	1:B:201:ASP:HB2	2.01	0.60
1:B:177:ASP:CB	1:B:198:ILE:HD11	2.24	0.60
1:A:119:HIS:HD2	1:A:154:LEU:HD23	1.67	0.60
1:A:241:GLU:OE2	4:A:306:PEG:H22	2.03	0.59
1:B:119:HIS:CD2	1:B:153:PRO:HB2	2.37	0.59
1:A:123:TYR:HA	1:A:166:ILE:O	2.03	0.59
1:B:189:ALA:O	7:B:306:OY3:H11	2.03	0.59
1:B:230:HIS:CD2	7:B:306:OY3:O77	2.56	0.58
1:A:162:ARG:HB3	1:A:162:ARG:NH1	2.19	0.58
1:B:209:LEU:CD2	1:B:216:VAL:O	2.52	0.57
1:B:175:HIS:CG	1:B:176:GLY:H	2.20	0.57
1:B:247:MET:HB2	7:B:306:OY3:H63	1.85	0.57
1:B:245:TYR:CE2	1:B:247:MET:HB3	2.39	0.57
1:B:183:GLY:HA2	1:B:207:ASP:CB	2.35	0.56
1:B:134[A]:ARG:NH2	1:B:134[A]:ARG:HB2	2.19	0.56
1:A:252:GLU:OE1	1:A:252:GLU:HA	2.05	0.56
1:B:134[A]:ARG:CZ	1:B:134[A]:ARG:CB	2.83	0.56
1:B:107:PHE:CE2	1:B:235:ASP:OD2	2.58	0.56
1:A:137:ILE:HG23	1:A:220:LEU:HD21	1.87	0.56
1:A:147:LEU:HD13	1:A:256:LEU:HG	1.88	0.56
1:A:173:ALA:HB1	4:A:309:PEG:H41	1.87	0.55
1:B:214:LYS:HE3	1:B:250:PHE:CE1	2.42	0.55
1:B:166:ILE:HG12	1:B:200:GLY:O	2.07	0.55
1:A:144:ALA:HA	1:A:221:PHE:HE1	1.71	0.54
1:B:178:GLY:O	4:B:309:PEG:H22	2.08	0.54
1:A:193:PRO:O	1:A:199:GLN:HB3	2.08	0.54
1:A:222:LEU:O	7:B:306:OY3:H66	2.08	0.54
1:B:235:ASP:OD2	7:B:306:OY3:H41	2.08	0.52
1:A:210:TRP:HZ3	1:A:223:VAL:HG21	1.75	0.52
1:A:162:ARG:HB3	1:A:162:ARG:HH11	1.74	0.51
1:B:211:SER:O	1:B:219:SER:HA	2.09	0.51
1:B:245:TYR:CD2	1:B:247:MET:HB3	2.45	0.51
1:A:151:VAL:CG2	1:A:264:ILE:HD12	2.41	0.50
1:A:245:TYR:HD2	1:A:247:MET:HB3	1.74	0.50
1:B:175:HIS:CG	1:B:176:GLY:N	2.79	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:213:GLY:HA3	1:B:219:SER:HB2	1.93	0.50
1:A:235:ASP:CG	1:A:236:HIS:H	2.15	0.50
1:B:227:GLU:OE2	7:B:306:OY3:N76	2.45	0.49
1:B:174:GLU:CG	1:B:174:GLU:O	2.60	0.49
1:A:245:TYR:CE2	1:A:247:MET:HB3	2.47	0.49
6:B:311:BCN:O21	6:B:311:BCN:C3	2.57	0.49
1:A:115:LYS:HB2	1:A:268:TYR:CE1	2.48	0.49
1:B:137:ILE:CG2	1:B:141:PHE:CE2	2.92	0.48
1:A:204:PHE:HB3	1:A:210:TRP:CZ2	2.49	0.48
1:B:134[A]:ARG:NH2	1:B:134[A]:ARG:CB	2.77	0.48
1:A:151:VAL:HG21	1:A:264:ILE:CD1	2.44	0.48
1:A:261:VAL:HA	1:A:264:ILE:HG12	1.96	0.48
1:B:252:GLU:HA	1:B:252:GLU:OE1	2.14	0.47
1:B:162:ARG:NH1	1:B:162:ARG:HB3	2.29	0.47
1:B:174:GLU:HA	1:B:180:PRO:HB3	1.96	0.47
1:A:225:ALA:HB1	1:A:243:LEU:HD21	1.97	0.46
1:B:192:PHE:CB	1:B:199:GLN:HA	2.46	0.46
1:A:227:GLU:HA	1:A:227:GLU:OE1	2.15	0.46
1:B:240:PRO:HA	1:B:245:TYR:CD1	2.51	0.46
1:A:211:SER:O	1:A:219:SER:HA	2.16	0.46
1:B:234:LEU:HD21	1:B:263:GLY:HA3	1.98	0.46
6:B:311:BCN:H51	6:B:311:BCN:H42	1.57	0.46
1:B:174:GLU:HB3	6:B:311:BCN:C2	2.43	0.45
1:A:134[A]:ARG:HE	1:A:134[A]:ARG:HB2	1.53	0.45
1:A:182:ASP:OD1	1:A:186:GLY:HA3	2.15	0.45
1:A:213:GLY:HA3	1:A:250:PHE:HE2	1.77	0.45
1:B:182:ASP:OD2	1:B:182:ASP:N	2.47	0.45
1:A:216:VAL:O	1:A:216:VAL:HG12	2.15	0.45
1:B:175:HIS:CD2	1:B:176:GLY:N	2.81	0.45
1:A:151:VAL:CG2	1:A:264:ILE:CD1	2.95	0.45
1:B:134[A]:ARG:HB2	1:B:134[A]:ARG:HH21	1.82	0.45
1:A:222:LEU:HD23	1:A:222:LEU:HA	1.85	0.45
1:B:261:VAL:HA	1:B:264:ILE:HG12	1.98	0.45
1:B:222:LEU:HD23	1:B:222:LEU:HA	1.83	0.45
1:A:174:GLU:O	1:A:174:GLU:HG2	2.16	0.44
1:B:121:ILE:HB	1:B:156:PHE:CD1	2.52	0.44
1:A:209:LEU:HD23	1:A:216:VAL:O	2.17	0.44
1:B:185:ASP:N	1:B:208:GLU:OE2	2.50	0.44
1:B:121:ILE:O	1:B:156:PHE:HA	2.18	0.44
1:A:261:VAL:HA	1:A:264:ILE:CG1	2.48	0.44
1:B:183:GLY:HA2	1:B:207:ASP:CG	2.37	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:223:VAL:HA	7:B:306:OY3:H14	2.00	0.44
1:B:115:LYS:HA	1:B:194:PRO:HG2	2.00	0.43
1:A:210:TRP:CZ3	1:A:223:VAL:HG21	2.53	0.43
1:A:195:GLY:C	1:A:199:GLN:HB2	2.39	0.43
1:A:254:PRO:HA	1:A:255:PRO:HD3	1.67	0.43
1:B:124:TRP:CH2	1:B:126:GLN:HG3	2.54	0.43
1:B:147:LEU:HG	1:B:256:LEU:HD13	2.00	0.43
1:B:148:TRP:CE3	1:B:264:ILE:HG21	2.54	0.43
1:A:177:ASP:HB3	1:A:198:ILE:HD11	2.01	0.42
1:B:133:PRO:O	1:B:136:VAL:N	2.53	0.42
6:A:315:BCN:O21	6:A:315:BCN:C3	2.65	0.42
1:A:179:TYR:HA	1:A:180:PRO:HD3	1.84	0.42
1:A:238:SER:HB3	8:A:476:HOH:O	2.20	0.42
1:A:182:ASP:HA	6:A:314:BCN:H31	2.01	0.42
1:A:245:TYR:HA	1:A:246:PRO:HD2	1.79	0.42
1:B:193:PRO:O	1:B:199:GLN:HB3	2.20	0.42
1:B:250:PHE:CG	1:B:251:THR:N	2.88	0.42
1:A:219:SER:O	1:A:223:VAL:HG23	2.20	0.41
1:A:229:GLY:O	1:A:234:LEU:HB2	2.19	0.41
1:B:250:PHE:CE2	1:B:251:THR:HG23	2.55	0.41
1:B:183:GLY:HA2	1:B:207:ASP:OD1	2.21	0.41
1:A:121:ILE:O	1:A:156:PHE:HA	2.20	0.41
1:B:222:LEU:O	7:B:306:OY3:H15	2.21	0.41
1:A:128:TYR:HD2	1:A:137:ILE:HD12	1.86	0.41
1:A:223:VAL:HA	7:B:306:OY3:H5	2.02	0.41
1:B:192:PHE:HA	1:B:193:PRO:HD3	1.94	0.40
1:B:228:PHE:O	1:B:232:LEU:HG	2.21	0.40
7:B:306:OY3:H59	7:B:306:OY3:O15	2.22	0.40
1:A:252:GLU:OE1	1:A:252:GLU:CA	2.67	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	163/164 (99%)	160 (98%)	3 (2%)	0	100	100
1	B	163/164 (99%)	154 (94%)	6 (4%)	3 (2%)	8	29
All	All	326/328 (99%)	314 (96%)	9 (3%)	3 (1%)	25	48

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	134[A]	ARG
1	B	134[B]	ARG
1	B	180	PRO

### 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	132/131 (101%)	113 (86%)	19 (14%)	3	9
1	B	132/131 (101%)	116 (88%)	16 (12%)	5	15
All	All	264/262 (101%)	229 (87%)	35 (13%)	4	11

All (35) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	108	GLN
1	A	111	GLU
1	A	129	SER
1	A	130	GLU
1	A	134[A]	ARG
1	A	134[B]	ARG
1	A	147	LEU
1	A	149	SER
1	A	155	THR
1	A	162	ARG
1	A	169	GLN
1	A	174	GLU
1	A	187	LEU

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Mol	Chain	Res	Type
1	A	188	LEU
1	A	208	GLU
1	A	214	LYS
1	A	241	GLU
1	A	247	MET
1	A	249	ARG
1	B	107	PHE
1	B	108	GLN
1	B	111	GLU
1	B	149	SER
1	B	151	VAL
1	B	155	THR
1	B	162	ARG
1	B	169	GLN
1	B	187	LEU
1	B	188	LEU
1	B	207	ASP
1	B	211	SER
1	B	214	LYS
1	B	238	SER
1	B	241	GLU
1	B	256	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	108	GLN
1	A	119	HIS
1	A	199	GLN
1	B	119	HIS
1	B	175	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](#)

Of 26 ligands modelled in this entry, 9 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
4	PEG	B	309	-	6,6,6	0.41	0	5,5,5	0.33	0
4	PEG	A	306	-	6,6,6	0.54	0	5,5,5	0.32	0
4	PEG	A	309	-	6,6,6	0.44	0	5,5,5	0.32	0
4	PEG	A	307	-	6,6,6	0.49	0	5,5,5	0.17	0
4	PEG	B	308	-	6,6,6	0.34	0	5,5,5	0.19	0
6	BCN	A	314	-	10,10,10	0.69	0	11,11,11	1.93	3 (27%)
5	ACT	A	313	-	3,3,3	0.76	0	3,3,3	1.37	0
4	PEG	A	308	-	6,6,6	0.51	0	5,5,5	0.34	0
4	PEG	A	310	-	6,6,6	0.39	0	5,5,5	0.24	0
5	ACT	A	312	-	3,3,3	0.78	0	3,3,3	1.36	0
6	BCN	A	315	-	10,10,10	0.68	0	11,11,11	1.96	3 (27%)
7	0Y3	B	306	2	78,82,82	1.65	4 (5%)	94,112,112	1.63	8 (8%)
6	BCN	B	311	-	10,10,10	0.66	0	11,11,11	1.97	3 (27%)
4	PEG	A	305	-	6,6,6	0.47	0	5,5,5	0.23	0
5	ACT	B	310	-	3,3,3	0.76	0	3,3,3	1.29	0
4	PEG	B	307	-	6,6,6	0.56	0	5,5,5	0.27	0
5	ACT	A	311	-	3,3,3	0.79	0	3,3,3	1.34	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	PEG	B	309	-	-	2/4/4/4	-
4	PEG	A	306	-	-	1/4/4/4	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	PEG	A	309	-	-	3/4/4/4	-
4	PEG	A	307	-	-	3/4/4/4	-
4	PEG	B	308	-	-	3/4/4/4	-
6	BCN	A	314	-	-	3/10/10/10	-
4	PEG	A	308	-	-	2/4/4/4	-
4	PEG	A	310	-	-	1/4/4/4	-
6	BCN	A	315	-	-	4/10/10/10	-
7	0Y3	B	306	2	-	9/82/94/94	0/5/5/5
6	BCN	B	311	-	-	4/10/10/10	-
4	PEG	A	305	-	-	2/4/4/4	-
4	PEG	B	307	-	-	4/4/4/4	-

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
7	B	306	0Y3	C2-S1	-8.86	1.64	1.76
7	B	306	0Y3	C63-S60	-8.68	1.64	1.76
7	B	306	0Y3	S1-N16	-2.77	1.56	1.70
7	B	306	0Y3	S60-N55	-2.69	1.57	1.70

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	B	306	0Y3	O61-S60-O62	-8.97	104.98	119.52
7	B	306	0Y3	O15-S1-O14	-8.54	105.68	119.52
6	A	314	BCN	C1-N1-C5	4.49	122.86	111.94
6	A	315	BCN	C1-N1-C3	4.01	121.69	111.94
6	B	311	BCN	C1-N1-C3	3.79	121.16	111.94
6	A	314	BCN	C1-N1-C3	3.44	120.31	111.94
6	B	311	BCN	C5-N1-C3	3.33	119.36	111.44
6	A	315	BCN	C5-N1-C3	3.31	119.31	111.44
6	B	311	BCN	C1-N1-C5	3.10	119.48	111.94
7	B	306	0Y3	C37-C34-N33	2.99	123.52	117.09
6	A	315	BCN	C1-N1-C5	2.90	118.99	111.94
7	B	306	0Y3	C27-N28-C29	2.70	127.84	122.84
7	B	306	0Y3	O35-C34-C37	-2.28	116.88	120.94
6	A	314	BCN	C5-N1-C3	2.26	116.82	111.44
7	B	306	0Y3	C63-S60-N55	2.26	114.57	104.71
7	B	306	0Y3	C50-N49-C48	2.25	127.01	122.84
7	B	306	0Y3	C45-N44-C43	2.17	127.02	122.08

There are no chirality outliers.

All (41) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	A	314	BCN	C4-C3-N1-C1
6	A	314	BCN	C6-C5-N1-C1
6	A	315	BCN	C2-C1-N1-C3
6	B	311	BCN	C2-C1-N1-C3
6	B	311	BCN	C4-C3-N1-C5
6	B	311	BCN	C6-C5-N1-C1
6	B	311	BCN	N1-C3-C4-O4
7	B	306	0Y3	C50-C51-C54-C75
7	B	306	0Y3	O56-N55-S60-O62
7	B	306	0Y3	O56-N55-S60-O61
7	B	306	0Y3	N49-C50-C51-C54
7	B	306	0Y3	C21-C20-C26-C27
4	B	307	PEG	C1-C2-O2-C3
7	B	306	0Y3	C30-C31-C32-N33
4	A	307	PEG	O2-C3-C4-O4
4	A	309	PEG	O1-C1-C2-O2
4	A	306	PEG	O2-C3-C4-O4
4	B	308	PEG	O1-C1-C2-O2
4	A	308	PEG	O2-C3-C4-O4
4	B	307	PEG	O1-C1-C2-O2
4	B	309	PEG	O1-C1-C2-O2
4	A	308	PEG	O1-C1-C2-O2
4	B	309	PEG	O2-C3-C4-O4
4	B	308	PEG	C4-C3-O2-C2
4	A	309	PEG	C1-C2-O2-C3
4	B	308	PEG	C1-C2-O2-C3
7	B	306	0Y3	N44-C45-C46-C47
4	B	307	PEG	C4-C3-O2-C2
6	A	314	BCN	N1-C3-C4-O4
4	A	305	PEG	O1-C1-C2-O2
4	B	307	PEG	O2-C3-C4-O4
4	A	307	PEG	C4-C3-O2-C2
4	A	305	PEG	C4-C3-O2-C2
4	A	310	PEG	O2-C3-C4-O4
7	B	306	0Y3	C20-C26-C27-N28
4	A	309	PEG	C4-C3-O2-C2
6	A	315	BCN	N1-C3-C4-O4
4	A	307	PEG	C1-C2-O2-C3
6	A	315	BCN	C4-C3-N1-C1
6	A	315	BCN	C6-C5-N1-C3

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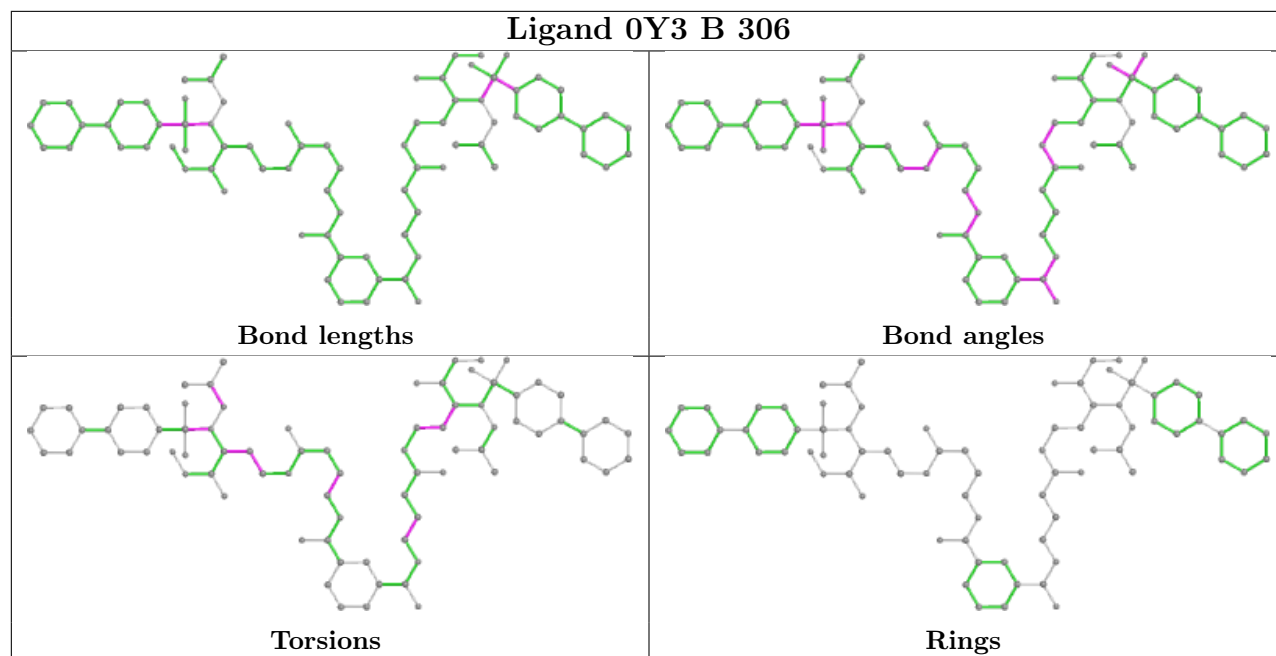
Mol	Chain	Res	Type	Atoms
7	B	306	0Y3	C58-C57-O56-N55

There are no ring outliers.

8 monomers are involved in 26 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	309	PEG	1	0
4	A	306	PEG	2	0
4	A	309	PEG	1	0
4	B	308	PEG	1	0
6	A	314	BCN	1	0
6	A	315	BCN	2	0
7	B	306	0Y3	12	0
6	B	311	BCN	7	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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	164/164 (100%)	1.99	68 (41%) 0 0	1, 15, 35, 49	0
1	B	164/164 (100%)	1.95	62 (37%) 0 0	0, 14, 31, 42	0
All	All	328/328 (100%)	1.97	130 (39%) 0 0	0, 15, 35, 49	0

All (130) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	173	ALA	7.2
1	A	113	ASP	7.0
1	B	183	GLY	6.8
1	B	237	SER	6.3
1	A	213	GLY	6.1
1	B	213	GLY	5.8
1	B	173	ALA	5.5
1	A	209	LEU	5.4
1	B	174	GLU	5.1
1	A	172	VAL	4.8
1	A	112	GLY	4.8
1	B	251	THR	4.7
1	B	250	PHE	4.6
1	B	269	GLY	4.5
1	A	207	ASP	4.5
1	A	183	GLY	4.4
1	A	249	ARG	4.4
1	A	251	THR	4.4
1	B	236	HIS	4.2
1	B	255	PRO	4.2
1	B	191	ALA	4.1
1	B	113	ASP	4.1
1	A	159	VAL	4.0
1	B	159	VAL	4.0

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	B	215	GLY	3.8
1	A	215	GLY	3.8
1	A	231	ALA	3.7
1	B	131	ASP	3.7
1	A	174	GLU	3.6
1	B	175	HIS	3.6
1	B	109	THR	3.6
1	A	224	ALA	3.6
1	A	128	TYR	3.5
1	B	128	TYR	3.5
1	A	208	GLU	3.4
1	B	166	ILE	3.4
1	A	196	PRO	3.4
1	A	145	PHE	3.4
1	B	172	VAL	3.4
1	B	248	TYR	3.3
1	A	124	TRP	3.3
1	B	214	LYS	3.3
1	A	255	PRO	3.3
1	A	216	VAL	3.3
1	B	242	ALA	3.2
1	A	132	LEU	3.2
1	A	176	GLY	3.2
1	B	254	PRO	3.2
1	B	190	HIS	3.2
1	B	238	SER	3.2
1	A	200	GLY	3.2
1	A	131	ASP	3.2
1	A	266	HIS	3.1
1	A	217	GLY	3.1
1	B	153	PRO	3.1
1	A	190	HIS	3.1
1	A	236	HIS	3.1
1	A	218	TYR	3.1
1	B	107	PHE	3.0
1	A	191	ALA	3.0
1	B	231	ALA	3.0
1	A	143	ARG	2.9
1	A	120	ASN	2.9
1	A	214	LYS	2.9
1	A	242	ALA	2.9
1	B	249	ARG	2.8

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	A	194	PRO	2.8
1	B	253	GLY	2.8
1	B	118	HIS	2.8
1	B	209	LEU	2.8
1	B	268	TYR	2.8
1	A	193	PRO	2.8
1	B	114	LEU	2.8
1	B	244	MET	2.8
1	B	200	GLY	2.8
1	B	233	GLY	2.7
1	A	121	ILE	2.7
1	A	254	PRO	2.7
1	B	193	PRO	2.7
1	B	119	HIS	2.7
1	A	269	GLY	2.6
1	B	266	HIS	2.6
1	B	176	GLY	2.6
1	B	212	LEU	2.6
1	B	207	ASP	2.6
1	A	153	PRO	2.5
1	A	142	ALA	2.5
1	A	248	TYR	2.5
1	A	114	LEU	2.5
1	A	149	SER	2.4
1	A	175	HIS	2.4
1	A	246	PRO	2.4
1	A	152	THR	2.4
1	B	121	ILE	2.4
1	B	192	PHE	2.4
1	B	110	PHE	2.4
1	B	216	VAL	2.4
1	B	147	LEU	2.4
1	B	182	ASP	2.3
1	A	250	PHE	2.3
1	A	244	MET	2.3
1	A	106	GLY	2.3
1	A	160	TYR	2.3
1	B	224	ALA	2.3
1	A	127	ASN	2.3
1	A	262	ASN	2.3
1	A	179	TYR	2.3
1	B	171	GLY	2.3

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Mol	Chain	Res	Type	RSRZ
1	B	178	GLY	2.3
1	A	118	HIS	2.2
1	A	233	GLY	2.2
1	A	204	PHE	2.2
1	A	147	LEU	2.2
1	B	194	PRO	2.2
1	A	177	ASP	2.2
1	A	119	HIS	2.2
1	A	239	VAL	2.2
1	A	257	HIS	2.2
1	B	145	PHE	2.2
1	A	212	LEU	2.2
1	B	259	ASP	2.2
1	A	199	GLN	2.2
1	B	112	GLY	2.1
1	B	221	PHE	2.1
1	B	265	ARG	2.1
1	B	127	ASN	2.1
1	B	139	ASP	2.1
1	A	237	SER	2.0
1	B	144	ALA	2.0
1	A	234	LEU	2.0

## 6.2 Non-standard residues in protein, DNA, RNA chains [\(i\)](#)

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

## 6.3 Carbohydrates [\(i\)](#)

There are no monosaccharides in this entry.

## 6.4 Ligands [\(i\)](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
4	PEG	A	306	7/7	0.43	0.41	23,23,23,24	0

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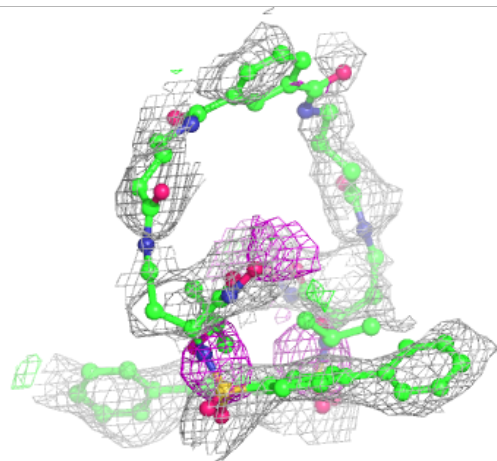
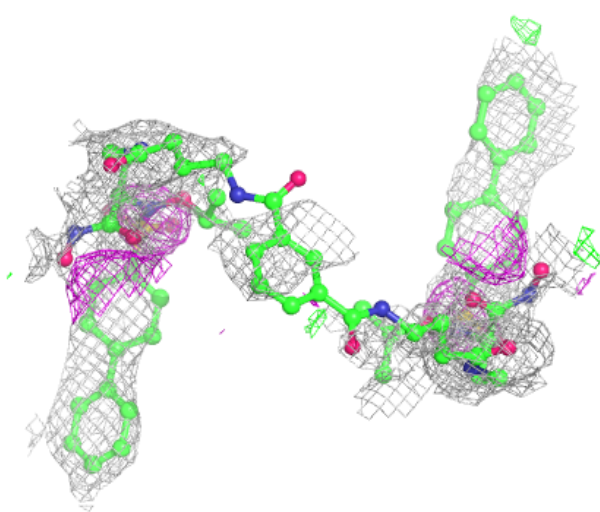
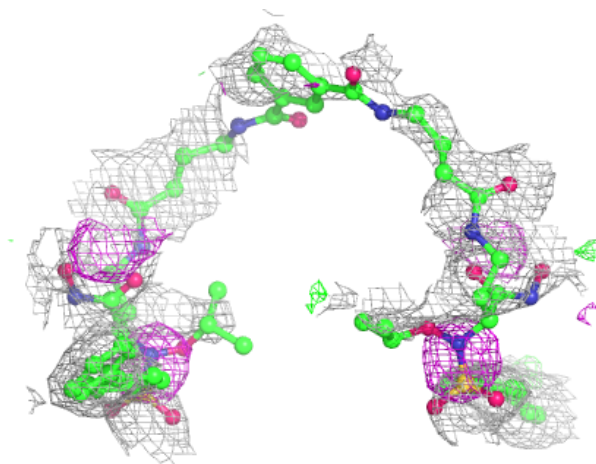
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
6	BCN	A	315	11/11	0.50	0.35	41,41,41,41	0
4	PEG	B	307	7/7	0.61	0.34	20,20,20,20	0
4	PEG	A	307	7/7	0.64	0.31	24,24,24,24	0
6	BCN	B	311	11/11	0.65	0.32	38,38,38,38	0
4	PEG	A	309	7/7	0.66	0.34	29,29,30,30	0
4	PEG	A	308	7/7	0.66	0.27	13,13,14,14	0
5	ACT	B	310	4/4	0.67	0.36	10,10,10,10	0
4	PEG	A	305	7/7	0.69	0.32	16,17,18,18	0
7	0Y3	B	306	78/78	0.72	0.43	32,38,49,50	0
4	PEG	A	310	7/7	0.75	0.25	2,2,2,3	0
6	BCN	A	314	11/11	0.76	0.30	17,18,18,18	0
4	PEG	B	308	7/7	0.82	0.24	5,5,6,6	0
4	PEG	B	309	7/7	0.83	0.20	3,3,3,3	0
5	ACT	A	311	4/4	0.86	0.25	5,5,5,5	0
3	CA	B	305	1/1	0.87	0.65	51,51,51,51	0
5	ACT	A	312	4/4	0.88	0.19	17,17,17,17	0
3	CA	A	303	1/1	0.88	0.15	15,15,15,15	0
3	CA	B	304	1/1	0.89	0.11	25,25,25,25	0
5	ACT	A	313	4/4	0.90	0.21	6,6,6,6	0
3	CA	A	304	1/1	0.91	0.25	21,21,21,21	0
2	ZN	B	301	1/1	0.92	0.10	17,17,17,17	0
2	ZN	A	301	1/1	0.94	0.05	16,16,16,16	0
3	CA	B	303	1/1	0.96	0.06	13,13,13,13	0
2	ZN	B	302	1/1	0.97	0.09	13,13,13,13	0
2	ZN	A	302	1/1	0.98	0.17	15,15,15,15	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 0Y3 B 306:**

$2mF_o-DF_c$  (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.