Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2024 – 04:04 PM EST

PDB ID	:	8G0H
Title	:	Human PARP1 deltaV687-E688 bound to UKTT5 (compound 10) and to a DNA double strand break.
Authors	:	Rouleau-Turcotte, E.; Pascal, J.M.
Deposited on	:	2023-01-31
Resolution	:	3.80 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:

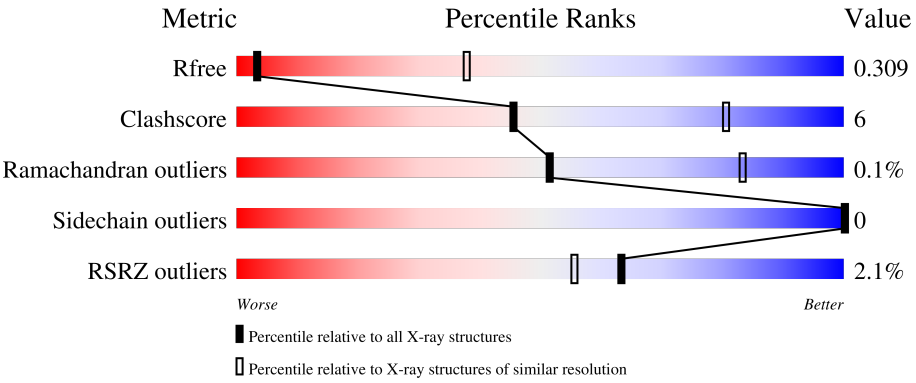
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 3.80 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	1212 (4.00-3.60)
Clashscore	141614	1288 (4.00-3.60)
Ramachandran outliers	138981	1243 (4.00-3.60)
Sidechain outliers	138945	1237 (4.00-3.60)
RSRZ outliers	127900	1121 (4.00-3.60)

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	N	5	40% 60%
1	O	5	60% 40%
2	M	5	100%
2	P	5	60% 40%
3	B	504	% 78% 15% 6%

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Mol	Chain	Length	Quality of chain
3	D	504	4% 80% 14% 6%
4	A	276	% 73% 6% 21%
4	C	276	% 72% 11% 18%

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
5	YH0	B	1101	-	-	-	X

2 Entry composition (i)

There are 6 unique types of molecules in this entry. The entry contains 11487 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 DNA chain called DNA (5'-D(*CP*GP*AP*CP*G)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	O	5	Total	C	N	O	P	0	0	0
			100	48	21	27	4			
1	N	5	Total	C	N	O	P	0	0	0
			100	48	21	27	4			

- Molecule 2 is a DNA chain called DNA (5'-D(*CP*GP*TP*CP*G)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	P	5	Total	C	N	O	P	0	0	0
			99	48	18	29	4			
2	M	5	Total	C	N	O	P	0	0	0
			99	48	18	29	4			

- Molecule 3 is a protein called Poly [ADP-ribose] polymerase 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	D	475	Total	C	N	O	S	0	0	0
			3766	2404	638	711	13			
3	B	473	Total	C	N	O	S	0	0	0
			3752	2397	636	706	13			

There are 24 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
D	517	MET	-	initiating methionine	UNP P09874
D	?	-	VAL	deletion	UNP P09874
D	?	-	GLU	deletion	UNP P09874
D	762	ALA	VAL	variant	UNP P09874
D	1015	LEU	-	expression tag	UNP P09874
D	1016	GLU	-	expression tag	UNP P09874
D	1017	HIS	-	expression tag	UNP P09874
D	1018	HIS	-	expression tag	UNP P09874

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Chain	Residue	Modelled	Actual	Comment	Reference
D	1019	HIS	-	expression tag	UNP P09874
D	1020	HIS	-	expression tag	UNP P09874
D	1021	HIS	-	expression tag	UNP P09874
D	1022	HIS	-	expression tag	UNP P09874
B	517	MET	-	initiating methionine	UNP P09874
B	?	-	VAL	deletion	UNP P09874
B	?	-	GLU	deletion	UNP P09874
B	762	ALA	VAL	variant	UNP P09874
B	1015	LEU	-	expression tag	UNP P09874
B	1016	GLU	-	expression tag	UNP P09874
B	1017	HIS	-	expression tag	UNP P09874
B	1018	HIS	-	expression tag	UNP P09874
B	1019	HIS	-	expression tag	UNP P09874
B	1020	HIS	-	expression tag	UNP P09874
B	1021	HIS	-	expression tag	UNP P09874
B	1022	HIS	-	expression tag	UNP P09874

- Molecule 4 is a protein called Fusion of human PARP1 zinc fingers 1 and 3 (Zn1, Zn3),Poly [ADP-ribose] polymerase 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	A	219	Total	C	N	O	S	0	0	0
			1721	1091	295	322	13			
4	C	227	Total	C	N	O	S	0	0	0
			1782	1126	305	338	13			

There are 40 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-19	MET	-	expression tag	UNP P09874
A	-18	GLY	-	expression tag	UNP P09874
A	-17	SER	-	expression tag	UNP P09874
A	-16	SER	-	expression tag	UNP P09874
A	-15	HIS	-	expression tag	UNP P09874
A	-14	HIS	-	expression tag	UNP P09874
A	-13	HIS	-	expression tag	UNP P09874
A	-12	HIS	-	expression tag	UNP P09874
A	-11	HIS	-	expression tag	UNP P09874
A	-10	HIS	-	expression tag	UNP P09874
A	-9	SER	-	expression tag	UNP P09874
A	-8	SER	-	expression tag	UNP P09874
A	-7	GLY	-	expression tag	UNP P09874

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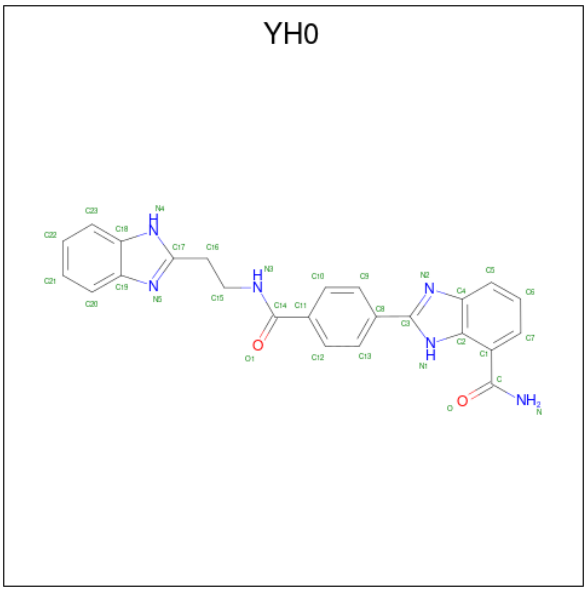
Chain	Residue	Modelled	Actual	Comment	Reference
A	-6	LEU	-	expression tag	UNP P09874
A	-5	VAL	-	expression tag	UNP P09874
A	-4	PRO	-	expression tag	UNP P09874
A	-3	ARG	-	expression tag	UNP P09874
A	-2	GLY	-	expression tag	UNP P09874
A	-1	SER	-	expression tag	UNP P09874
A	0	HIS	-	expression tag	UNP P09874
C	-19	MET	-	expression tag	UNP P09874
C	-18	GLY	-	expression tag	UNP P09874
C	-17	SER	-	expression tag	UNP P09874
C	-16	SER	-	expression tag	UNP P09874
C	-15	HIS	-	expression tag	UNP P09874
C	-14	HIS	-	expression tag	UNP P09874
C	-13	HIS	-	expression tag	UNP P09874
C	-12	HIS	-	expression tag	UNP P09874
C	-11	HIS	-	expression tag	UNP P09874
C	-10	HIS	-	expression tag	UNP P09874
C	-9	SER	-	expression tag	UNP P09874
C	-8	SER	-	expression tag	UNP P09874
C	-7	GLY	-	expression tag	UNP P09874
C	-6	LEU	-	expression tag	UNP P09874
C	-5	VAL	-	expression tag	UNP P09874
C	-4	PRO	-	expression tag	UNP P09874
C	-3	ARG	-	expression tag	UNP P09874
C	-2	GLY	-	expression tag	UNP P09874
C	-1	SER	-	expression tag	UNP P09874
C	0	HIS	-	expression tag	UNP P09874

- Molecule 5 is 2-(4-{[2-(1H-benzimidazol-2-yl)ethyl]carbamoyl}phenyl)-1H-benzimidazole-7-carboxamide (three-letter code: YH0) (formula: $C_{24}H_{20}N_6O_2$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	D	1	Total C N O 32 24 6 2	0	0
5	B	1	Total C N O 32 24 6 2	0	0

- Molecule 6 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	2	Total Zn 2 2	0	0
6	C	2	Total Zn 2 2	0	0

3 Residue-property plots

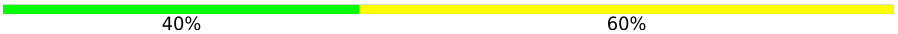
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density.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

• Molecule 1: DNA (5'-D(*CP*GP*AP*CP*G)-3')

Chain O:

• Molecule 1: DNA (5'-D(*CP*GP*AP*CP*G)-3')

Chain N:

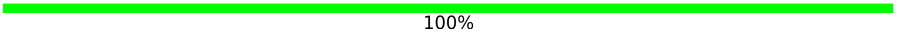


• Molecule 2: DNA (5'-D(*CP*GP*TP*CP*G)-3')

Chain P:

• Molecule 2: DNA (5'-D(*CP*GP*TP*CP*G)-3')

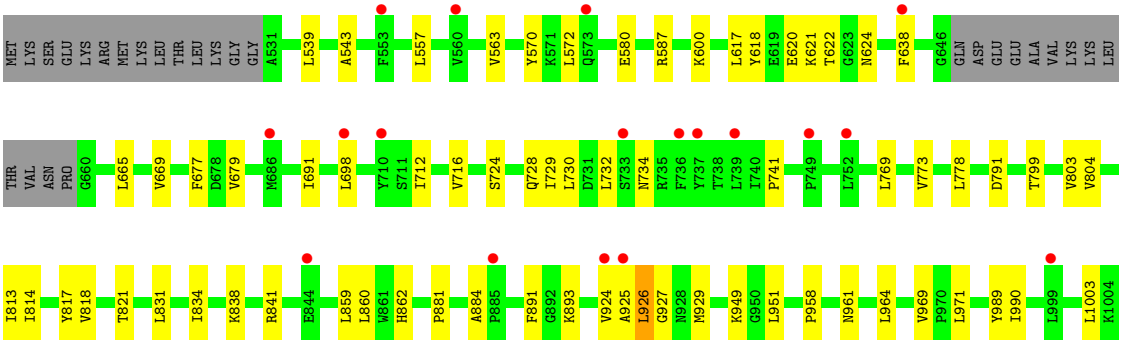
Chain M:

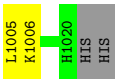


There are no outlier residues recorded for this chain.

• Molecule 3: Poly [ADP-ribose] polymerase 1

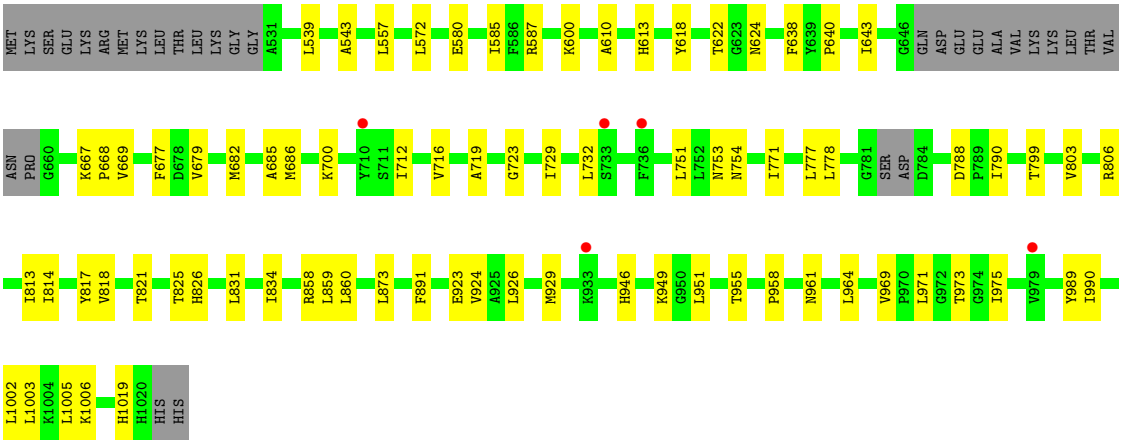
Chain D:





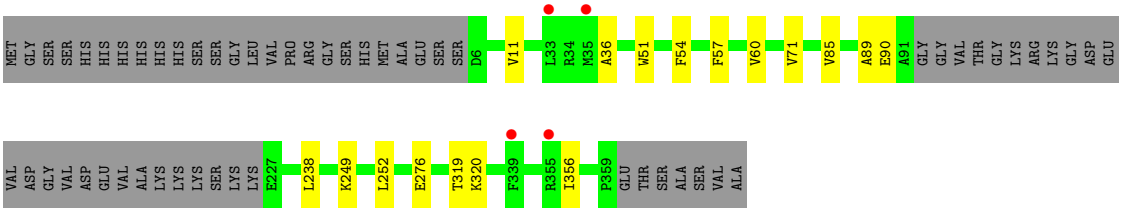
• Molecule 3: Poly [ADP-ribose] polymerase 1

Chain B:



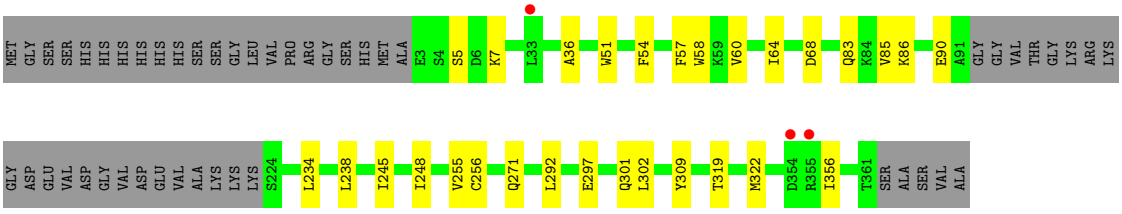
• Molecule 4: Fusion of human PARP1 zinc fingers 1 and 3 (Zn1, Zn3),Poly [ADP-ribose] polymerase 1

Chain A:



• Molecule 4: Fusion of human PARP1 zinc fingers 1 and 3 (Zn1, Zn3),Poly [ADP-ribose] polymerase 1

Chain C:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	108.07Å 110.17Å 117.09Å 90.00° 114.51° 90.00°	Depositor
Resolution (Å)	76.59 – 3.80 76.59 – 3.80	Depositor EDS
% Data completeness (in resolution range)	99.3 (76.59-3.80) 99.6 (76.59-3.80)	Depositor EDS
R_{merge}	0.16	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.26 (at 3.78Å)	Xtriage
Refinement program	PHENIX 1.19.2_4159	Depositor
R, R_{free}	0.240 , 0.306 0.244 , 0.309	Depositor DCC
R_{free} test set	1291 reflections (5.22%)	wwPDB-VP
Wilson B-factor (Å^2)	162.4	Xtriage
Anisotropy	0.250	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.28 , 123.8	EDS
L-test for twinning[2]	$< \|L\| > = 0.42$, $< L^2 > = 0.24$	Xtriage
Estimated twinning fraction	0.076 for h,-k,-h-l	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	11487	wwPDB-VP
Average B, all atoms (Å^2)	197.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.52% 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: YH0, ZN

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\#\|Z\| > 5$	RMSZ	$\#\|Z\| > 5$
1	N	0.40	0/112	0.73	0/171
1	O	0.44	0/112	0.70	0/171
2	M	0.51	0/110	0.90	0/168
2	P	0.53	0/110	0.90	0/168
3	B	0.25	0/3834	0.45	0/5175
3	D	0.25	0/3849	0.46	0/5197
4	A	0.24	0/1759	0.45	0/2372
4	C	0.25	0/1820	0.45	0/2452
All	All	0.26	0/11706	0.47	0/15874

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	N	100	0	57	3	0
1	O	100	0	57	2	0
2	M	99	0	58	0	0
2	P	99	0	58	1	0
3	B	3752	0	3746	60	1

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	D	3766	0	3756	47	1
4	A	1721	0	1658	13	0
4	C	1782	0	1718	24	0
5	B	32	0	0	0	0
5	D	32	0	0	1	0
6	A	2	0	0	0	0
6	C	2	0	0	0	0
All	All	11487	0	11108	144	1

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 6.

All (144) 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)
3:D:813:ILE:HG21	3:D:964:LEU:HD11	1.59	0.85
3:B:813:ILE:HG21	3:B:964:LEU:HD11	1.64	0.77
3:B:679:VAL:HG22	3:B:778:LEU:HD21	1.66	0.76
4:C:271:GLN:N	4:C:301:GLN:OE1	2.18	0.76
4:C:54:PHE:HE1	4:C:85:VAL:HG22	1.59	0.68
3:B:677:PHE:HD1	3:B:778:LEU:HD12	1.57	0.68
4:A:36:ALA:HB2	4:A:51:TRP:CE3	2.30	0.67
4:C:36:ALA:HB2	4:C:51:TRP:CE3	2.29	0.66
3:D:618:TYR:O	3:D:622:THR:HG22	1.95	0.65
3:B:618:TYR:O	3:B:622:THR:HG22	1.97	0.65
3:B:712:ILE:O	3:B:716:VAL:HG23	1.97	0.65
1:O:3:DA:OP1	3:D:600:LYS:NZ	2.23	0.65
3:D:679:VAL:HG22	3:D:778:LEU:HD21	1.78	0.64
4:A:276:GLU:N	4:A:276:GLU:OE1	2.29	0.64
4:A:54:PHE:HE1	4:A:85:VAL:HG22	1.64	0.63
4:C:238:LEU:HD11	4:C:356:ILE:HG21	1.79	0.63
1:O:2:DG:OP2	3:D:621:LYS:NZ	2.24	0.63
3:B:679:VAL:HG22	3:B:778:LEU:CD2	2.28	0.62
3:D:834:ILE:HD11	3:D:1006:LYS:HB2	1.82	0.62
3:D:964:LEU:HD12	3:D:969:VAL:HG21	1.81	0.62
3:B:860:LEU:HD12	3:B:924:VAL:HG11	1.82	0.61
4:A:238:LEU:HD11	4:A:356:ILE:HG21	1.81	0.61
3:D:860:LEU:HD11	3:D:926:LEU:HD11	1.83	0.60
3:D:859:LEU:HD12	3:D:969:VAL:HG22	1.83	0.60
4:A:90:GLU:N	4:A:90:GLU:OE1	2.34	0.60
3:D:557:LEU:HB3	3:D:638:PHE:HB3	1.84	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:C:238:LEU:CD1	4:C:356:ILE:HG21	2.34	0.58
3:D:814:ILE:CG2	3:D:1003:LEU:HD21	2.35	0.57
4:A:238:LEU:CD1	4:A:356:ILE:HG21	2.34	0.57
3:B:677:PHE:CD1	3:B:778:LEU:HD12	2.39	0.57
3:B:751:LEU:HD23	3:B:753:ASN:N	2.20	0.57
3:B:958:PRO:O	3:B:961:ASN:ND2	2.36	0.56
3:D:712:ILE:O	3:D:716:VAL:HG23	2.04	0.56
3:B:729:ILE:HG21	3:B:751:LEU:HD21	1.85	0.56
4:A:54:PHE:CE1	4:A:85:VAL:HG22	2.41	0.56
3:D:814:ILE:O	3:D:818:VAL:HG23	2.06	0.55
4:C:292:LEU:HD22	4:C:302:LEU:HD11	1.89	0.55
3:D:734:ASN:ND2	4:C:319:THR:HG22	2.22	0.55
3:D:958:PRO:O	3:D:961:ASN:ND2	2.38	0.55
4:C:54:PHE:CE1	4:C:85:VAL:HG22	2.41	0.54
3:B:669:VAL:HG23	3:B:803:VAL:CG2	2.38	0.54
3:B:814:ILE:O	3:B:818:VAL:HG23	2.08	0.54
3:D:669:VAL:HG23	3:D:803:VAL:CG2	2.38	0.53
3:B:729:ILE:CG2	3:B:751:LEU:HD21	2.38	0.53
3:D:860:LEU:HD12	3:D:924:VAL:HG11	1.92	0.52
3:D:563:VAL:HG22	3:D:730:LEU:HD21	1.91	0.51
3:D:799:THR:HG22	3:D:841:ARG:HG2	1.93	0.51
3:B:580:GLU:N	3:B:580:GLU:OE1	2.43	0.51
3:D:813:ILE:HD13	3:D:964:LEU:HD21	1.93	0.51
4:C:57:PHE:O	4:C:60:VAL:HG22	2.11	0.51
3:D:580:GLU:N	3:D:580:GLU:OE1	2.44	0.51
3:B:753:ASN:OD1	3:B:754:ASN:N	2.43	0.51
3:D:698:LEU:HD12	3:D:741:PRO:HG3	1.93	0.51
4:C:5:SER:O	4:C:7:LYS:N	2.44	0.51
2:P:24:DT:H2'	2:P:25:DC:C6	2.46	0.51
4:A:36:ALA:HB2	4:A:51:TRP:CD2	2.46	0.51
3:D:881:PRO:O	3:D:893:LYS:NZ	2.33	0.50
3:B:831:LEU:HD12	3:B:1005:LEU:HD23	1.92	0.50
3:B:682:MET:HG3	3:B:778:LEU:HD22	1.94	0.50
3:B:806:ARG:NH2	3:B:834:ILE:O	2.43	0.50
3:B:926:LEU:HD13	3:B:929:MET:CE	2.42	0.50
3:D:734:ASN:HD22	4:C:319:THR:HG22	1.76	0.49
3:B:971:LEU:HD12	3:B:971:LEU:O	2.12	0.49
3:B:825:THR:HG22	3:B:826:HIS:ND1	2.27	0.49
1:N:3:DA:OP1	3:B:600:LYS:NZ	2.32	0.49
3:B:860:LEU:HD11	3:B:989:TYR:HD2	1.78	0.49
3:D:665:LEU:HD11	3:D:791:ASP:OD1	2.13	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:N:1:DC:H2'	1:N:2:DG:C8	2.48	0.48
3:B:572:LEU:HD12	3:B:587:ARG:HG2	1.95	0.48
3:B:926:LEU:HD13	3:B:929:MET:HE2	1.95	0.48
4:A:89:ALA:HB3	4:A:90:GLU:OE1	2.14	0.48
4:C:234:LEU:HD23	4:C:238:LEU:CD1	2.44	0.48
3:B:817:TYR:CE1	3:B:821:THR:HG21	2.49	0.47
3:B:859:LEU:HD12	3:B:969:VAL:HG22	1.97	0.47
3:B:858:ARG:HD3	3:B:926:LEU:HD12	1.96	0.47
3:D:831:LEU:HD12	3:D:1005:LEU:HD23	1.97	0.47
4:C:36:ALA:HB2	4:C:51:TRP:CD2	2.50	0.47
1:N:1:DC:HO5'	3:B:638:PHE:HZ	1.63	0.47
4:A:57:PHE:O	4:A:60:VAL:HG22	2.14	0.46
4:C:58:TRP:CH2	4:C:64:ILE:HD12	2.50	0.46
3:B:716:VAL:HG22	3:B:732:LEU:HD13	1.98	0.46
3:D:724:SER:OG	3:D:728:GLN:OE1	2.33	0.46
4:C:58:TRP:HH2	4:C:64:ILE:HD12	1.81	0.46
3:D:817:TYR:CE1	3:D:821:THR:HG21	2.51	0.45
3:B:716:VAL:HG22	3:B:732:LEU:HB3	1.99	0.45
3:B:719:ALA:O	3:B:723:GLY:N	2.49	0.45
4:A:319:THR:HG22	4:A:320:LYS:N	2.31	0.45
4:C:302:LEU:HD13	4:C:309:TYR:HB3	1.98	0.45
3:B:716:VAL:HA	3:B:732:LEU:HD13	1.98	0.45
4:C:245:ILE:HA	4:C:248:ILE:HD12	1.98	0.45
3:B:788:ASP:OD2	3:B:790:ILE:HD12	2.16	0.45
4:A:11:VAL:HG12	4:A:71:VAL:HG12	1.98	0.45
3:D:971:LEU:HD12	3:D:971:LEU:O	2.17	0.44
3:B:814:ILE:CG2	3:B:1003:LEU:HD21	2.47	0.44
3:B:955:THR:CG2	3:B:975:ILE:HD11	2.47	0.44
4:C:297:GLU:N	4:C:297:GLU:OE1	2.50	0.44
3:D:572:LEU:HD11	3:D:617:LEU:HD13	1.99	0.44
3:D:860:LEU:HD11	3:D:989:TYR:HD2	1.81	0.44
3:B:949:LYS:HD3	3:B:951:LEU:HD21	1.99	0.44
4:C:90:GLU:OE1	4:C:90:GLU:N	2.49	0.44
3:D:572:LEU:HD12	3:D:587:ARG:HG2	2.00	0.44
3:B:685:ALA:HB1	3:B:771:ILE:HD13	1.99	0.44
4:C:322:MET:O	4:C:322:MET:HG2	2.18	0.44
3:D:563:VAL:CG2	3:D:730:LEU:HD21	2.47	0.44
3:D:929:MET:SD	3:D:949:LYS:HB2	2.58	0.44
3:B:667:LYS:N	3:B:668:PRO:HD2	2.33	0.44
3:D:804:VAL:HG23	3:D:838:LYS:H	1.83	0.43
3:B:622:THR:HG23	3:B:624:ASN:H	1.82	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:B:799:THR:HG21	3:B:873:LEU:HD12	2.00	0.43
3:B:973:THR:O	3:B:975:ILE:HG23	2.18	0.43
4:C:68:ASP:N	4:C:68:ASP:OD1	2.50	0.43
4:C:255:VAL:HG23	4:C:256:CYS:SG	2.59	0.42
3:D:949:LYS:HD3	3:D:951:LEU:HD21	2.01	0.42
3:B:539:LEU:O	3:B:543:ALA:N	2.48	0.42
3:D:891:PHE:HB2	3:D:990:ILE:CD1	2.50	0.42
3:B:859:LEU:HD23	3:B:923:GLU:HA	2.02	0.42
4:C:83:GLN:HA	4:C:86:LYS:HE3	2.02	0.42
3:D:716:VAL:HG22	3:D:732:LEU:HB3	2.01	0.42
3:B:557:LEU:HD23	3:B:640:PRO:HA	2.00	0.42
3:B:817:TYR:HE1	3:B:821:THR:HG21	1.83	0.42
3:B:964:LEU:HD12	3:B:969:VAL:HG21	2.02	0.42
3:D:677:PHE:HD1	3:D:778:LEU:HD12	1.85	0.41
3:D:729:ILE:HA	3:D:732:LEU:HD12	2.02	0.41
3:D:925:ALA:O	3:D:927:GLY:N	2.53	0.41
3:B:557:LEU:HB3	3:B:638:PHE:HB3	2.02	0.41
3:B:926:LEU:O	3:B:946:HIS:HB2	2.20	0.41
4:C:302:LEU:C	4:C:302:LEU:HD12	2.40	0.41
3:D:622:THR:HG23	3:D:624:ASN:H	1.86	0.41
3:D:769:LEU:O	3:D:773:VAL:HG23	2.19	0.41
3:B:585:ILE:CD1	3:B:613:HIS:HB3	2.51	0.41
3:B:1002:LEU:HD23	3:B:1003:LEU:N	2.36	0.41
3:B:585:ILE:HD11	3:B:610:ALA:O	2.21	0.41
3:D:539:LEU:O	3:D:543:ALA:N	2.49	0.41
3:B:643:ILE:HG23	3:B:700:LYS:O	2.21	0.41
4:A:249:LYS:HA	4:A:252:LEU:HB2	2.03	0.41
3:B:834:ILE:HD11	3:B:1006:LYS:HB2	2.03	0.41
3:D:570:TYR:HE2	3:D:572:LEU:HD13	1.86	0.40
3:B:751:LEU:HD23	3:B:753:ASN:H	1.84	0.40
3:D:862:HIS:HA	5:D:1101:YH0:O	2.21	0.40
3:B:777:LEU:O	3:B:777:LEU:HD23	2.21	0.40
3:D:884:ALA:O	3:D:893:LYS:NZ	2.49	0.40
3:B:686:MET:HG3	3:B:771:ILE:CG2	2.51	0.40
3:B:891:PHE:HB2	3:B:990:ILE:CD1	2.51	0.40
3:B:669:VAL:HG23	3:B:803:VAL:HG22	2.02	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:D:620:GLU:OE2	3:B:1019:HIS:ND1[2_657]	2.19	0.01

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
3	B	467/504 (93%)	430 (92%)	37 (8%)	0	100 100
3	D	471/504 (94%)	433 (92%)	36 (8%)	2 (0%)	34 70
4	A	215/276 (78%)	201 (94%)	14 (6%)	0	100 100
4	C	223/276 (81%)	207 (93%)	16 (7%)	0	100 100
All	All	1376/1560 (88%)	1271 (92%)	103 (8%)	2 (0%)	51 83

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	D	926	LEU
3	D	691	ILE

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
3	B	410/441 (93%)	410 (100%)	0	100 100
3	D	412/441 (93%)	412 (100%)	0	100 100
4	A	184/243 (76%)	184 (100%)	0	100 100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
4	C	192/243 (79%)	192 (100%)	0	100	100
All	All	1198/1368 (88%)	1198 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
3	B	627	HIS

5.3.3 RNA

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains

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

5.5 Carbohydrates

There are no monosaccharides in this entry.

5.6 Ligand geometry

Of 6 ligands modelled in this entry, 4 are monoatomic - leaving 2 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	$\#\|Z\| > 2$
5	YH0	D	1101	-	33,36,36	0.90	2 (6%)	37,51,51	0.81	0
5	YH0	B	1101	-	33,36,36	0.91	2 (6%)	37,51,51	0.67	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
5	YH0	D	1101	-	-	9/18/18/18	0/5/5/5
5	YH0	B	1101	-	-	12/18/18/18	0/5/5/5

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	D	1101	YH0	C3-N1	-2.24	1.33	1.35
5	D	1101	YH0	C1-C2	-2.20	1.40	1.43
5	B	1101	YH0	C1-C2	-2.15	1.40	1.43
5	B	1101	YH0	C3-N1	-2.07	1.33	1.35

There are no bond angle outliers.

There are no chirality outliers.

All (21) torsion outliers are listed below:

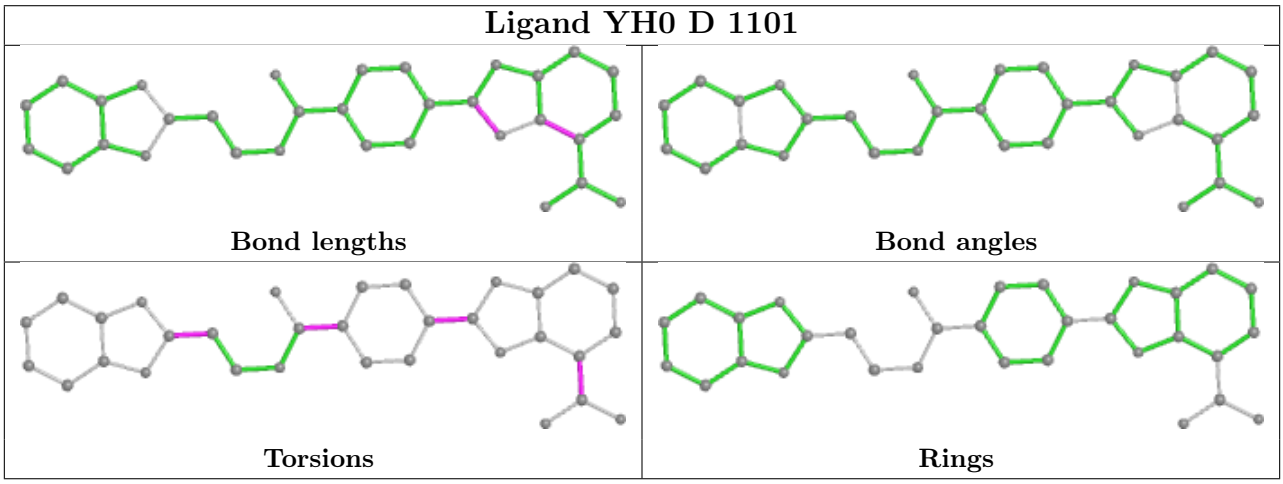
Mol	Chain	Res	Type	Atoms
5	D	1101	YH0	C15-C16-C17-N4
5	B	1101	YH0	C15-C16-C17-N5
5	D	1101	YH0	N1-C3-C8-C9
5	D	1101	YH0	N2-C3-C8-C9
5	D	1101	YH0	N2-C3-C8-C13
5	B	1101	YH0	N2-C3-C8-C9
5	B	1101	YH0	N2-C3-C8-C13
5	B	1101	YH0	C12-C11-C14-O1
5	D	1101	YH0	O-C-C1-C2
5	B	1101	YH0	C10-C11-C14-O1
5	B	1101	YH0	C12-C11-C14-N3
5	B	1101	YH0	C10-C11-C14-N3
5	D	1101	YH0	N1-C3-C8-C13
5	B	1101	YH0	N1-C3-C8-C9
5	B	1101	YH0	N1-C3-C8-C13
5	D	1101	YH0	N-C-C1-C2
5	B	1101	YH0	N-C-C1-C2
5	B	1101	YH0	O-C-C1-C2
5	D	1101	YH0	C10-C11-C14-O1
5	B	1101	YH0	O-C-C1-C7
5	D	1101	YH0	C12-C11-C14-O1

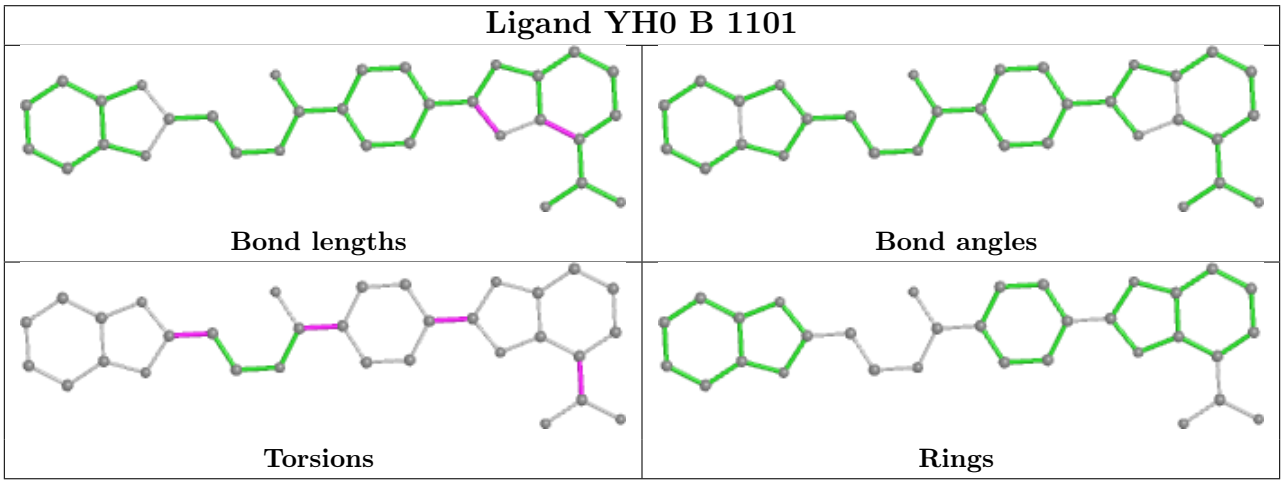
There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	D	1101	YH0	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.





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	N	5/5 (100%)	0.33	0 100 100	172, 175, 179, 185	0
1	O	5/5 (100%)	0.11	0 100 100	158, 170, 184, 191	0
2	M	5/5 (100%)	-0.17	0 100 100	197, 200, 203, 210	0
2	P	5/5 (100%)	-0.15	0 100 100	203, 205, 208, 218	0
3	B	473/504 (93%)	-0.07	5 (1%) 80 74	146, 189, 231, 295	0
3	D	475/504 (94%)	0.08	18 (3%) 40 33	147, 185, 231, 290	0
4	A	219/276 (79%)	-0.12	4 (1%) 68 61	168, 214, 277, 310	0
4	C	227/276 (82%)	-0.28	3 (1%) 77 70	163, 214, 264, 305	0
All	All	1414/1580 (89%)	-0.06	30 (2%) 63 55	146, 194, 250, 310	0

All (30) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	D	686	MET	4.5
3	D	925	ALA	4.1
3	D	733	SER	2.9
3	D	739	LEU	2.9
4	A	35	MET	2.9
3	B	710	TYR	2.6
4	A	33	LEU	2.5
3	D	573	GLN	2.5
3	D	885	PRO	2.5
4	A	355	ARG	2.5
4	A	339	PHE	2.5
3	B	736	PHE	2.4
3	B	933	LYS	2.4
3	D	553	PHE	2.4
3	D	698	LEU	2.4
3	D	924	VAL	2.4

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Mol	Chain	Res	Type	RSRZ
3	D	638	PHE	2.4
4	C	355	ARG	2.3
3	D	752	LEU	2.3
3	B	733	SER	2.3
4	C	354	ASP	2.3
3	D	737	TYR	2.3
3	D	736	PHE	2.2
3	B	979	VAL	2.2
3	D	844	GLU	2.2
3	D	749	PRO	2.1
3	D	560	VAL	2.1
3	D	999	LEU	2.1
3	D	710	TYR	2.1
4	C	33	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.

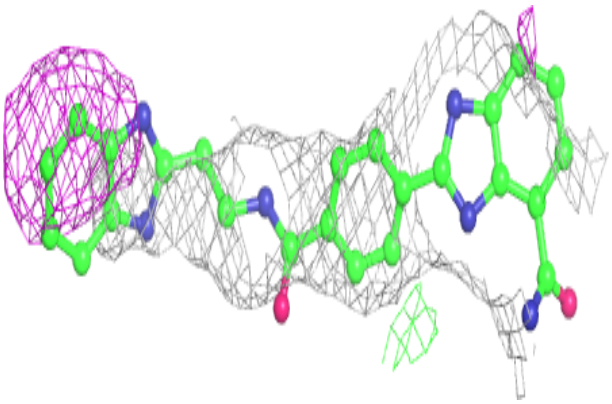
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
5	YH0	B	1101	32/32	0.62	0.52	138,171,190,210	0
5	YH0	D	1101	32/32	0.68	0.40	137,162,178,200	0
6	ZN	A	401	1/1	0.93	0.16	227,227,227,227	0
6	ZN	C	402	1/1	0.93	0.18	254,254,254,254	0
6	ZN	A	402	1/1	0.96	0.15	157,157,157,157	0
6	ZN	C	401	1/1	0.97	0.16	136,136,136,136	0

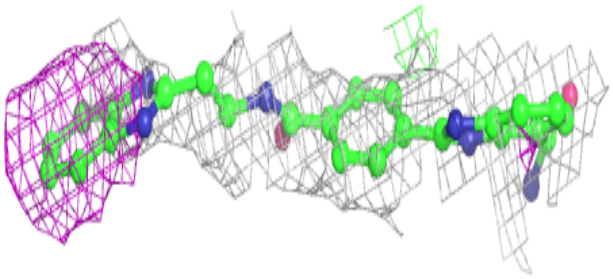
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers

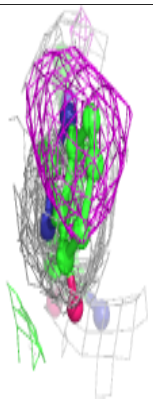
as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around YH0 B 1101:

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

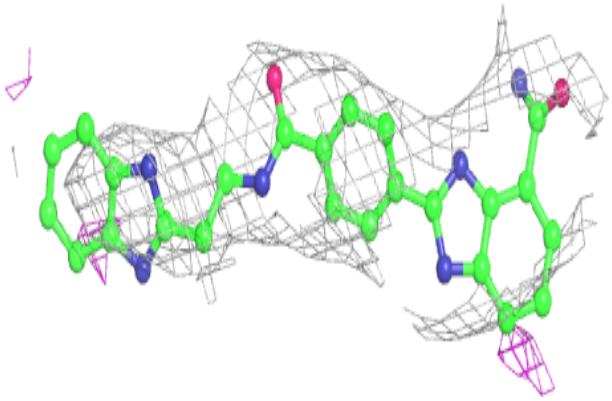


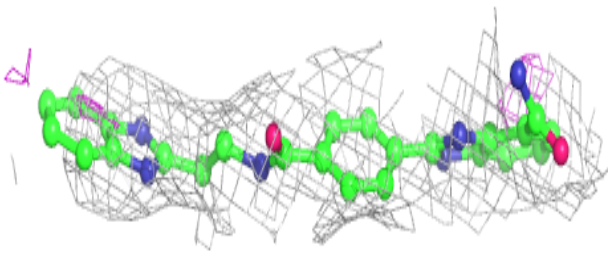


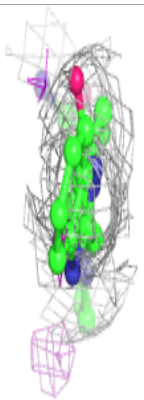


Electron density around YH0 D 1101:

$2mF_o$-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.