



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 6, 2025 – 04:24 pm BST

PDB ID : 6QAS / pdb_00006qas
Title : Crystal structure of ULK1 in complexed with PF-03814735
Authors : Chaikuad, A.; Arrowsmith, C.H.; Edwards, A.M.; Bountra, C.; Knapp, S.;
Structural Genomics Consortium (SGC)
Deposited on : 2018-12-19
Resolution : 1.75 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 : 4-5-2 with Phenix2.0
Mogul : 1.8.4, CSD as541be (2020)
Xtriage (Phenix) : 2.0
EDS : 3.0
buster-report : 1.1.7 (2018)
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.46

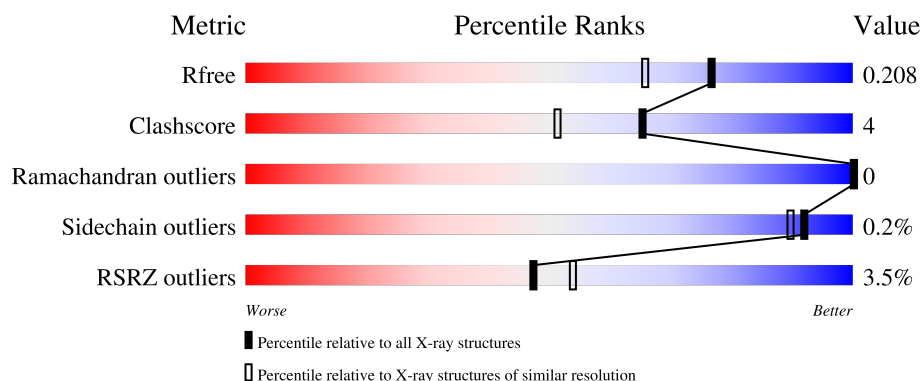
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

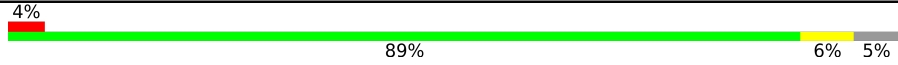
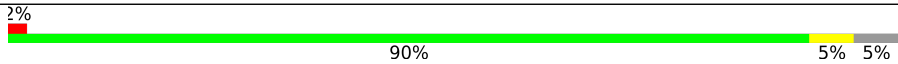
The reported resolution of this entry is 1.75 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	2888 (1.76-1.76)
Clashscore	180529	3097 (1.76-1.76)
Ramachandran outliers	177936	3072 (1.76-1.76)
Sidechain outliers	177891	3072 (1.76-1.76)
RSRZ outliers	164620	2887 (1.76-1.76)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	287	
1	B	287	

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 5104 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.

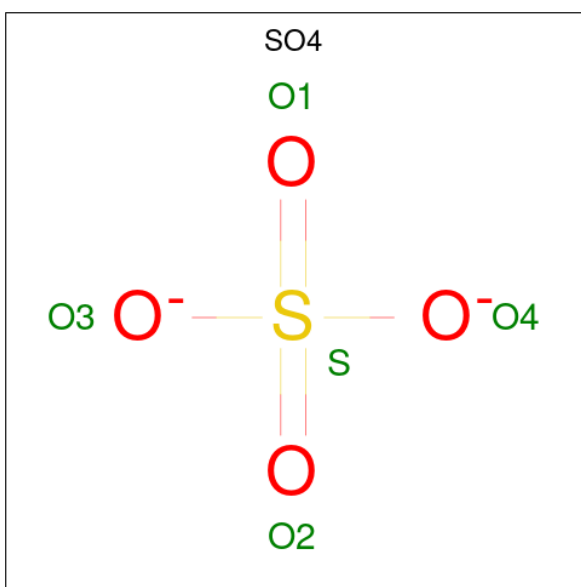
- Molecule 1 is a protein called Serine/threonine-protein kinase ULK1.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	274	Total	C	N	O	P	S	0	6	0
			2218	1415	389	396	2	16			
1	B	273	Total	C	N	O	P	S	0	8	0
			2229	1421	391	398	2	17			

There are 12 discrepancies between the modelled and reference sequences:

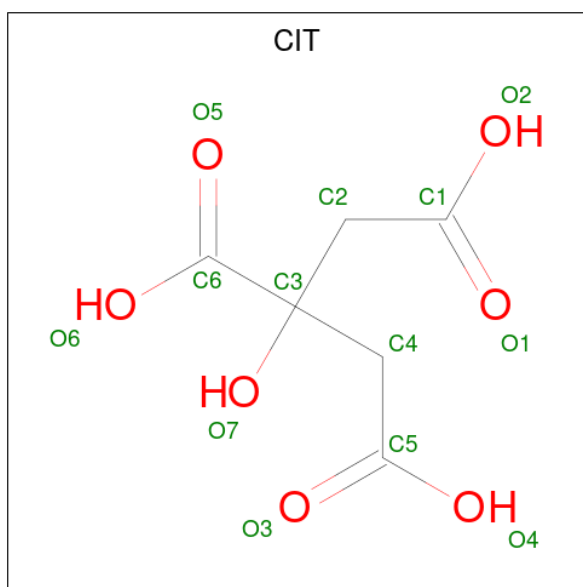
Chain	Residue	Modelled	Actual	Comment	Reference
A	-3	GLY	-	expression tag	UNP O75385
A	-2	GLY	-	expression tag	UNP O75385
A	-1	GLY	-	expression tag	UNP O75385
A	0	SER	-	expression tag	UNP O75385
A	37	ALA	GLU	conflict	UNP O75385
A	38	ALA	LYS	conflict	UNP O75385
B	-3	GLY	-	expression tag	UNP O75385
B	-2	GLY	-	expression tag	UNP O75385
B	-1	GLY	-	expression tag	UNP O75385
B	0	SER	-	expression tag	UNP O75385
B	37	ALA	GLU	conflict	UNP O75385
B	38	ALA	LYS	conflict	UNP O75385

- Molecule 2 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



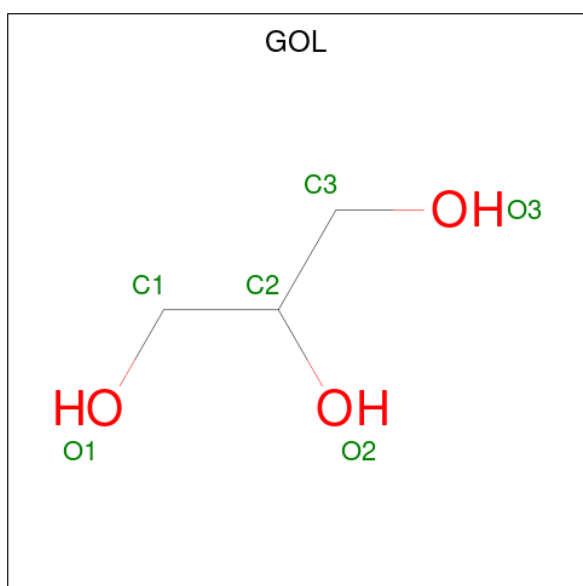
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	O	S	0	0
			5	4	1		
2	A	1	Total	O	S	0	0
			5	4	1		
2	A	1	Total	O	S	0	0
			5	4	1		
2	B	1	Total	O	S	0	0
			5	4	1		
2	B	1	Total	O	S	0	0
			5	4	1		
2	B	1	Total	O	S	0	0
			5	4	1		

- Molecule 3 is CITRIC ACID (CCD ID: CIT) (formula: C₆H₈O₇).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			13	6	7		
3	B	1	Total	C	O	0	0
			13	6	7		

- Molecule 4 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).



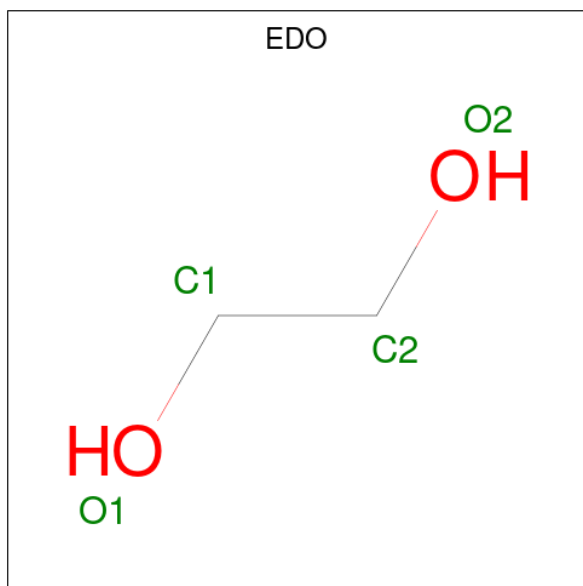
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			6	3	3		
4	A	1	Total	C	O	0	0
			6	3	3		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			6	3	3		
4	A	1	Total	C	O	0	0
			6	3	3		
4	A	1	Total	C	O	0	0
			6	3	3		
4	A	1	Total	C	O	0	0
			6	3	3		
4	B	1	Total	C	O	0	0
			6	3	3		
4	B	1	Total	C	O	0	0
			6	3	3		
4	B	1	Total	C	O	0	0
			6	3	3		
4	B	1	Total	C	O	0	0
			6	3	3		

- Molecule 5 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: C₂H₆O₂).



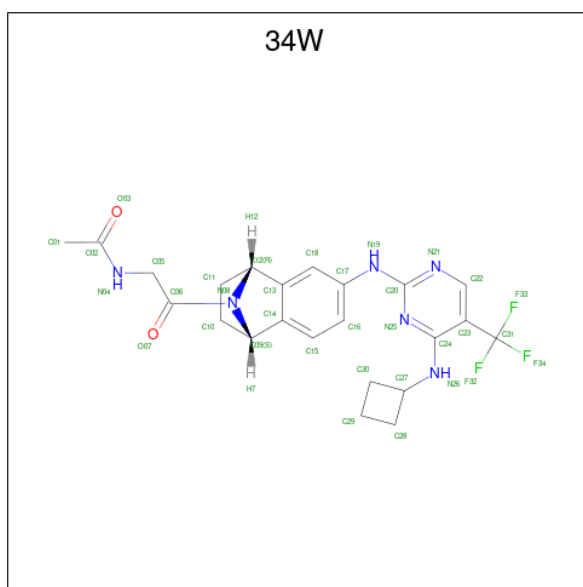
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			4	2	2		
5	A	1	Total	C	O	0	0
			4	2	2		

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

- Molecule 6 is N-{2-[(1S,4R)-6-{[4-(cyclobutylamino)-5-(trifluoromethyl)pyrimidin-2-yl]amino}-1,2,3,4-tetrahydro-1,4-epiminonaphthalen-9-yl]-2-oxoethyl}acetamide (CCD ID: 34W) (formula: C₂₃H₂₅F₃N₆O₂).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
6	A	1	Total	C	F	N	O	0	0
			34	23	3	6	2		
6	B	1	Total	C	F	N	O	0	0
			34	23	3	6	2		
6	B	1	Total	C	F	N	O	0	0
			34	23	3	6	2		

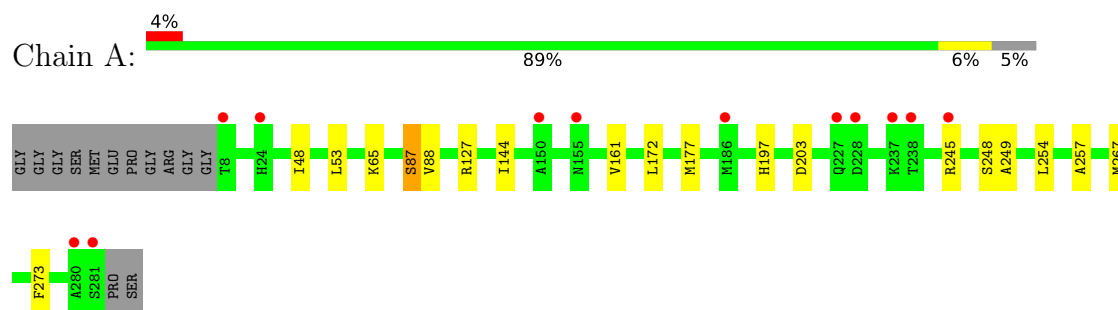
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	205	Total	O	0	0
			205	205		
7	B	180	Total	O	0	0
			180	180		

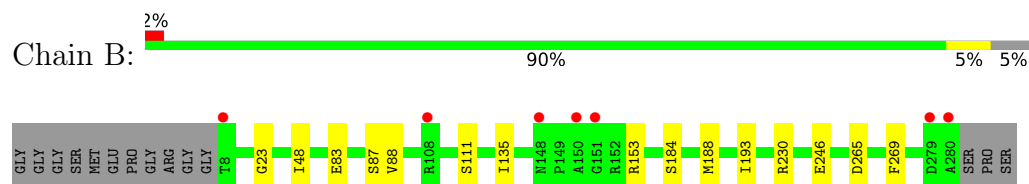
3 Residue-property plots [i](#)

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: Serine/threonine-protein kinase ULK1



- Molecule 1: Serine/threonine-protein kinase ULK1



4 Data and refinement statistics

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α , β , γ	74.24Å 74.24Å 222.31Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	47.47 – 1.75 47.47 – 1.75	Depositor EDS
% Data completeness (in resolution range)	100.0 (47.47-1.75) 100.0 (47.47-1.75)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.38 (at 1.75Å)	Xtriage
Refinement program	REFMAC 5.8.0232	Depositor
R, R_{free}	0.170 , 0.197 0.181 , 0.208	Depositor DCC
R_{free} test set	3177 reflections (4.98%)	wwPDB-VP
Wilson B-factor (Å ²)	27.6	Xtriage
Anisotropy	0.140	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.38 , 36.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	5104	wwPDB-VP
Average B, all atoms (Å ²)	31.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.18% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: EDO, CIT, TPO, 34W, SEP, SO4, GOL

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	1.04	0/2259	1.12	1/3040 (0.0%)
1	B	1.08	0/2267	1.10	0/3049
All	All	1.06	0/4526	1.11	1/6089 (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	A	203	ASP	CA-CB-CG	5.02	117.62	112.60

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	2218	0	2255	12	0
1	B	2229	0	2266	15	0
2	A	15	0	0	0	0
2	B	15	0	0	0	0
3	A	13	0	5	0	0
3	B	13	0	5	0	0
4	A	36	0	48	3	0
4	B	30	0	40	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	A	28	0	41	4	0
5	B	20	0	30	4	0
6	A	34	0	25	2	0
6	B	68	0	50	6	0
7	A	205	0	0	3	0
7	B	180	0	0	4	0
All	All	5104	0	4765	35	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 4.

All (35) 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)
4:A:309:GOL:H2	7:A:537:HOH:O	1.95	0.67
6:B:316:34W:N25	6:B:316:34W:H15	2.12	0.65
1:B:23:GLY:HA3	6:B:315:34W:C29	2.30	0.61
5:A:314:EDO:H11	7:A:447:HOH:O	2.00	0.61
1:A:248:SER:HA	4:A:310:GOL:H11	1.82	0.61
1:A:48:ILE:HD11	1:A:88[B]:VAL:HG12	1.86	0.58
6:A:318:34W:N25	6:A:318:34W:H14	2.22	0.55
1:B:111:SER:CB	5:B:311:EDO:H21	2.37	0.55
1:B:111:SER:OG	5:B:311:EDO:H21	2.09	0.52
6:B:315:34W:N25	6:B:315:34W:H14	2.25	0.51
1:A:245:ARG:NH1	7:A:408:HOH:O	2.44	0.50
1:B:230:ARG:NE	7:B:406:HOH:O	2.43	0.49
6:B:316:34W:N25	6:B:316:34W:C18	2.75	0.48
1:B:188[A]:MET:HE2	1:B:193:ILE:HB	1.95	0.48
1:A:65:LYS:HE2	5:A:317:EDO:O2	2.13	0.47
1:A:53:LEU:HB3	5:A:311:EDO:H11	1.96	0.47
1:B:184:SER:O	1:B:188[A]:MET:HG3	2.15	0.47
1:A:249:ALA:H	4:A:310:GOL:H11	1.80	0.46
1:B:265:ASP:OD1	7:B:401:HOH:O	2.20	0.46
1:B:153:ARG:HB3	6:B:316:34W:H5	1.97	0.45
1:B:111:SER:HB3	5:B:311:EDO:H21	1.98	0.45
1:A:48:ILE:HD12	1:A:87:SEP:HA	2.01	0.43
1:B:88:VAL:HG21	7:B:552:HOH:O	2.18	0.43
1:A:177[B]:MET:HE2	1:A:197:HIS:C	2.44	0.43
6:A:318:34W:N25	6:A:318:34W:C16	2.82	0.42
1:A:127:ARG:HA	1:A:273:PHE:CZ	2.55	0.42
1:A:144:ILE:HG23	1:A:161:VAL:HG13	2.00	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:269:PHE:HB2	4:B:309:GOL:H2	2.01	0.42
1:A:257:ALA:HB3	1:A:267:MET:HE3	2.01	0.41
1:A:172:LEU:HD23	5:A:315:EDO:H12	2.01	0.41
6:B:315:34W:N25	6:B:315:34W:C16	2.83	0.41
1:B:83:GLU:HG2	1:B:88:VAL:HG13	2.03	0.41
1:B:246[A]:GLU:OE1	5:B:314:EDO:O1	2.37	0.41
1:B:48:ILE:HG12	7:B:434:HOH:O	2.19	0.41
1:B:135:ILE:HG22	4:B:307:GOL:H11	2.02	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	276/287 (96%)	267 (97%)	9 (3%)	0	100	100
1	B	277/287 (96%)	268 (97%)	9 (3%)	0	100	100
All	All	553/574 (96%)	535 (97%)	18 (3%)	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	237/239 (99%)	236 (100%)	1 (0%)	89	86

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	B	238/239 (100%)	238 (100%)	0	100	100
All	All	475/478 (99%)	474 (100%)	1 (0%)	92	90

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	254	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	24	HIS
1	A	173	GLN
1	B	105	HIS
1	B	148	ASN
1	B	260	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

4 non-standard protein/DNA/RNA residues 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	$\# Z > 2$
1	TPO	A	180	1	8,10,11	0.92	0	10,14,16	0.72	0
1	SEP	B	87	1	8,9,10	1.10	1 (12%)	8,12,14	1.05	1 (12%)
1	TPO	B	180	1	8,10,11	0.63	0	10,14,16	0.96	0
1	SEP	A	87	1	8,9,10	1.18	1 (12%)	8,12,14	1.12	1 (12%)

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
1	TPO	A	180	1	-	1/9/11/13	-
1	SEP	B	87	1	-	0/5/8/10	-
1	TPO	B	180	1	-	0/9/11/13	-
1	SEP	A	87	1	-	1/5/8/10	-

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	87	SEP	P-OG	2.65	1.68	1.60
1	B	87	SEP	P-OG	2.14	1.67	1.60

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	87	SEP	OG-CB-CA	2.30	110.38	108.14
1	B	87	SEP	O3P-P-O2P	2.04	115.43	107.64

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	87	SEP	CB-OG-P-O2P
1	A	180	TPO	O-C-CA-CB

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	A	87	SEP	1	0

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry

34 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$
5	EDO	A	315	-	3,3,3	0.20	0	2,2,2	0.27	0
6	34W	A	318	-	38,38,38	0.55	0	47,57,57	1.24	7 (14%)
5	EDO	B	313	-	3,3,3	0.19	0	2,2,2	0.03	0
2	SO4	B	301	-	4,4,4	0.54	0	6,6,6	0.11	0
5	EDO	A	316	-	3,3,3	0.15	0	2,2,2	0.04	0
6	34W	B	316	-	38,38,38	0.87	2 (5%)	47,57,57	1.21	5 (10%)
5	EDO	A	314	-	3,3,3	0.37	0	2,2,2	0.01	0
5	EDO	B	314	-	3,3,3	0.30	0	2,2,2	0.07	0
4	GOL	A	308	-	5,5,5	0.14	0	5,5,5	0.29	0
2	SO4	A	302	-	4,4,4	0.34	0	6,6,6	0.07	0
2	SO4	B	302	-	4,4,4	0.48	0	6,6,6	0.07	0
5	EDO	B	311	-	3,3,3	0.27	0	2,2,2	0.29	0
5	EDO	B	310	-	3,3,3	0.18	0	2,2,2	0.05	0
5	EDO	A	317	-	3,3,3	0.98	0	2,2,2	0.25	0
5	EDO	A	313	-	3,3,3	0.30	0	2,2,2	0.14	0
4	GOL	A	305	-	5,5,5	0.26	0	5,5,5	0.65	0
4	GOL	B	305	-	5,5,5	0.10	0	5,5,5	0.32	0
4	GOL	A	306	-	5,5,5	0.29	0	5,5,5	0.59	0
4	GOL	A	310	-	5,5,5	0.20	0	5,5,5	0.31	0
2	SO4	A	303	-	4,4,4	0.42	0	6,6,6	0.07	0
4	GOL	B	307	-	5,5,5	0.09	0	5,5,5	0.33	0
4	GOL	B	306	-	5,5,5	0.31	0	5,5,5	0.36	0
5	EDO	A	311	-	3,3,3	0.27	0	2,2,2	0.09	0
5	EDO	A	312	-	3,3,3	0.10	0	2,2,2	0.05	0
4	GOL	B	309	-	5,5,5	0.09	0	5,5,5	0.33	0
2	SO4	B	303	-	4,4,4	0.40	0	6,6,6	0.07	0
4	GOL	A	309	-	5,5,5	0.14	0	5,5,5	0.32	0
6	34W	B	315	-	38,38,38	0.70	1 (2%)	47,57,57	1.25	7 (14%)
5	EDO	B	312	-	3,3,3	0.07	0	2,2,2	0.17	0
3	CIT	A	304	-	12,12,12	0.96	0	17,17,17	1.45	3 (17%)
3	CIT	B	304	-	12,12,12	1.24	2 (16%)	17,17,17	1.48	3 (17%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	GOL	B	308	-	5,5,5	0.13	0	5,5,5	0.32	0
4	GOL	A	307	-	5,5,5	0.14	0	5,5,5	0.36	0
2	SO4	A	301	-	4,4,4	0.28	0	6,6,6	0.12	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	EDO	A	315	-	-	1/1/1/1	-
6	34W	A	318	-	-	3/23/50/50	0/6/5/5
5	EDO	B	313	-	-	1/1/1/1	-
5	EDO	A	316	-	-	0/1/1/1	-
6	34W	B	316	-	-	8/23/50/50	0/6/5/5
5	EDO	A	314	-	-	1/1/1/1	-
5	EDO	B	314	-	-	0/1/1/1	-
4	GOL	A	308	-	-	2/4/4/4	-
5	EDO	B	311	-	-	1/1/1/1	-
5	EDO	B	310	-	-	1/1/1/1	-
5	EDO	A	317	-	-	0/1/1/1	-
5	EDO	A	313	-	-	1/1/1/1	-
4	GOL	A	305	-	-	2/4/4/4	-
4	GOL	B	305	-	-	0/4/4/4	-
4	GOL	A	310	-	-	2/4/4/4	-
4	GOL	A	306	-	-	2/4/4/4	-
4	GOL	B	307	-	-	2/4/4/4	-
4	GOL	B	306	-	-	0/4/4/4	-
5	EDO	A	311	-	-	0/1/1/1	-
5	EDO	A	312	-	-	0/1/1/1	-
4	GOL	B	309	-	-	4/4/4/4	-
4	GOL	A	309	-	-	3/4/4/4	-
6	34W	B	315	-	-	4/23/50/50	0/6/5/5
5	EDO	B	312	-	-	1/1/1/1	-
3	CIT	A	304	-	-	0/16/16/16	-
3	CIT	B	304	-	-	4/16/16/16	-
4	GOL	B	308	-	-	2/4/4/4	-
4	GOL	A	307	-	-	0/4/4/4	-

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	B	316	34W	C05-C06	2.86	1.64	1.52
3	B	304	CIT	C3-C6	2.85	1.56	1.53
6	B	316	34W	C11-C10	2.71	1.61	1.54
3	B	304	CIT	O2-C1	-2.13	1.23	1.30
6	B	315	34W	C05-C06	2.11	1.61	1.52

All (25) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	B	316	34W	C11-C12-N08	-4.05	99.27	101.97
3	B	304	CIT	O5-C6-C3	-3.96	116.65	122.25
3	A	304	CIT	O5-C6-C3	-3.93	116.68	122.25
6	B	316	34W	C10-C09-N08	-3.92	99.36	101.97
6	B	315	34W	C11-C12-N08	-3.47	99.66	101.97
6	B	315	34W	C10-C09-N08	-3.44	99.68	101.97
6	A	318	34W	C11-C12-N08	-3.36	99.74	101.97
6	A	318	34W	C10-C09-N08	-3.02	99.96	101.97
3	B	304	CIT	O6-C6-C3	2.96	118.19	113.05
6	A	318	34W	C24-N26-C27	-2.77	119.09	124.26
6	A	318	34W	C13-C14-C09	-2.77	105.81	110.49
3	A	304	CIT	O6-C6-C3	2.70	117.74	113.05
6	B	315	34W	C29-C28-C27	2.55	90.58	88.37
6	B	315	34W	C13-C14-C09	-2.54	106.21	110.49
6	B	316	34W	C29-C28-C27	-2.45	86.24	88.37
6	A	318	34W	C15-C14-C09	2.44	133.16	129.06
6	B	315	34W	C29-C30-C27	2.42	90.47	88.37
6	B	316	34W	C14-C13-C12	-2.41	106.43	110.49
6	B	316	34W	C13-C14-C09	-2.39	106.46	110.49
6	A	318	34W	C14-C13-C12	-2.39	106.46	110.49
6	A	318	34W	C29-C28-C27	-2.33	86.34	88.37
6	B	315	34W	C15-C14-C09	2.28	132.89	129.06
6	B	315	34W	C14-C13-C12	-2.20	106.78	110.49
3	A	304	CIT	O1-C1-C2	-2.12	116.74	122.94
3	B	304	CIT	O3-C5-C4	-2.12	116.75	122.94

There are no chirality outliers.

All (45) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	305	GOL	O1-C1-C2-O2
4	A	305	GOL	O1-C1-C2-C3
4	A	306	GOL	C1-C2-C3-O3

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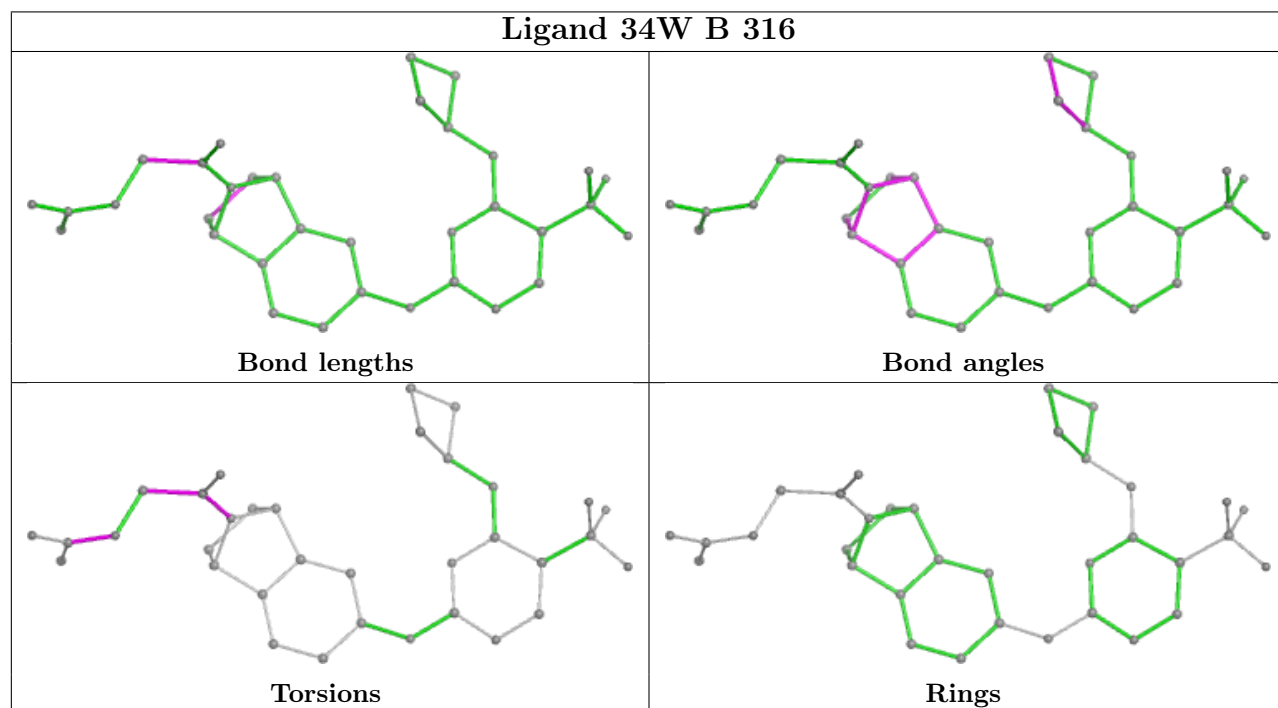
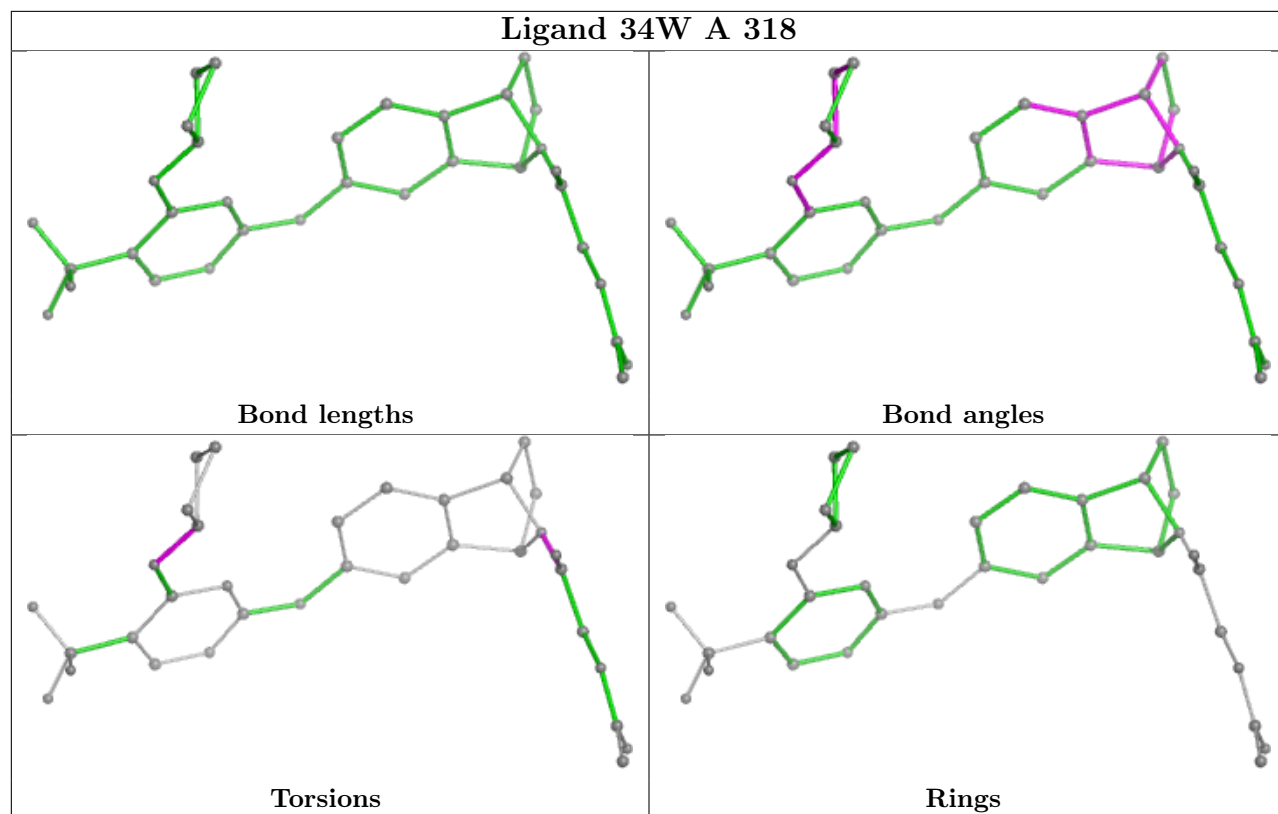
Mol	Chain	Res	Type	Atoms
4	A	308	GOL	O1-C1-C2-C3
4	A	309	GOL	C1-C2-C3-O3
4	A	310	GOL	C1-C2-C3-O3
4	B	307	GOL	C1-C2-C3-O3
4	B	308	GOL	O1-C1-C2-C3
4	B	309	GOL	C1-C2-C3-O3
6	B	316	34W	C01-C02-N04-C05
6	B	316	34W	O03-C02-N04-C05
6	B	316	34W	N04-C05-C06-O07
6	B	316	34W	C05-C06-N08-C09
6	B	316	34W	C05-C06-N08-C12
6	B	316	34W	O07-C06-N08-C09
6	B	316	34W	O07-C06-N08-C12
6	A	318	34W	O07-C06-N08-C12
4	B	309	GOL	O1-C1-C2-C3
4	A	306	GOL	O2-C2-C3-O3
4	A	308	GOL	O1-C1-C2-O2
4	A	310	GOL	O2-C2-C3-O3
4	B	308	GOL	O1-C1-C2-O2
4	B	309	GOL	O1-C1-C2-O2
4	B	309	GOL	O2-C2-C3-O3
5	A	315	EDO	O1-C1-C2-O2
5	B	312	EDO	O1-C1-C2-O2
6	B	316	34W	N04-C05-C06-N08
4	A	309	GOL	O2-C2-C3-O3
4	B	307	GOL	O2-C2-C3-O3
5	A	314	EDO	O1-C1-C2-O2
5	B	311	EDO	O1-C1-C2-O2
6	B	315	34W	O07-C06-N08-C12
3	B	304	CIT	C2-C3-C6-O6
6	A	318	34W	C05-C06-N08-C12
6	B	315	34W	N04-C05-C06-N08
5	A	313	EDO	O1-C1-C2-O2
5	B	313	EDO	O1-C1-C2-O2
4	A	309	GOL	O1-C1-C2-C3
3	B	304	CIT	C2-C3-C6-O5
3	B	304	CIT	C4-C3-C6-O5
6	B	315	34W	N04-C05-C06-O07
6	A	318	34W	C28-C27-N26-C24
6	B	315	34W	C30-C27-N26-C24
3	B	304	CIT	C4-C3-C6-O6
5	B	310	EDO	O1-C1-C2-O2

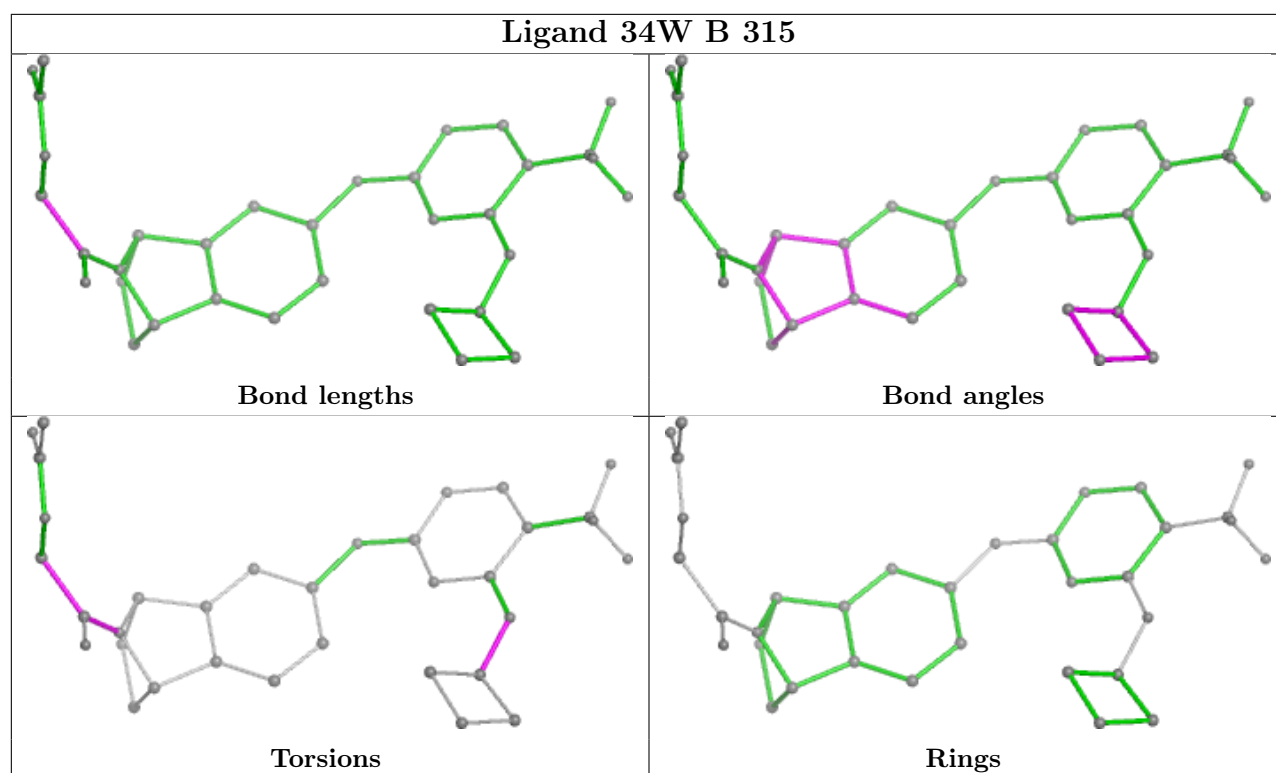
There are no ring outliers.

13 monomers are involved in 21 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	315	EDO	1	0
6	A	318	34W	2	0
6	B	316	34W	3	0
5	A	314	EDO	1	0
5	B	314	EDO	1	0
5	B	311	EDO	3	0
5	A	317	EDO	1	0
4	A	310	GOL	2	0
4	B	307	GOL	1	0
5	A	311	EDO	1	0
4	B	309	GOL	1	0
4	A	309	GOL	1	0
6	B	315	34W	3	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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	272/287 (94%)	0.07	12 (4%) 39 44	14, 26, 50, 66	6 (2%)
1	B	271/287 (94%)	0.06	7 (2%) 57 64	13, 26, 48, 81	8 (2%)
All	All	543/574 (94%)	0.06	19 (3%) 47 54	13, 26, 50, 81	14 (2%)

All (19) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	280	ALA	7.8
1	A	280	ALA	4.4
1	B	151	GLY	4.4
1	A	8	THR	3.2
1	A	245	ARG	2.8
1	A	24	HIS	2.8
1	B	8	THR	2.8
1	A	281	SER	2.7
1	B	279	ASP	2.7
1	B	150	ALA	2.7
1	A	150	ALA	2.4
1	A	186	MET	2.4
1	B	108	ARG	2.2
1	A	237	LYS	2.2
1	A	238	THR	2.2
1	A	155	ASN	2.1
1	B	148	ASN	2.1
1	A	227[A]	GLN	2.1
1	A	228	ASP	2.0

6.2 Non-standard residues in protein, DNA, RNA chains [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, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
1	SEP	B	87	10/11	0.88	0.14	25,35,50,52	0
1	SEP	A	87	10/11	0.91	0.13	26,39,56,58	0
1	TPO	A	180	11/12	0.99	0.04	19,20,21,21	0
1	TPO	B	180	11/12	0.99	0.04	20,20,21,22	0

6.3 Carbohydrates [i](#)

There are no oligosaccharides 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, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
5	EDO	B	310	4/4	0.56	0.27	40,44,47,54	0
5	EDO	A	312	4/4	0.62	0.24	54,56,56,58	0
5	EDO	B	313	4/4	0.67	0.25	48,51,52,55	0
6	34W	B	316	34/34	0.70	0.18	38,46,73,80	0
5	EDO	A	316	4/4	0.74	0.21	63,63,65,68	0
4	GOL	A	308	6/6	0.75	0.22	53,58,60,68	0
4	GOL	B	309	6/6	0.76	0.18	48,52,57,57	0
5	EDO	A	311	4/4	0.77	0.19	48,51,51,54	0
4	GOL	A	310	6/6	0.78	0.27	41,48,52,53	0
4	GOL	B	308	6/6	0.78	0.18	58,59,61,63	0
2	SO4	A	303	5/5	0.78	0.11	71,72,76,77	0
5	EDO	A	314	4/4	0.79	0.15	37,39,41,44	0
5	EDO	B	312	4/4	0.79	0.18	42,54,56,63	0
5	EDO	A	315	4/4	0.80	0.14	42,44,44,45	0
4	GOL	B	305	6/6	0.80	0.16	36,52,54,64	0
4	GOL	B	306	6/6	0.81	0.14	33,36,39,40	0
4	GOL	A	309	6/6	0.83	0.14	43,54,58,59	0
5	EDO	A	313	4/4	0.85	0.18	47,51,58,61	0
5	EDO	B	314	4/4	0.86	0.15	39,48,51,52	0
4	GOL	B	307	6/6	0.86	0.15	44,48,49,50	0
4	GOL	A	305	6/6	0.89	0.13	35,43,45,45	0
5	EDO	B	311	4/4	0.89	0.12	45,51,52,57	0

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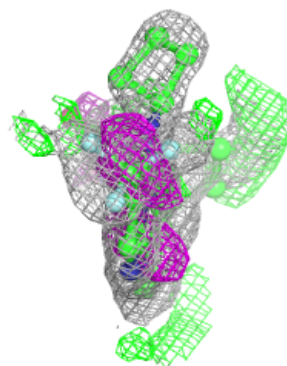
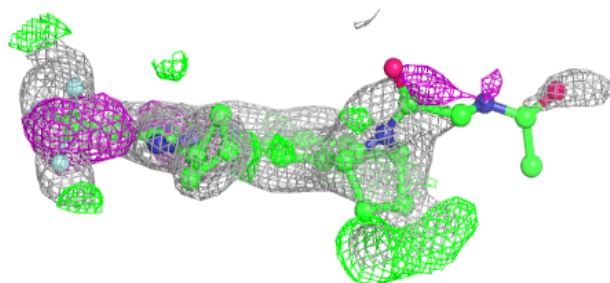
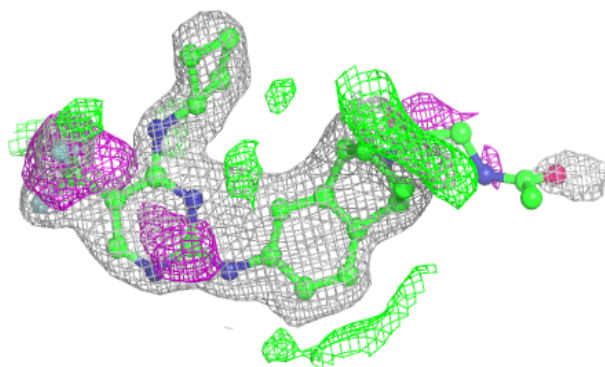
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	CIT	B	304	13/13	0.91	0.09	31,35,42,45	0
2	SO4	A	302	5/5	0.91	0.10	48,52,55,56	0
2	SO4	A	301	5/5	0.92	0.10	44,45,48,49	0
2	SO4	B	303	5/5	0.93	0.09	45,45,51,54	0
3	CIT	A	304	13/13	0.93	0.07	29,35,41,43	0
6	34W	B	315	34/34	0.93	0.11	21,31,73,74	0
2	SO4	B	301	5/5	0.93	0.09	39,43,52,53	0
5	EDO	A	317	4/4	0.94	0.12	22,36,39,52	0
4	GOL	A	307	6/6	0.94	0.08	30,34,36,36	0
4	GOL	A	306	6/6	0.95	0.08	24,31,33,35	0
2	SO4	B	302	5/5	0.96	0.07	43,47,50,52	0
6	34W	A	318	34/34	0.96	0.07	20,27,46,49	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.

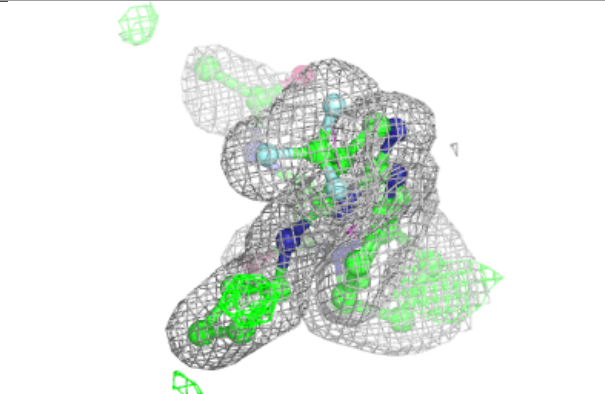
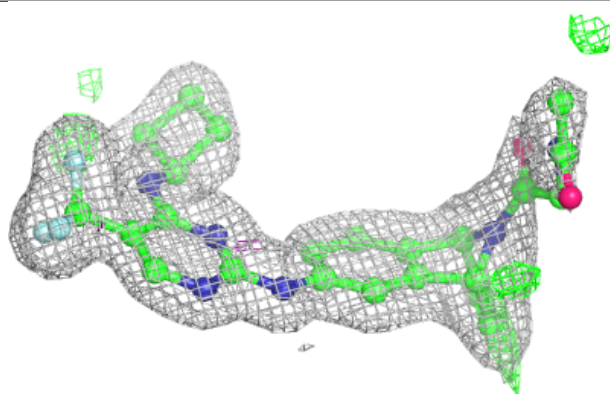
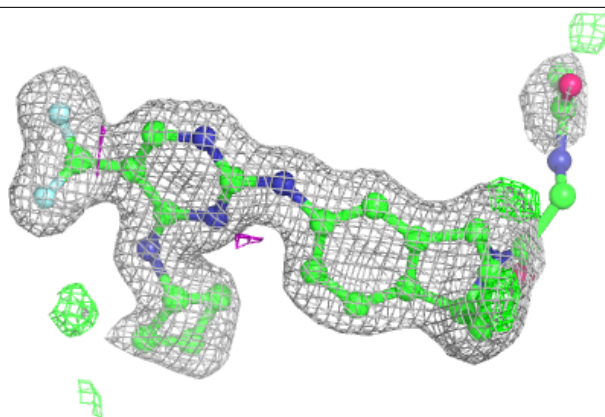
Electron density around 34W B 316:

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

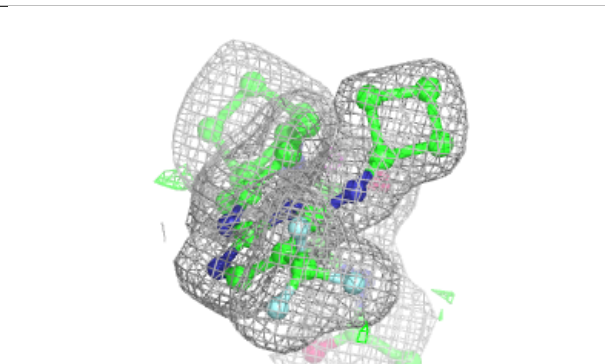
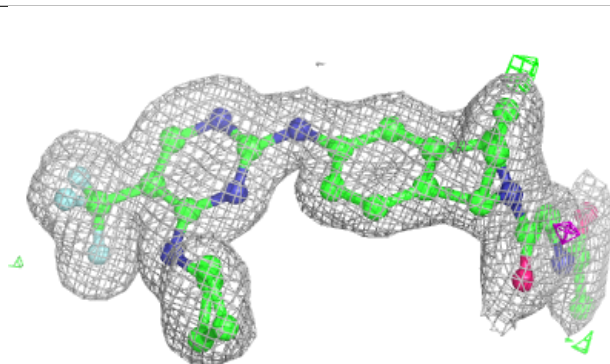
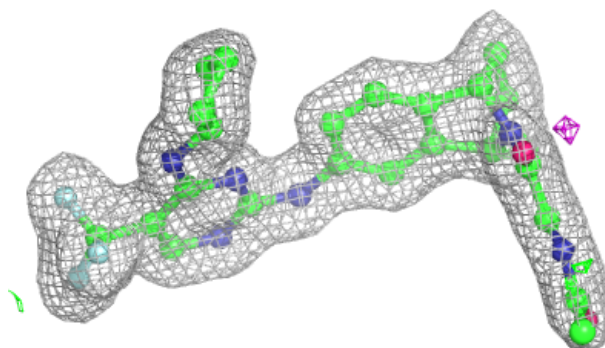


Electron density around 34W B 315:

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

**Electron density around 34W A 318:**

$2mF_o-DF_c$ (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.