Full wwPDB X-ray Structure Validation Report (i)

Jun 26, 2025 – 01:49 pm BST

PDB ID	:	9I1O / pdb_00009i1o
Title	:	The MK-RSL - sulfato-terphen[3]arene complex, C121 form
Authors	:	Ifeagwu, M.C.; Mockler, N.M.; Crowley, P.B.
Deposited on	:	2025-01-16
Resolution	:	1.64 Å(reported)

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

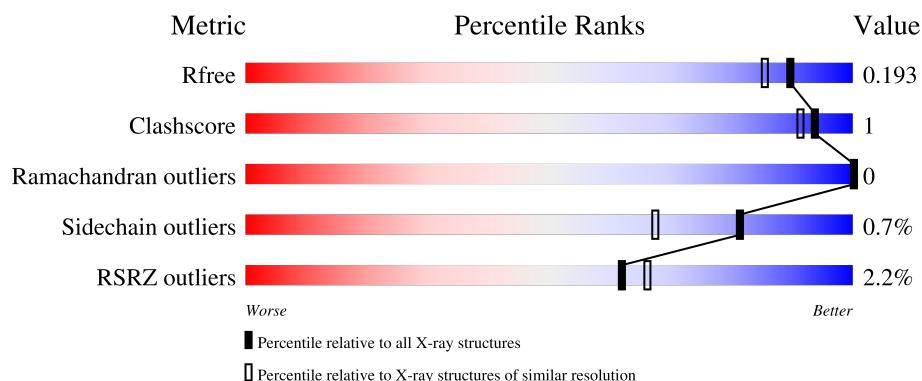|		
MolProbity	:	4-5-2 with Phenix2.0rc1
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	2.0rc1
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.003 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.44

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 1.64 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	Percentile Ranks	Value
Rfree		0.193
Clashscore		1
Ramachandran outliers		0
Sidechain outliers		0.7%
RSRZ outliers		2.2%

Worse   *Better*

▉ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R$_{free}$	164625	1015 (1.64-1.64)
Clashscore	180529	1093 (1.64-1.64)
Ramachandran outliers	177936	1077 (1.64-1.64)
Sidechain outliers	177891	1077 (1.64-1.64)
RSRZ outliers	164620	1015 (1.64-1.64)

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

Mol	Chain	Length	Quality of chain
1	A	91	3% 96% •
1	B	91	.% 97% ••
1	C	91	3% 98% •
1	D	91	.% 97% •
1	E	91	.% 95% ••

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W O R L D W I D E
wwPDB
PROTEIN DATA BANK

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Mol	Chain	Length	Quality of chain
1	F	91	

2 Entry composition ⓘ

There are 4 unique types of molecules in this entry. The entry contains 5110 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.
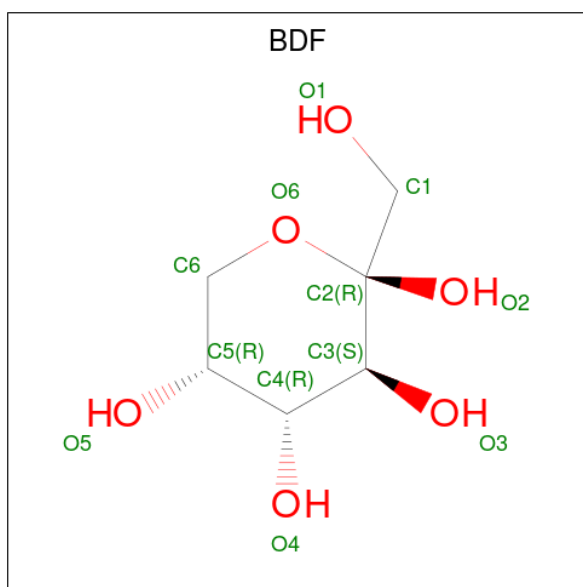
- Molecule 1 is a protein called Fucose-binding lectin protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	91	Total	C	N	O	S	20	1	0
			701	441	120	137	3			
1	B	91	Total	C	N	O	S	20	1	0
			701	441	120	137	3			
1	C	91	Total	C	N	O	S	19	1	0
			704	443	121	137	3			
1	D	91	Total	C	N	O	S	18	0	0
			698	439	120	136	3			
1	E	91	Total	C	N	O	S	16	1	0
			704	443	121	137	3			
1	F	91	Total	C	N	O	S	16	0	0
			698	439	120	136	3			

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	LYS	SER	engineered mutation	UNP A0A0S4TLR1
B	1	LYS	SER	engineered mutation	UNP A0A0S4TLR1
C	1	LYS	SER	engineered mutation	UNP A0A0S4TLR1
D	1	LYS	SER	engineered mutation	UNP A0A0S4TLR1
E	1	LYS	SER	engineered mutation	UNP A0A0S4TLR1
F	1	LYS	SER	engineered mutation	UNP A0A0S4TLR1

- Molecule 2 is beta-D-fructopyranose (CCD ID: BDF) (formula: $C_6H_{12}O_6$).

BDF

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total 12	C 6	O 6	0	0
2	A	1	Total 12	C 6	O 6	0	0
2	B	1	Total 12	C 6	O 6	0	0
2	B	1	Total 12	C 6	O 6	0	0
2	C	1	Total 12	C 6	O 6	0	0
2	C	1	Total 12	C 6	O 6	0	0
2	D	1	Total 12	C 6	O 6	0	0
2	D	1	Total 12	C 6	O 6	0	0
2	E	1	Total 12	C 6	O 6	0	0
2	E	1	Total 12	C 6	O 6	0	0
2	F	1	Total 12	C 6	O 6	0	0
2	F	1	Total 12	C 6	O 6	0	0

- Molecule 3 is sulfato-terphen[3]arene complex (CCD ID: A1IZO) (formula: $C_{57}H_{42}O_{48}S_{12}$) (labeled as "Ligand of Interest" by depositor).
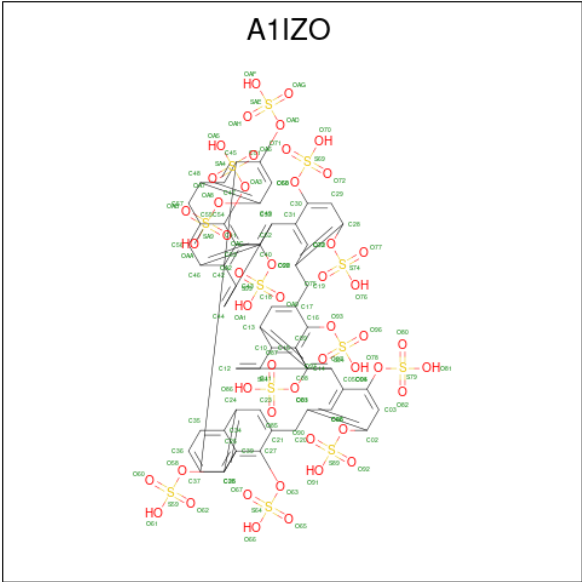
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	O	S		
3	F	1	117	57	48	12	0	0

• Molecule 4 is water.

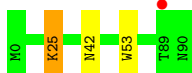| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	102	Total 102	O 102	0	0
4	B	110	Total 115	O 115	0	5
4	C	105	Total 106	O 106	0	1
4	D	120	Total 123	O 123	0	3
4	E	98	Total 100	O 100	0	2
4	F	94	Total 97	O 97	0	3

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: Fucose-binding lectin protein

Chain A:

3%
96%

M0 K1 K25 R29 D32 Y37 A88 T89 N90

• Molecule 1: Fucose-binding lectin protein

Chain B:

%
97%

M0 K25 N42 W53 T89 N90

• Molecule 1: Fucose-binding lectin protein

Chain C:

3%
98%

M0 P14 T89 N90

• Molecule 1: Fucose-binding lectin protein

Chain D:

%
97%

M0 P14 N47 W53 T89 N90

• Molecule 1: Fucose-binding lectin protein

Chain E:

%
95%

M0 Q4 W10 P14 S15 I59 T89 N90

• Molecule 1: Fucose-binding lectin protein

Chain F:
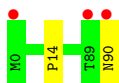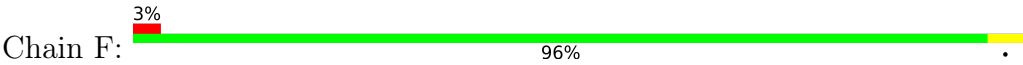
4 Data and refinement statistics (i)

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	167.52Å 45.99Å 70.16Å 90.00° 108.24° 90.00°	Depositor
Resolution (Å)	44.66 – 1.64 44.66 – 1.64	Depositor EDS
% Data completeness (in resolution range)	99.6 (44.66-1.64) 99.6 (44.66-1.64)	Depositor EDS
R_{merge}	0.11	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.32 (at 1.64Å)	Xtriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, R_{free}	0.156 , 0.194 0.156 , 0.193	Depositor DCC
R_{free} test set	3128 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å^2)	14.2	Xtriage
Anisotropy	0.495	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.35 , 45.2	EDS
L-test for twinning[2]	$< |L| > = 0.50, < L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	5110	wwPDB-VP
Average B, all atoms (Å^2)	17.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.37% of the height of the origin peak. No significant pseudotranslation is detected.*

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[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: A1IZO, BDF

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	0.35	0/725	0.55	0/994
1	B	0.38	0/725	0.57	0/994
1	C	0.35	0/728	0.58	0/998
1	D	0.41	0/719	0.56	0/986
1	E	0.37	0/728	0.56	0/998
1	F	0.36	0/719	0.56	0/986
All	All	0.37	0/4344	0.56	0/5956

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2   Too-close contacts ⓘ

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	701	0	658	3	0
1	B	701	0	658	2	0
1	C	704	0	661	2	0
1	D	698	0	653	2	0
1	E	704	0	661	4	0
1	F	698	0	653	2	0
2	A	24	0	24	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	24	0	24	0	0
2	C	24	0	22	0	0
2	D	24	0	24	0	0
2	E	24	0	24	0	0
2	F	24	0	23	0	0
3	F	117	0	0	0	0
4	A	102	0	0	0	0
4	B	115	0	0	0	0
4	C	106	0	0	0	0
4	D	123	0	0	0	0
4	E	100	0	0	0	0
4	F	97	0	0	0	0
All	All	5110	0	4085	11	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 1.

All (11) 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:A:29:ARG:HH22	1:C:90:ASN:ND2	2.12	0.47
1:A:25:LYS:HA	1:A:25:LYS:HE2	1.99	0.45
1:B:25:LYS:HE2	1:B:42:ASN:HD21	1.82	0.45
1:E:10:TRP:CG	1:E:59:ILE:HD13	2.53	0.44
1:A:32:ASP:OD2	1:A:37:TYR:OH	2.29	0.42
1:F:28:GLU:HB2	1:F:41:PHE:HB3	2.02	0.42
1:B:53:TRP:CE2	1:C:14:PRO:HG3	2.55	0.41
1:D:47:ASN:HD21	1:E:4[A]:GLN:HG2	1.85	0.41
1:F:32:ASP:OD2	1:F:37:TYR:OH	2.26	0.41
1:D:53:TRP:CZ2	1:E:14:PRO:HG3	2.56	0.41
1:E:10:TRP:CE2	1:E:15:SER:HB2	2.56	0.41

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	90/91 (99%)	86 (96%)	4 (4%)	0	100	100
1	B	90/91 (99%)	88 (98%)	2 (2%)	0	100	100
1	C	90/91 (99%)	87 (97%)	3 (3%)	0	100	100
1	D	89/91 (98%)	88 (99%)	1 (1%)	0	100	100
1	E	90/91 (99%)	89 (99%)	1 (1%)	0	100	100
1	F	89/91 (98%)	88 (99%)	1 (1%)	0	100	100
All	All	538/546 (98%)	526 (98%)	12 (2%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

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	73/72 (101%)	73 (100%)	0	100	100
1	B	73/72 (101%)	72 (99%)	1 (1%)	62	38
1	C	73/72 (101%)	73 (100%)	0	100	100
1	D	72/72 (100%)	71 (99%)	1 (1%)	62	38
1	E	73/72 (101%)	72 (99%)	1 (1%)	62	38
1	F	72/72 (100%)	72 (100%)	0	100	100
All	All	436/432 (101%)	433 (99%)	3 (1%)	81	67

All (3) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	25	LYS
1	D	14	PRO
1	E	14	PRO

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

Mol	Chain	Res	Type
1	B	42	ASN

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 oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

13 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	#$|Z| > 2$
2	BDF	A	102	-	12,12,12	2.62	2 (16%)	18,18,18	1.35	4 (22%)
2	BDF	B	102	-	12,12,12	2.99	2 (16%)	18,18,18	1.37	2 (11%)
2	BDF	F	103	-	12,12,12	2.89	3 (25%)	18,18,18	1.04	1 (5%)
2	BDF	C	102	-	12,12,12	2.76	4 (33%)	18,18,18	1.66	3 (16%)
2	BDF	D	101	-	12,12,12	2.69	4 (33%)	18,18,18	1.53	5 (27%)
2	BDF	D	102	-	12,12,12	3.01	2 (16%)	18,18,18	1.55	4 (22%)
2	BDF	E	101	-	12,12,12	3.15	3 (25%)	18,18,18	1.32	2 (11%)
2	BDF	E	102	-	12,12,12	3.29	3 (25%)	18,18,18	1.71	4 (22%)
3	A1IZO	F	101	-	126,126,126	2.59	22 (17%)	189,201,201	1.83	62 (32%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#|Z| > 2	Counts	RMSZ	#|Z| > 2
2	BDF	C	101	-	12,12,12	2.82	3 (25%)	18,18,18	1.38	5 (27%)
2	BDF	B	101	-	12,12,12	2.90	2 (16%)	18,18,18	1.75	5 (27%)
2	BDF	F	102	-	12,12,12	3.20	3 (25%)	18,18,18	1.40	4 (22%)
2	BDF	A	101	-	12,12,12	2.78	2 (16%)	18,18,18	1.77	6 (33%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	BDF	A	102	-	-	0/3/23/23	0/1/1/1
2	BDF	B	102	-	-	0/3/23/23	0/1/1/1
2	BDF	F	103	-	-	0/3/23/23	0/1/1/1
2	BDF	C	102	-	-	0/3/23/23	0/1/1/1
2	BDF	D	101	-	-	0/3/23/23	0/1/1/1
2	BDF	D	102	-	-	0/3/23/23	0/1/1/1
2	BDF	E	101	-	-	0/3/23/23	0/1/1/1
2	BDF	E	102	-	-	0/3/23/23	0/1/1/1
3	A1IZO	F	101	-	-	21/96/96/96	-
2	BDF	C	101	-	-	0/3/23/23	0/1/1/1
2	BDF	B	101	-	-	0/3/23/23	0/1/1/1
2	BDF	F	102	-	-	0/3/23/23	0/1/1/1
2	BDF	A	101	-	-	0/3/23/23	0/1/1/1

All (55) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	E	102	BDF	O6-C2	10.71	1.52	1.42
3	F	101	A1IZO	OAD-SAE	10.26	1.73	1.58
2	F	102	BDF	O6-C2	10.00	1.51	1.42
3	F	101	A1IZO	O58-S59	9.38	1.72	1.58
2	E	101	BDF	O6-C2	9.35	1.50	1.42
2	D	102	BDF	O6-C2	9.34	1.50	1.42
2	B	102	BDF	O6-C2	8.96	1.50	1.42
3	F	101	A1IZO	O68-S69	8.87	1.71	1.58
2	F	103	BDF	O6-C2	8.77	1.50	1.42
2	C	101	BDF	O6-C2	8.63	1.50	1.42
3	F	101	A1IZO	O83-S84	8.59	1.71	1.58
2	B	101	BDF	O6-C2	8.57	1.50	1.42
2	A	101	BDF	O6-C2	8.51	1.50	1.42

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	F	101	A1IZO	O78-S79	8.22	1.70	1.58
2	C	102	BDF	O6-C2	8.13	1.49	1.42
2	A	102	BDF	O6-C2	7.76	1.49	1.42
2	D	101	BDF	O6-C2	7.76	1.49	1.42
3	F	101	A1IZO	O63-S64	7.66	1.69	1.58
3	F	101	A1IZO	O88-S89	7.62	1.69	1.58
3	F	101	A1IZO	OA8-SA9	6.02	1.67	1.58
3	F	101	A1IZO	O73-S74	5.75	1.67	1.58
3	F	101	A1IZO	O98-S99	5.05	1.66	1.58
3	F	101	A1IZO	OA3-SA4	4.61	1.65	1.58
3	F	101	A1IZO	O93-S94	4.57	1.65	1.58
2	E	101	BDF	O6-C6	4.10	1.49	1.43
2	B	101	BDF	O6-C6	4.10	1.49	1.43
3	F	101	A1IZO	OA3-C54	-3.75	1.34	1.42
2	B	102	BDF	O6-C6	3.67	1.48	1.43
3	F	101	A1IZO	OA8-C49	-3.59	1.34	1.42
2	F	102	BDF	O6-C6	3.32	1.48	1.43
2	A	102	BDF	O6-C6	3.30	1.48	1.43
3	F	101	A1IZO	O98-C52	-3.27	1.35	1.42
2	D	102	BDF	O6-C6	3.21	1.48	1.43
2	A	101	BDF	O6-C6	3.18	1.48	1.43
3	F	101	A1IZO	O83-C14	-3.17	1.35	1.42
3	F	101	A1IZO	O93-C16	-3.00	1.36	1.42
2	F	103	BDF	O6-C6	2.98	1.47	1.43
2	C	102	BDF	O6-C6	2.93	1.47	1.43
3	F	101	A1IZO	O63-C27	-2.90	1.36	1.42
2	D	101	BDF	O6-C6	2.80	1.47	1.43
3	F	101	A1IZO	O73-C28	-2.80	1.36	1.42
3	F	101	A1IZO	O68-C30	-2.80	1.36	1.42
3	F	101	A1IZO	O88-C02	-2.67	1.36	1.42
2	C	101	BDF	O6-C6	2.63	1.47	1.43
2	C	102	BDF	O2-C2	-2.60	1.36	1.40
2	C	101	BDF	O2-C2	-2.57	1.36	1.40
2	F	103	BDF	O2-C2	-2.41	1.36	1.40
2	C	102	BDF	C4-C3	-2.36	1.49	1.53
2	D	101	BDF	C4-C3	-2.35	1.49	1.53
2	D	101	BDF	C2-C3	-2.30	1.51	1.53
3	F	101	A1IZO	OAD-C51	-2.23	1.37	1.42
2	E	102	BDF	O6-C6	2.14	1.46	1.43
2	E	102	BDF	C4-C3	-2.13	1.49	1.53
2	E	101	BDF	O2-C2	-2.13	1.37	1.40
2	F	102	BDF	C4-C3	-2.05	1.49	1.53

All (107) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	C	102	BDF	O6-C2-C1	5.11	111.91	105.58
3	F	101	A1IZO	C19-C17-C16	4.35	126.50	121.21
3	F	101	A1IZO	O88-C02-C01	3.87	122.53	117.95
2	E	101	BDF	O6-C2-C1	3.84	110.34	105.58
3	F	101	A1IZO	C18-C13-C14	-3.62	112.05	117.97
2	B	101	BDF	C6-O6-C2	-3.57	110.05	114.09
2	E	102	BDF	O2-C2-C3	3.57	113.56	107.79
3	F	101	A1IZO	C47-C45-C51	-3.49	112.26	117.97
3	F	101	A1IZO	C32-C22-C28	-3.49	114.60	118.26
3	F	101	A1IZO	C23-C24-C25	-3.42	112.38	117.97
3	F	101	A1IZO	C23-C21-C27	-3.42	114.67	118.26
2	E	102	BDF	O6-C2-C1	3.37	109.76	105.58
2	A	101	BDF	C2-C3-C4	-3.34	106.21	110.70
2	E	102	BDF	O2-C2-C1	-3.30	106.00	111.12
3	F	101	A1IZO	O68-S69-O72	-3.29	98.12	107.71
3	F	101	A1IZO	C47-C48-C49	-3.24	114.86	118.26
3	F	101	A1IZO	C39-C34-C35	-3.22	111.16	117.59
2	B	101	BDF	O6-C2-C3	3.17	112.93	109.76
3	F	101	A1IZO	C06-C05-C04	-3.17	112.79	117.97
3	F	101	A1IZO	C12-C07-C08	-3.08	111.45	117.59
2	B	102	BDF	C1-C2-C3	-3.06	105.88	111.94
2	A	101	BDF	O1-C1-C2	-3.06	105.36	111.86
3	F	101	A1IZO	C56-C46-C42	3.02	124.22	118.58
3	F	101	A1IZO	C11-C10-C09	-3.01	111.59	117.59
2	A	101	BDF	O2-C2-C1	-2.98	106.49	111.12
2	A	101	BDF	O6-C2-C1	2.96	109.25	105.58
3	F	101	A1IZO	C56-C46-C52	-2.95	113.15	117.97
3	F	101	A1IZO	C18-C17-C16	-2.95	115.17	118.26
3	F	101	A1IZO	O93-C16-C17	2.94	121.42	117.95
3	F	101	A1IZO	C43-C42-C41	-2.93	111.74	117.59
3	F	101	A1IZO	C38-C37-C36	-2.91	111.79	117.59
3	F	101	A1IZO	C13-C18-C17	2.84	128.02	122.42
3	F	101	A1IZO	C44-C33-C40	-2.84	111.93	117.59
3	F	101	A1IZO	C43-C42-C46	2.83	125.49	120.91
3	F	101	A1IZO	C32-C31-C30	-2.79	113.42	117.97
2	B	101	BDF	O2-C2-O6	-2.73	106.25	110.69
3	F	101	A1IZO	C06-C01-C02	-2.72	115.40	118.26
3	F	101	A1IZO	C39-C34-C24	2.72	125.31	120.91
3	F	101	A1IZO	C24-C23-C21	2.70	127.75	122.42
2	D	101	BDF	O2-C2-C3	2.69	112.13	107.79
3	F	101	A1IZO	C37-C45-C51	2.68	128.26	122.33
2	D	102	BDF	O6-C2-C1	2.66	108.87	105.58

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	F	101	A1IZO	C38-C39-C34	2.60	124.88	121.13
2	E	101	BDF	C6-O6-C2	-2.60	111.15	114.09
2	F	102	BDF	O6-C2-C3	2.59	112.35	109.76
3	F	101	A1IZO	O91-S89-O92	2.57	117.42	108.49
3	F	101	A1IZO	O61-S59-O62	2.54	117.33	108.49
3	F	101	A1IZO	C56-C55-C54	-2.54	115.60	118.26
3	F	101	A1IZO	C44-C43-C42	2.54	124.79	121.13
3	F	101	A1IZO	C05-C06-C01	2.54	127.43	122.42
2	A	102	BDF	O2-C2-C3	2.54	111.89	107.79
3	F	101	A1IZO	O95-S94-O93	2.53	111.91	105.83
3	F	101	A1IZO	C32-C31-C33	2.52	123.29	118.58
3	F	101	A1IZO	C11-C12-C07	2.50	124.73	121.13
2	D	101	BDF	O6-C2-C1	2.47	108.65	105.58
3	F	101	A1IZO	C41-C40-C33	2.45	124.67	121.13
3	F	101	A1IZO	C45-C47-C48	2.45	127.25	122.42
2	B	101	BDF	O6-C2-C1	2.45	108.61	105.58
2	C	101	BDF	O1-C1-C2	-2.43	106.70	111.86
3	F	101	A1IZO	C31-C32-C22	2.43	127.21	122.42
3	F	101	A1IZO	C20-C01-C02	2.41	124.14	121.21
2	F	102	BDF	C6-O6-C2	-2.41	111.37	114.09
3	F	101	A1IZO	OAF-SAE-OAH	2.39	116.81	108.49
2	F	102	BDF	O6-C2-C1	2.37	108.52	105.58
3	F	101	A1IZO	OA8-C49-C48	2.37	120.75	117.95
3	F	101	A1IZO	OAD-C51-C50	-2.36	114.82	118.81
2	A	102	BDF	C2-C3-C4	-2.36	107.53	110.70
2	C	101	BDF	C6-O6-C2	-2.35	111.44	114.09
2	C	101	BDF	O6-C2-C1	2.33	108.47	105.58
3	F	101	A1IZO	C08-C09-C10	2.33	124.49	121.13
2	D	102	BDF	C1-C2-C3	-2.31	107.36	111.94
2	A	102	BDF	C6-O6-C2	-2.30	111.48	114.09
2	D	101	BDF	O6-C2-C3	-2.30	107.47	109.76
3	F	101	A1IZO	C09-C10-C13	2.28	124.61	120.91
2	F	102	BDF	O1-C1-C2	-2.28	107.01	111.86
2	E	102	BDF	C6-O6-C2	-2.26	111.53	114.09
3	F	101	A1IZO	C12-C07-C05	2.26	124.57	120.91
2	D	102	BDF	C6-C5-C4	2.25	112.44	109.67
2	D	102	BDF	O1-C1-C2	-2.23	107.13	111.86
2	A	101	BDF	O6-C6-C5	-2.21	107.80	111.11
3	F	101	A1IZO	O76-S74-O73	2.19	111.11	105.83
3	F	101	A1IZO	O58-C25-C26	-2.19	115.11	118.81
2	B	102	BDF	O6-C2-C1	2.19	108.29	105.58
2	C	101	BDF	O2-C2-O6	-2.16	107.19	110.69

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	101	BDF	C6-O6-C2	-2.15	111.66	114.09
3	F	101	A1IZO	C39-C38-C37	2.14	124.21	121.13
2	C	102	BDF	O2-C2-C1	-2.11	107.84	111.12
3	F	101	A1IZO	O63-C27-C21	2.10	120.43	117.95
3	F	101	A1IZO	O81-S79-O78	2.09	110.87	105.83
2	D	101	BDF	O5-C5-C6	-2.09	104.88	109.15
3	F	101	A1IZO	O83-C14-C15	-2.09	115.29	118.81
3	F	101	A1IZO	O78-C04-C03	-2.08	115.29	118.81
3	F	101	A1IZO	O78-C04-C05	2.08	121.72	118.86
3	F	101	A1IZO	C44-C33-C31	2.07	124.27	120.91
3	F	101	A1IZO	OA3-SA4-OA7	-2.07	101.67	107.71
2	C	101	BDF	O6-C2-C3	2.06	111.82	109.76
3	F	101	A1IZO	C57-C48-C49	2.06	123.71	121.21
3	F	101	A1IZO	C19-C22-C32	2.05	123.39	120.23
2	D	101	BDF	O1-C1-C2	-2.04	107.52	111.86
2	A	102	BDF	C5-C4-C3	2.04	112.76	110.48
2	B	101	BDF	O2-C2-C3	2.03	111.08	107.79
2	F	103	BDF	O6-C2-C1	2.03	108.10	105.58
3	F	101	A1IZO	C36-C35-C34	2.02	124.05	121.13
3	F	101	A1IZO	C20-C21-C23	2.02	123.34	120.23
3	F	101	A1IZO	OA1-S99-OA2	2.01	115.49	108.49
3	F	101	A1IZO	O58-C25-C24	2.01	121.63	118.86
2	C	102	BDF	C6-O6-C2	-2.01	111.82	114.09

There are no chirality outliers.

All (21) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	F	101	A1IZO	C25-O58-S59-O61
3	F	101	A1IZO	C25-O58-S59-O62
3	F	101	A1IZO	C30-O68-S69-O72
3	F	101	A1IZO	C04-O78-S79-O80
3	F	101	A1IZO	C04-O78-S79-O81
3	F	101	A1IZO	C23-C24-C34-C39
3	F	101	A1IZO	C36-C37-C45-C51
3	F	101	A1IZO	C38-C37-C45-C51
3	F	101	A1IZO	C01-C20-C21-C27
3	F	101	A1IZO	C18-C17-C19-C22
3	F	101	A1IZO	C30-O68-S69-O70
3	F	101	A1IZO	C16-C17-C19-C22
3	F	101	A1IZO	C23-C24-C34-C35
3	F	101	A1IZO	C01-C20-C21-C23

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Mol	Chain	Res	Type	Atoms
3	F	101	A1IZO	C25-O58-S59-O60
3	F	101	A1IZO	C04-O78-S79-O82
3	F	101	A1IZO	C25-C24-C34-C39
3	F	101	A1IZO	C49-C48-C57-C55
3	F	101	A1IZO	C47-C48-C57-C55
3	F	101	A1IZO	C36-C37-C45-C47
3	F	101	A1IZO	C38-C37-C45-C47

There are no ring outliers.

No monomer is involved in short contacts.

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

Ligand A1IZO F 101

Bond lengths

Bond angles

Torsions

Rings
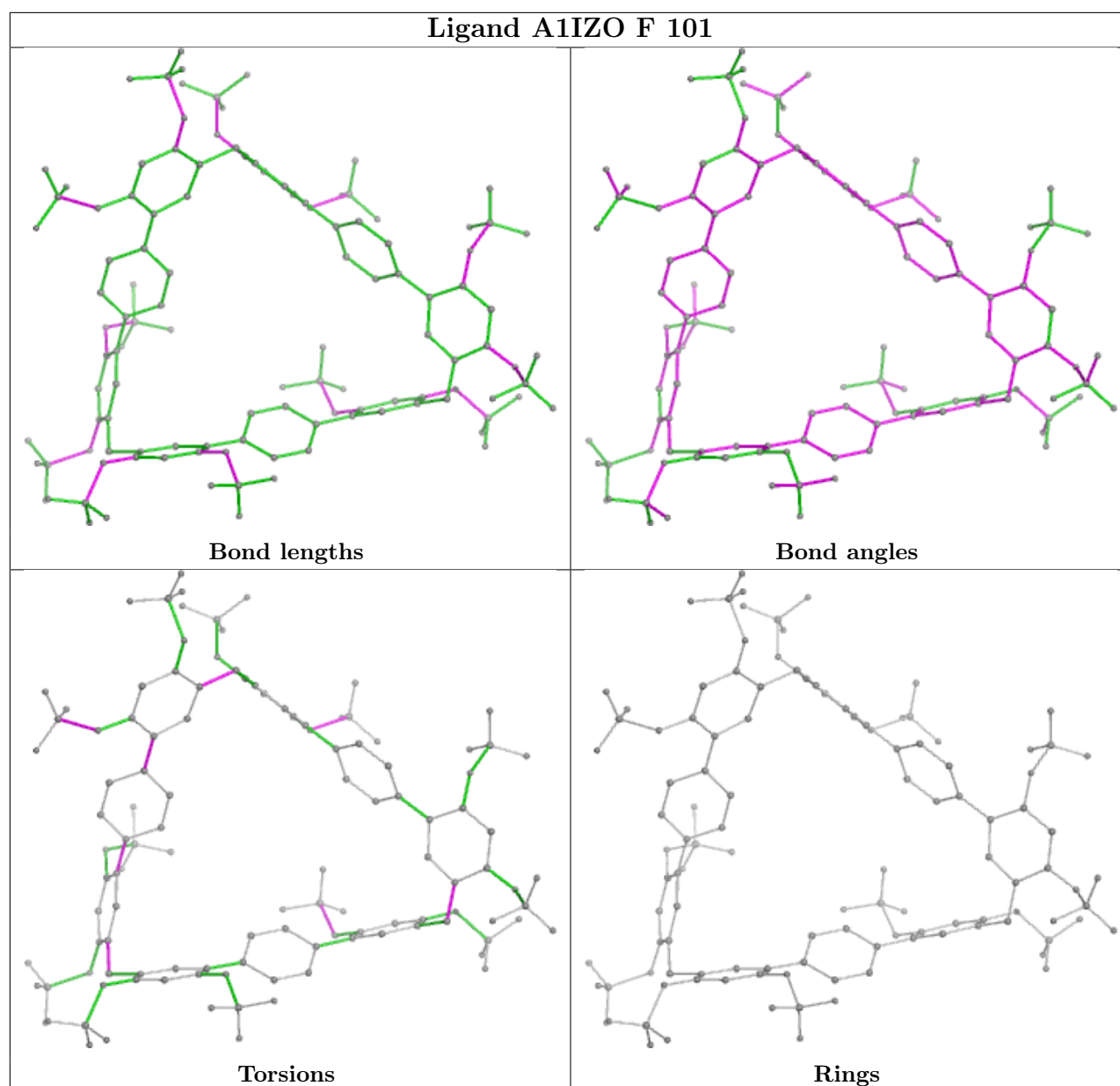
5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å^2)	Q<0.9
1	A	89/91 (97%)	-0.38	3 (3%)	48	51	8, 12, 25, 33	3 (3%)
1	B	91/91 (100%)	-0.41	1 (1%)	77	81	5, 13, 24, 41	5 (5%)
1	C	91/91 (100%)	-0.22	3 (3%)	49	53	10, 14, 25, 37	7 (7%)
1	D	90/91 (98%)	-0.47	1 (1%)	77	81	8, 12, 22, 38	2 (2%)
1	E	90/91 (98%)	-0.07	1 (1%)	77	81	9, 16, 27, 34	5 (5%)
1	F	90/91 (98%)	-0.23	3 (3%)	49	53	4, 14, 25, 37	2 (2%)
All	All	541/546 (99%)	-0.30	12 (2%)	62	66	4, 14, 25, 41	24 (4%)

All (12) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	E	89	THR	6.8
1	C	90	ASN	4.9
1	C	0	MET	4.4
1	F	90	ASN	4.4
1	A	89	THR	4.3
1	F	1	LYS	4.2
1	D	89	THR	3.2
1	A	1	LYS	2.7
1	B	89	THR	2.4
1	C	89	THR	2.4
1	F	89	THR	2.4
1	A	88	ALA	2.3

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

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

6.3 Carbohydrates ⓘ

There are no oligosaccharides in this entry.
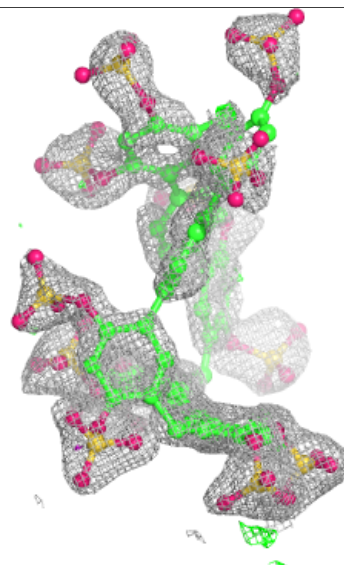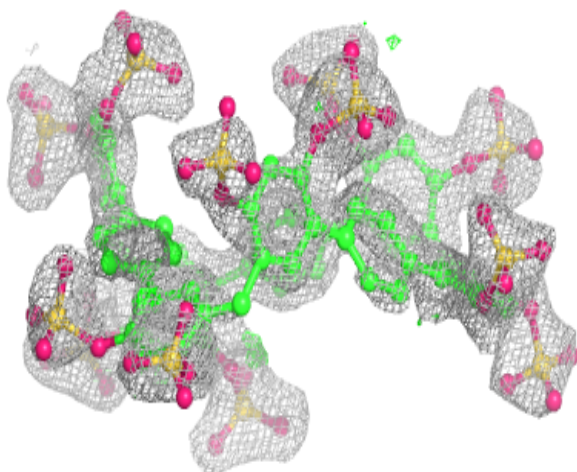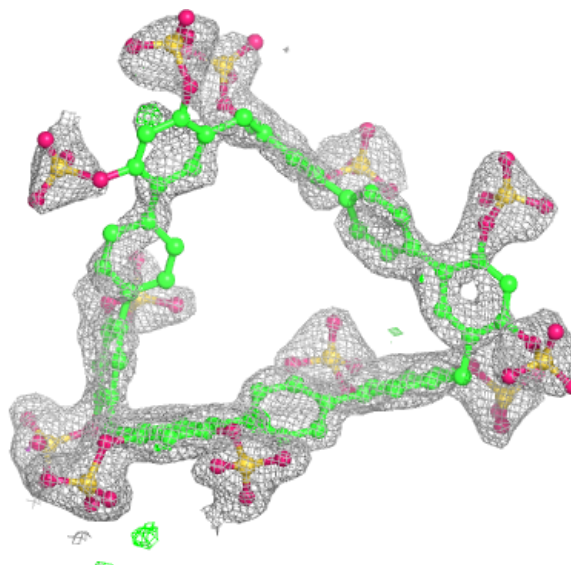
6.4 Ligands ⓘ

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	A1IZO	F	101	117/117	0.88	0.13	15,40,56,63	117
2	BDF	E	101	12/12	0.95	0.08	12,17,26,31	0
2	BDF	F	102	12/12	0.95	0.07	11,15,23,25	0
2	BDF	B	101	12/12	0.95	0.07	14,18,22,32	0
2	BDF	E	102	12/12	0.96	0.07	13,15,21,30	0
2	BDF	D	102	12/12	0.96	0.06	9,13,16,22	0
2	BDF	C	102	12/12	0.96	0.05	12,16,20,25	0
2	BDF	A	101	12/12	0.97	0.05	8,12,16,20	0
2	BDF	B	102	12/12	0.97	0.05	11,15,19,21	0
2	BDF	F	103	12/12	0.97	0.05	12,18,23,25	0
2	BDF	C	101	12/12	0.97	0.05	11,15,22,26	0
2	BDF	A	102	12/12	0.98	0.04	9,11,16,21	0
2	BDF	D	101	12/12	0.98	0.04	10,12,15,21	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 A1IZO F 101:

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

6.5 Other polymers ⓘ

There are no such residues in this entry.