



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 05:11 AM UTC

PDB ID : 5FDX / pdb_00005fdx
Title : Structure of DDR1 receptor tyrosine kinase in complex with D2164 inhibitor at 2.65 Angstroms resolution.
Authors : Bartual, S.G.; Pinkas, D.M.; Wang, Z.; Ding, K.; Mahajan, P.; Kupinska, K.; Mukhopadhyay, S.; Strain-Damerell, C.; Chalk, R.; Borkowska, O.; Talon, R.; Kopec, J.; Williams, E.; Tallant, C.; Chaikuad, A.; Sorell, F.; Newman, J.; Burgess-Brown, N.; von Delft, F.; Arrowsmith, C.H.; Edwards, A.M.; Bountra, C.; Bullock, A.; Structural Genomics Consortium (SGC)
Deposited on : 2015-12-16
Resolution : 2.65 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 : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12

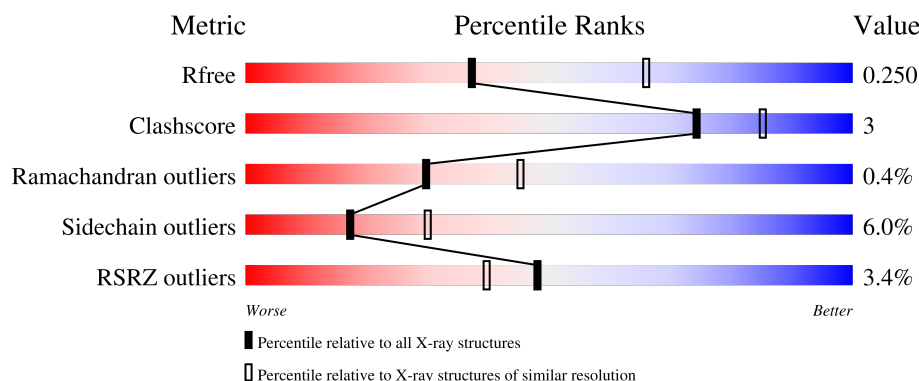
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.65 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}	180053	1110 (2.66-2.66)
Clashscore	190562	1141 (2.66-2.66)
Ramachandran outliers	187476	1126 (2.66-2.66)
Sidechain outliers	187428	1126 (2.66-2.66)
RSRZ outliers	180081	1110 (2.66-2.66)

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	337	
1	B	337	

Ideal geometry (proteins) : Engh & Huber (2001)
 Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
 Validation Pipeline (wwPDB-VP) : 2.49

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 4569 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 Epithelial discoidin domain-containing receptor 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	280	Total	C	N	O	S	0	0	0
			2194	1409	383	384	18			
1	B	274	Total	C	N	O	S	0	0	0
			2117	1360	364	376	17			

There are 48 discrepancies between the modelled and reference sequences:

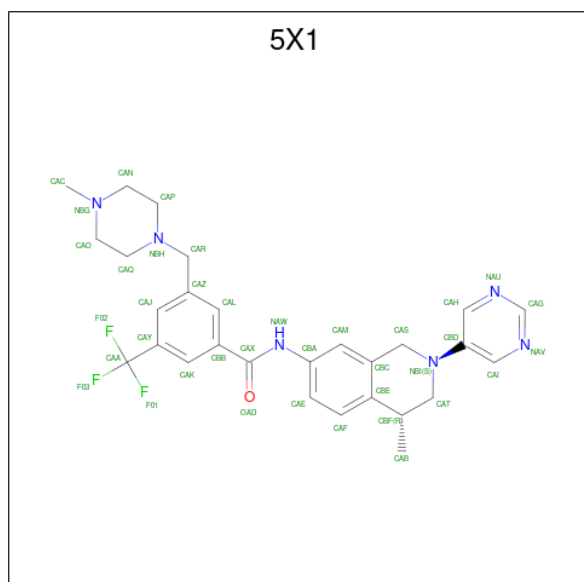
Chain	Residue	Modelled	Actual	Comment	Reference
A	577	MET	-	initiating methionine	UNP Q08345
A	578	GLY	-	expression tag	UNP Q08345
A	579	HIS	-	expression tag	UNP Q08345
A	580	HIS	-	expression tag	UNP Q08345
A	581	HIS	-	expression tag	UNP Q08345
A	582	HIS	-	expression tag	UNP Q08345
A	583	HIS	-	expression tag	UNP Q08345
A	584	HIS	-	expression tag	UNP Q08345
A	585	SER	-	expression tag	UNP Q08345
A	586	SER	-	expression tag	UNP Q08345
A	587	GLY	-	expression tag	UNP Q08345
A	588	VAL	-	expression tag	UNP Q08345
A	589	ASP	-	expression tag	UNP Q08345
A	590	LEU	-	expression tag	UNP Q08345
A	591	GLY	-	expression tag	UNP Q08345
A	592	THR	-	expression tag	UNP Q08345
A	593	GLU	-	expression tag	UNP Q08345
A	594	ASN	-	expression tag	UNP Q08345
A	595	LEU	-	expression tag	UNP Q08345
A	596	TYR	-	expression tag	UNP Q08345
A	597	PHE	-	expression tag	UNP Q08345
A	598	GLN	-	expression tag	UNP Q08345
A	599	SER	-	expression tag	UNP Q08345
A	600	MET	-	expression tag	UNP Q08345
B	577	MET	-	initiating methionine	UNP Q08345

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Chain	Residue	Modelled	Actual	Comment	Reference
B	578	GLY	-	expression tag	UNP Q08345
B	579	HIS	-	expression tag	UNP Q08345
B	580	HIS	-	expression tag	UNP Q08345
B	581	HIS	-	expression tag	UNP Q08345
B	582	HIS	-	expression tag	UNP Q08345
B	583	HIS	-	expression tag	UNP Q08345
B	584	HIS	-	expression tag	UNP Q08345
B	585	SER	-	expression tag	UNP Q08345
B	586	SER	-	expression tag	UNP Q08345
B	587	GLY	-	expression tag	UNP Q08345
B	588	VAL	-	expression tag	UNP Q08345
B	589	ASP	-	expression tag	UNP Q08345
B	590	LEU	-	expression tag	UNP Q08345
B	591	GLY	-	expression tag	UNP Q08345
B	592	THR	-	expression tag	UNP Q08345
B	593	GLU	-	expression tag	UNP Q08345
B	594	ASN	-	expression tag	UNP Q08345
B	595	LEU	-	expression tag	UNP Q08345
B	596	TYR	-	expression tag	UNP Q08345
B	597	PHE	-	expression tag	UNP Q08345
B	598	GLN	-	expression tag	UNP Q08345
B	599	SER	-	expression tag	UNP Q08345
B	600	MET	-	expression tag	UNP Q08345

- Molecule 2 is 3-[(4-methylpiperazin-1-yl)methyl]-{N}-(4 {R})-4-methyl-2-pyrimidin-5-yl-3,4-dihydro-1 {H}-isoquinolin-7-yl]-5-(trifluoromethyl)benzamide (CCD ID: 5X1) (formula: C₂₈H₃₁F₃N₆O).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	F	N	O	0	0
			38	28	3	6	1		
2	B	1	Total	C	F	N	O	0	0
			38	28	3	6	1		

- Molecule 3 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: $C_2H_6O_2$).



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

- Molecule 4 is DI(HYDROXYETHYL)ETHER (CCD ID: PEG) (formula: $C_4H_{10}O_3$).



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

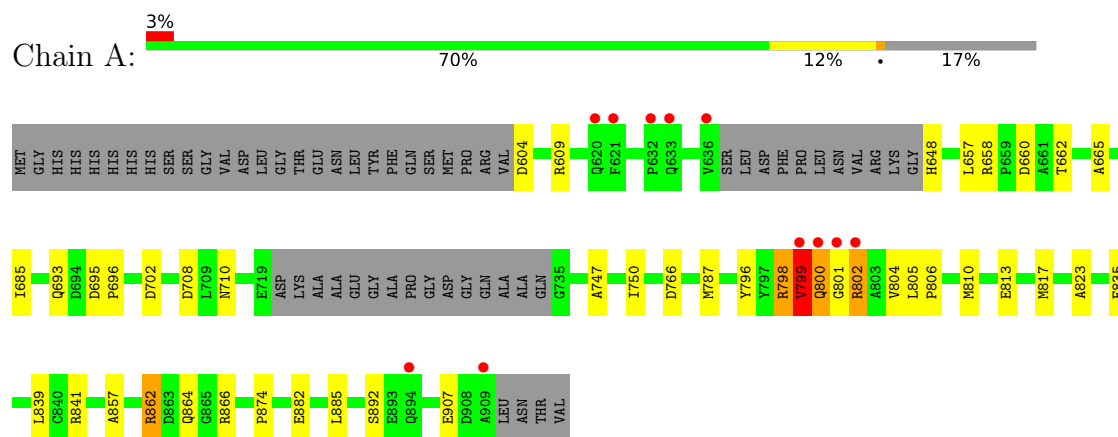
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	75	Total	O	0	0
			75	75		
5	B	66	Total	O	0	0
			66	66		

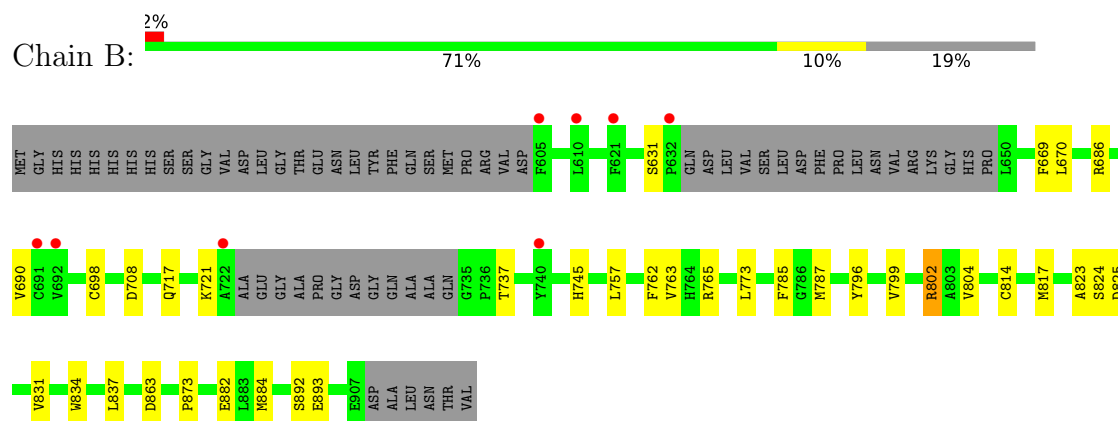
3 Residue-property plots [i](#)

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: Epithelial discoidin domain-containing receptor 1



- Molecule 1: Epithelial discoidin domain-containing receptor 1



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	45.55Å 120.34Å 63.02Å 90.00° 94.87° 90.00°	Depositor
Resolution (Å)	43.44 – 2.65 43.44 – 2.65	Depositor EDS
% Data completeness (in resolution range)	98.4 (43.44-2.65) 98.4 (43.44-2.65)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.38 (at 2.65Å)	Xtriage
Refinement program	BUSTER 2.10.2	Depositor
R, R_{free}	0.194 , 0.273 (Not available) , 0.250	Depositor DCC
R_{free} test set	961 reflections (4.88%)	wwPDB-VP
Wilson B-factor (Å ²)	43.1	Xtriage
Anisotropy	0.719	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 80.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	4569	wwPDB-VP
Average B, all atoms (Å ²)	58.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.62% 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 ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: PEG, 5X1, EDO

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	0.91	1/2245 (0.0%)	1.35	13/3042 (0.4%)
1	B	0.89	1/2166 (0.0%)	1.32	9/2936 (0.3%)
All	All	0.90	2/4411 (0.0%)	1.33	22/5978 (0.4%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	800	GLN	CA-C	8.28	1.61	1.53
1	B	873	PRO	CA-C	5.43	1.54	1.51

All (22) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	604	ASP	CA-CB-CG	8.37	120.97	112.60
1	B	825	ASP	CA-CB-CG	7.45	120.05	112.60
1	A	806	PRO	CA-C-N	6.03	129.03	120.53
1	A	806	PRO	C-N-CA	6.03	129.03	120.53
1	A	798	ARG	CA-C-N	5.96	132.43	121.70
1	A	798	ARG	C-N-CA	5.96	132.43	121.70
1	A	857	ALA	CA-C-N	5.44	126.02	119.98
1	A	857	ALA	C-N-CA	5.44	126.02	119.98
1	B	863	ASP	CA-CB-CG	5.36	117.96	112.60
1	B	831	VAL	CA-C-N	5.35	127.72	120.65
1	B	831	VAL	C-N-CA	5.35	127.72	120.65
1	B	708	ASP	CA-CB-CG	5.35	117.95	112.60
1	A	708	ASP	CA-CB-CG	5.33	117.93	112.60
1	A	813	GLU	CA-C-N	5.33	127.86	120.29
1	A	813	GLU	C-N-CA	5.33	127.86	120.29
1	B	669	PHE	CA-C-N	5.21	127.21	120.44
1	B	669	PHE	C-N-CA	5.21	127.21	120.44

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	766	ASP	CA-CB-CG	5.10	117.70	112.60
1	B	745	HIS	CA-C-N	5.07	127.15	120.60
1	B	745	HIS	C-N-CA	5.07	127.15	120.60
1	A	835	GLU	CA-C-N	5.07	126.95	120.56
1	A	835	GLU	C-N-CA	5.07	126.95	120.56

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	2194	0	2134	16	0
1	B	2117	0	2025	11	0
2	A	38	0	0	0	0
2	B	38	0	0	0	0
3	A	16	0	24	0	0
3	B	4	0	6	0	0
4	A	7	0	10	0	0
4	B	14	0	20	2	0
5	A	75	0	0	0	0
5	B	66	0	0	0	0
All	All	4569	0	4219	27	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 3.

All (27) 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:800:GLN:CB	1:A:801:GLY:HA3	2.04	0.88
1:B:799:VAL:HG13	1:B:802:ARG:HB2	1.72	0.70
1:A:882:GLU:HA	1:A:885:LEU:HD12	1.81	0.61
1:A:800:GLN:CB	1:A:801:GLY:CA	2.79	0.59
1:A:799:VAL:HA	1:A:802:ARG:HH11	1.70	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:799:VAL:HG12	1:A:802:ARG:HB2	1.91	0.52
1:A:798:ARG:HB3	1:A:804:VAL:HG22	1.94	0.50
1:B:787:MET:HG2	1:B:796:TYR:CE1	2.46	0.50
1:A:874:PRO:HG3	4:B:1004:PEG:H22	1.95	0.48
1:B:814:CYS:SG	1:B:824:SER:HB2	2.52	0.48
1:A:747:ALA:HA	1:A:750:ILE:HD12	1.95	0.48
1:A:657:LEU:O	1:A:696:PRO:HB3	2.14	0.47
1:A:823:ALA:HB1	1:A:892:SER:HB2	1.95	0.47
1:B:717:GLN:HG3	1:B:737:THR:HG22	1.96	0.47
1:B:763:VAL:HG12	1:B:765:ARG:HG3	1.97	0.47
1:B:773:LEU:HD21	1:B:785:PHE:HZ	1.81	0.46
1:A:862:ARG:HD2	1:A:864:GLN:HG3	1.99	0.44
1:B:823:ALA:CB	1:B:892:SER:HB2	2.48	0.44
1:B:799:VAL:HG22	1:B:802:ARG:HG3	1.98	0.44
1:A:658:ARG:C	1:A:660:ASP:H	2.27	0.43
1:B:804:VAL:H	4:B:1004:PEG:H42	1.83	0.43
1:B:757:LEU:HD22	1:B:762:PHE:CD2	2.55	0.42
1:A:823:ALA:CB	1:A:892:SER:HB2	2.48	0.42
1:B:834:TRP:HB2	1:B:884:MET:HE3	2.01	0.42
1:A:805:LEU:HD13	1:A:810:MET:HE1	2.02	0.41
1:A:662:THR:HG23	1:A:665:ALA:H	1.86	0.40
1:A:796:TYR:HB3	1:A:804:VAL:HG12	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	274/337 (81%)	257 (94%)	16 (6%)	1 (0%)	30	45
1	B	268/337 (80%)	256 (96%)	11 (4%)	1 (0%)	30	45
All	All	542/674 (80%)	513 (95%)	27 (5%)	2 (0%)	30	45

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	799	VAL
1	B	631	SER

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	224/288 (78%)	208 (93%)	16 (7%)	13	23
1	B	211/288 (73%)	201 (95%)	10 (5%)	23	40
All	All	435/576 (76%)	409 (94%)	26 (6%)	17	30

All (26) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	609	ARG
1	A	648	HIS
1	A	685	ILE
1	A	693	GLN
1	A	695	ASP
1	A	702	ASP
1	A	710	ASN
1	A	787	MET
1	A	799	VAL
1	A	802	ARG
1	A	817	MET
1	A	839	LEU
1	A	841	ARG
1	A	862	ARG
1	A	866	ARG
1	A	907	GLU
1	B	670	LEU
1	B	686	ARG
1	B	690	VAL
1	B	698	CYS
1	B	721	LYS

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Mol	Chain	Res	Type
1	B	802	ARG
1	B	817	MET
1	B	837	LEU
1	B	882	GLU
1	B	893	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	683	ASN
1	A	706	ASN
1	A	716	HIS
1	A	864	GLN
1	B	717	GLN
1	B	847	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

10 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
3	EDO	A	1005	-	3,3,3	0.44	0	2,2,2	0.25	0
3	EDO	A	1004	-	3,3,3	0.36	0	2,2,2	0.62	0
4	PEG	B	1003	-	6,6,6	0.68	0	5,5,5	0.32	0
2	5X1	A	1001	-	42,42,42	2.85	13 (30%)	59,61,61	1.74	14 (23%)
3	EDO	A	1002	-	3,3,3	0.42	0	2,2,2	0.44	0
4	PEG	B	1004	-	6,6,6	0.60	0	5,5,5	0.27	0
3	EDO	A	1003	-	3,3,3	0.50	0	2,2,2	0.35	0
3	EDO	B	1002	-	3,3,3	0.39	0	2,2,2	0.32	0
2	5X1	B	1001	-	42,42,42	2.70	13 (30%)	59,61,61	2.02	16 (27%)
4	PEG	A	1006	-	6,6,6	0.58	0	5,5,5	0.18	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
3	EDO	A	1005	-	-	1/1/1/1	-
3	EDO	A	1004	-	-	0/1/1/1	-
4	PEG	B	1003	-	-	2/4/4/4	-
2	5X1	A	1001	-	-	3/22/44/44	0/5/5/5
3	EDO	A	1002	-	-	1/1/1/1	-
4	PEG	B	1004	-	-	3/4/4/4	-
3	EDO	A	1003	-	-	0/1/1/1	-
3	EDO	B	1002	-	-	1/1/1/1	-
2	5X1	B	1001	-	-	2/22/44/44	0/5/5/5
4	PEG	A	1006	-	-	3/4/4/4	-

All (26) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1001	5X1	CAF-CBE	11.23	1.53	1.39
2	B	1001	5X1	CAF-CBE	10.73	1.52	1.39
2	A	1001	5X1	CAM-CBC	8.80	1.53	1.39
2	B	1001	5X1	CAM-CBC	7.72	1.51	1.39
2	A	1001	5X1	CAX-NAW	4.81	1.49	1.35
2	B	1001	5X1	CAX-NAW	4.50	1.48	1.35
2	B	1001	5X1	CBC-CBE	-3.54	1.34	1.40
2	B	1001	5X1	CAL-CBB	3.51	1.44	1.39
2	A	1001	5X1	CBC-CBE	-3.45	1.34	1.40
2	A	1001	5X1	CAL-CBB	3.40	1.44	1.39

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	1001	5X1	CAJ-CAY	3.20	1.44	1.39
2	A	1001	5X1	CAS-CBC	3.11	1.58	1.51
2	B	1001	5X1	CBD-NBI	3.10	1.47	1.38
2	A	1001	5X1	CBD-NBI	2.97	1.47	1.38
2	B	1001	5X1	CAS-CBC	2.65	1.57	1.51
2	A	1001	5X1	CAF-CAE	2.54	1.42	1.38
2	A	1001	5X1	CAJ-CAY	2.52	1.43	1.39
2	B	1001	5X1	CAF-CAE	2.26	1.42	1.38
2	B	1001	5X1	CAE-CBA	2.25	1.43	1.39
2	A	1001	5X1	CBB-CAX	2.18	1.55	1.50
2	B	1001	5X1	CAG-NAV	2.14	1.37	1.33
2	A	1001	5X1	CAH-NAU	2.10	1.38	1.34
2	A	1001	5X1	CAG-NAV	2.10	1.37	1.33
2	B	1001	5X1	CAP-NBH	-2.09	1.41	1.46
2	B	1001	5X1	CAJ-CAZ	2.07	1.42	1.39
2	A	1001	5X1	CAK-CBB	2.05	1.42	1.39

All (30) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	1001	5X1	CAS-NBI-CAT	7.97	122.86	112.67
2	A	1001	5X1	CAS-NBI-CAT	4.55	118.49	112.67
2	A	1001	5X1	CAH-NAU-CAG	4.48	121.08	115.80
2	B	1001	5X1	CBC-CAS-NBI	-4.40	107.50	112.07
2	B	1001	5X1	CAH-NAU-CAG	4.37	120.95	115.80
2	A	1001	5X1	CBC-CAS-NBI	-4.11	107.81	112.07
2	A	1001	5X1	NAV-CAG-NAU	-3.92	119.88	126.73
2	B	1001	5X1	NAV-CAG-NAU	-3.62	120.41	126.73
2	A	1001	5X1	CAL-CBB-CAK	-3.57	115.47	119.65
2	B	1001	5X1	CAL-CBB-CAK	-3.49	115.56	119.65
2	A	1001	5X1	CAI-NAV-CAG	3.39	119.80	115.80
2	A	1001	5X1	CBC-CBE-CBF	3.35	123.96	117.40
2	B	1001	5X1	CAI-NAV-CAG	3.08	119.44	115.80
2	B	1001	5X1	CAJ-CAY-CAA	3.00	123.53	119.57
2	B	1001	5X1	CBD-CAH-NAU	-2.83	119.56	122.81
2	B	1001	5X1	CAR-NBH-CAQ	2.73	116.93	111.07
2	B	1001	5X1	CBC-CBE-CBF	2.64	122.57	117.40
2	B	1001	5X1	CAS-CBC-CAM	-2.45	115.11	120.01
2	B	1001	5X1	CAK-CAY-CAA	-2.31	116.51	119.57
2	A	1001	5X1	CAS-CBC-CBE	2.29	124.61	120.86
2	A	1001	5X1	CAS-NBI-CBD	-2.25	114.22	118.00
2	B	1001	5X1	CAF-CBE-CBF	-2.24	117.33	122.14

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	1001	5X1	CAS-CBC-CAM	-2.23	115.55	120.01
2	A	1001	5X1	CBD-CAH-NAU	-2.21	120.28	122.81
2	B	1001	5X1	F03-CAA-CAY	-2.15	108.29	112.90
2	A	1001	5X1	CAF-CBE-CBF	-2.14	117.55	122.14
2	A	1001	5X1	CBB-CAX-NAW	2.12	121.04	115.90
2	A	1001	5X1	F01-CAA-CAY	-2.10	108.39	112.90
2	B	1001	5X1	CAS-CBC-CBE	2.09	124.28	120.86
2	B	1001	5X1	F01-CAA-CAY	-2.04	108.53	112.90

There are no chirality outliers.

All (16) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	1001	5X1	CAH-CBD-NBI-CAS
2	B	1001	5X1	CAZ-CAR-NBH-CAQ
2	B	1001	5X1	CAZ-CAR-NBH-CAP
4	A	1006	PEG	O1-C1-C2-O2
4	B	1004	PEG	O2-C3-C4-O4
3	A	1002	EDO	O1-C1-C2-O2
3	B	1002	EDO	O1-C1-C2-O2
4	B	1003	PEG	O1-C1-C2-O2
4	B	1003	PEG	O2-C3-C4-O4
4	B	1004	PEG	O1-C1-C2-O2
3	A	1005	EDO	O1-C1-C2-O2
4	B	1004	PEG	C4-C3-O2-C2
2	A	1001	5X1	CAI-CBD-NBI-CAS
4	A	1006	PEG	C4-C3-O2-C2
2	A	1001	5X1	CAI-CBD-NBI-CAT
4	A	1006	PEG	C1-C2-O2-C3

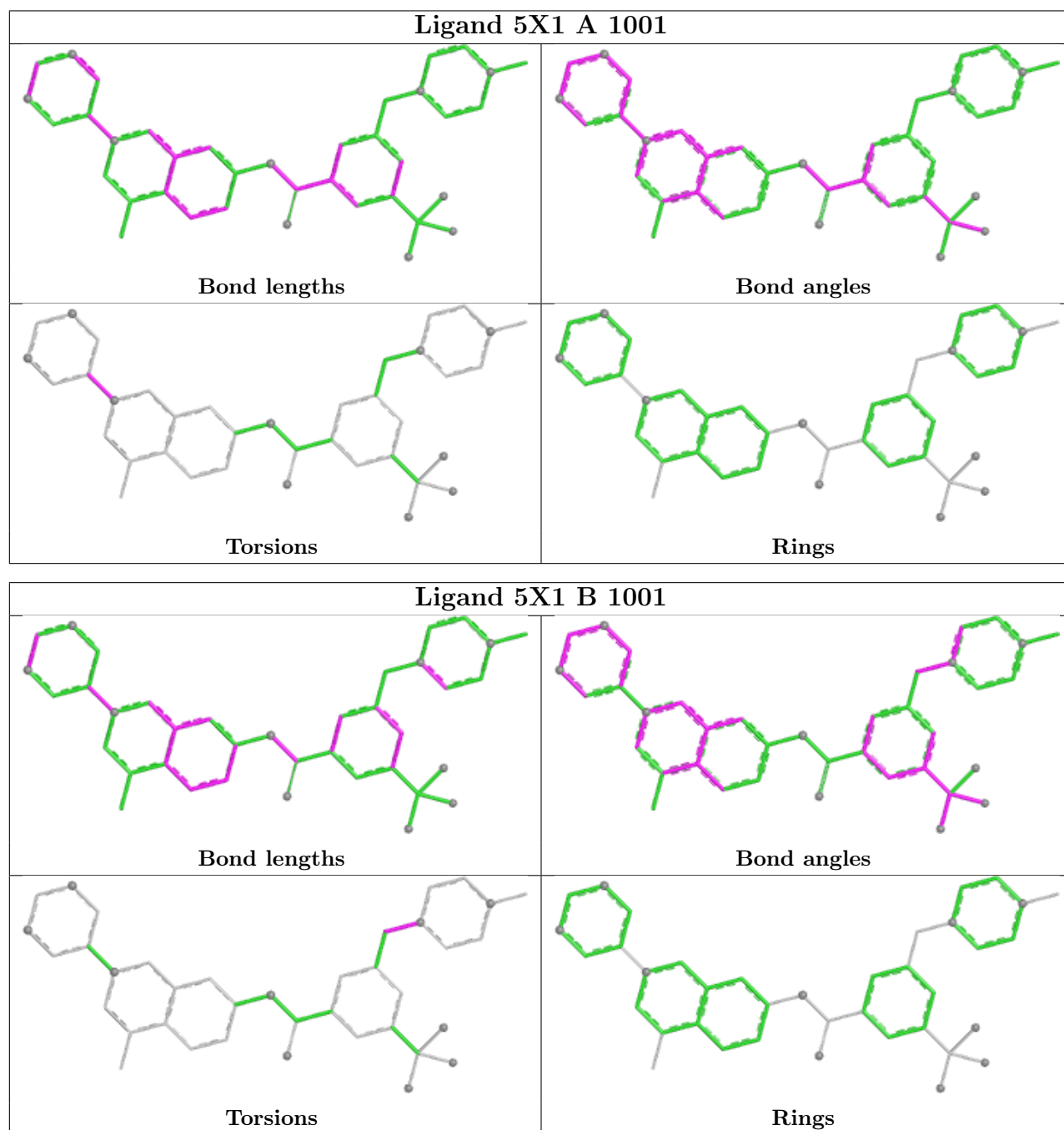
There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	1004	PEG	2	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 ⓘ

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 [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	280/337 (83%)	0.30	11 (3%) 43 35	30, 53, 81, 98	0
1	B	274/337 (81%)	0.33	8 (2%) 53 46	39, 58, 102, 132	0
All	All	554/674 (82%)	0.31	19 (3%) 48 40	30, 56, 92, 132	0

All (19) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	799	VAL	3.9
1	A	636	VAL	3.9
1	A	909	ALA	3.1
1	A	800	GLN	2.9
1	A	633	GLN	2.9
1	B	691	CYS	2.6
1	A	802	ARG	2.6
1	A	801	GLY	2.6
1	B	621	PHE	2.6
1	B	692	VAL	2.5
1	A	620	GLN	2.5
1	B	605	PHE	2.5
1	B	722	ALA	2.4
1	B	740	TYR	2.3
1	A	621	PHE	2.3
1	A	632	PRO	2.2
1	B	632	PRO	2.1
1	A	894	GLN	2.1
1	B	610	LEU	2.0

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

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

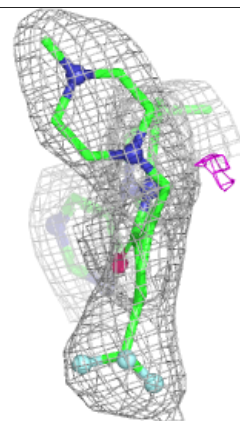
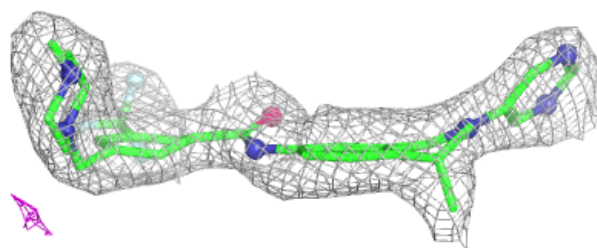
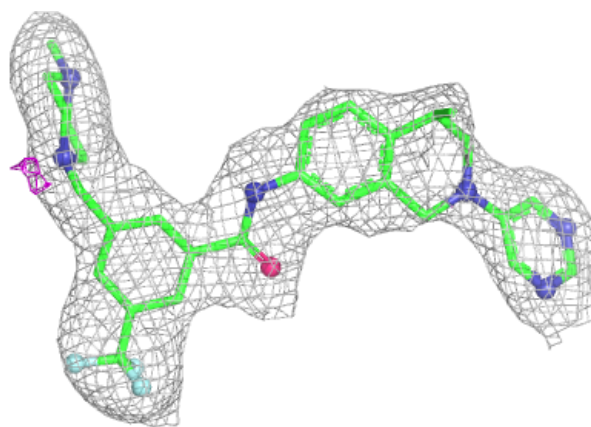
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

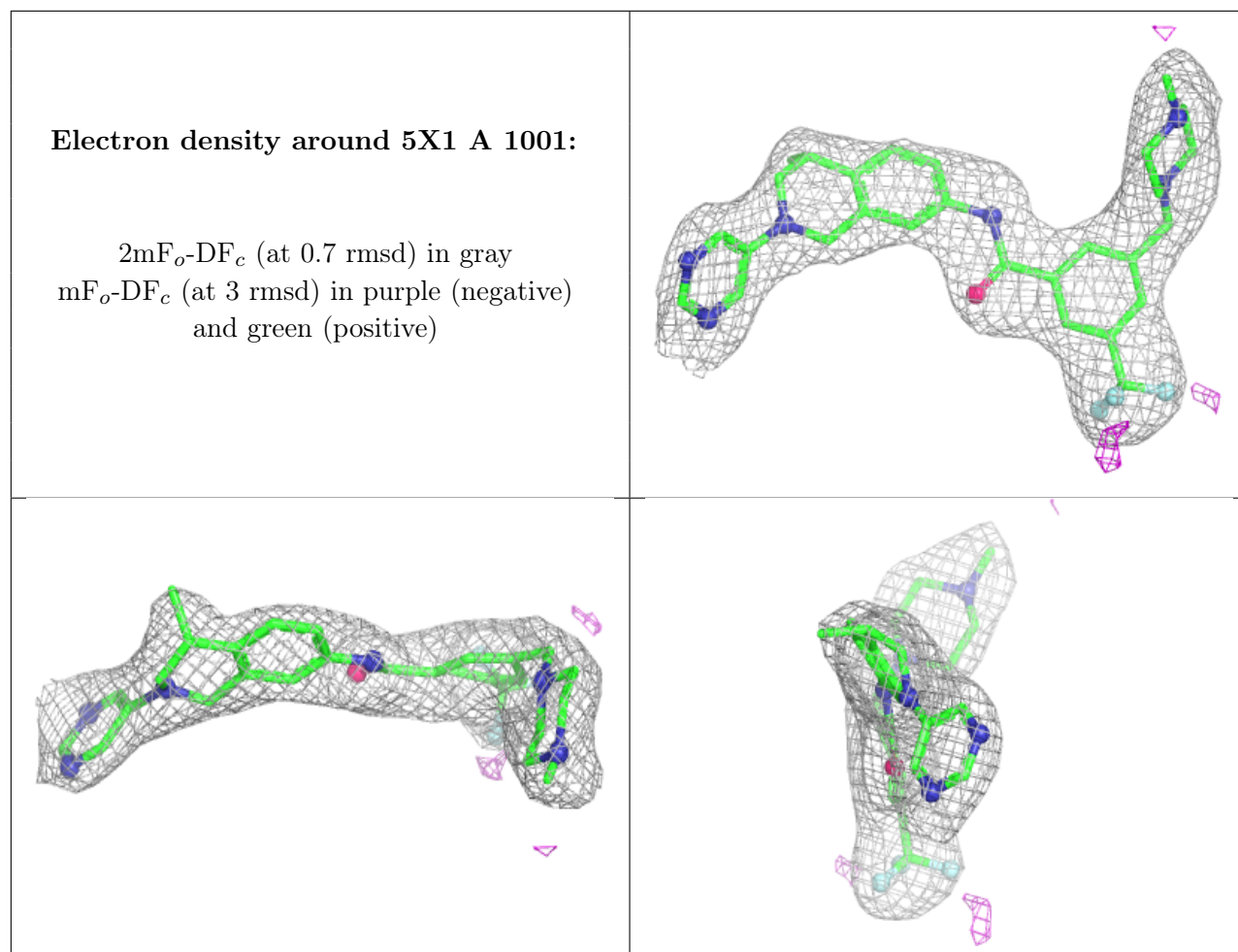
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	EDO	A	1005	4/4	0.69	0.15	65,66,68,69	0
4	PEG	B	1004	7/7	0.76	0.18	76,79,80,81	0
4	PEG	A	1006	7/7	0.81	0.16	68,71,72,72	0
4	PEG	B	1003	7/7	0.86	0.17	48,55,59,59	0
3	EDO	B	1002	4/4	0.86	0.14	61,62,65,66	0
3	EDO	A	1003	4/4	0.87	0.12	45,47,52,55	0
2	5X1	B	1001	38/38	0.91	0.10	41,46,58,59	0
3	EDO	A	1004	4/4	0.92	0.11	45,45,48,51	0
2	5X1	A	1001	38/38	0.92	0.10	31,40,48,48	0
3	EDO	A	1002	4/4	0.94	0.11	36,38,39,40	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 5X1 B 1001:

$2mF_o-DF_c$ (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.