



Full wwPDB X-ray Structure Validation Report ⓘ

Jan 30, 2024 – 12:12 pm GMT

PDB ID : 8QMF
Title : Transketolase from *Vibrio vulnificus* in complex with thiamin pyrophosphate
Authors : Ballut, L.; Georges, R.N.; Octobre, G.; Charmantray, F.; Doumeche, B.
Deposited on : 2023-09-22
Resolution : 2.10 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 : 1.8.4, 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

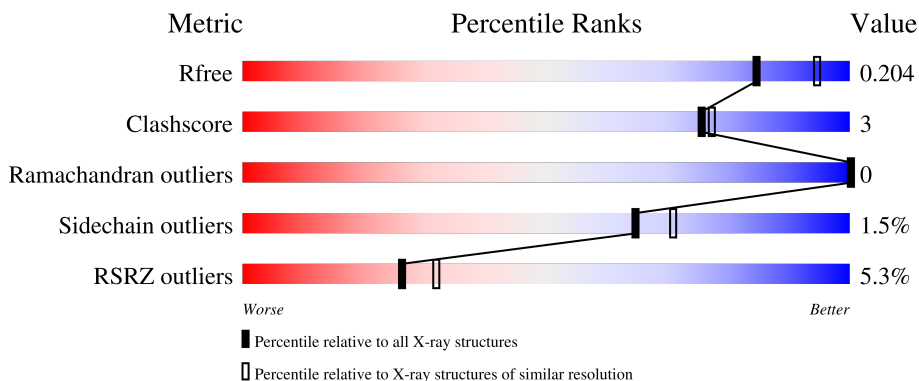
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

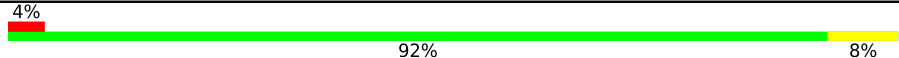
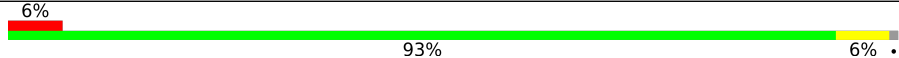
The reported resolution of this entry is 2.10 Å.

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	5197 (2.10-2.10)
Clashscore	141614	5710 (2.10-2.10)
Ramachandran outliers	138981	5647 (2.10-2.10)
Sidechain outliers	138945	5648 (2.10-2.10)
RSRZ outliers	127900	5083 (2.10-2.10)

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	678	
1	B	678	

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
3	EDO	B	703	-	-	-	X

2 Entry composition i

There are 6 unique types of molecules in this entry. The entry contains 11174 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 Transketolase 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	678	5203	3284	900	991	28	0	0	0
1	B	674	5153	3254	884	987	28	0	0	0

There are 30 discrepancies between the modelled and reference sequences:

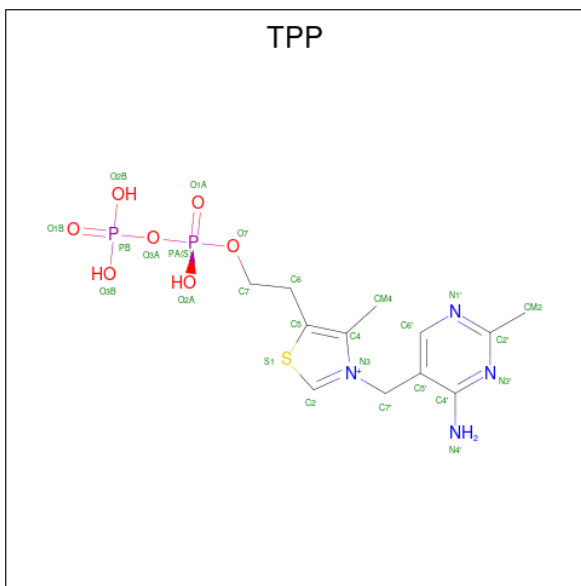
Chain	Residue	Modelled	Actual	Comment	Reference
A	664	GLU	-	expression tag	UNP Q7MDD4
A	665	ASN	-	expression tag	UNP Q7MDD4
A	666	LEU	-	expression tag	UNP Q7MDD4
A	667	TYR	-	expression tag	UNP Q7MDD4
A	668	PHE	-	expression tag	UNP Q7MDD4
A	669	GLN	-	expression tag	UNP Q7MDD4
A	670	GLY	-	expression tag	UNP Q7MDD4
A	671	LEU	-	expression tag	UNP Q7MDD4
A	672	GLU	-	expression tag	UNP Q7MDD4
A	673	HIS	-	expression tag	UNP Q7MDD4
A	674	HIS	-	expression tag	UNP Q7MDD4
A	675	HIS	-	expression tag	UNP Q7MDD4
A	676	HIS	-	expression tag	UNP Q7MDD4
A	677	HIS	-	expression tag	UNP Q7MDD4
A	678	HIS	-	expression tag	UNP Q7MDD4
B	664	GLU	-	expression tag	UNP Q7MDD4
B	665	ASN	-	expression tag	UNP Q7MDD4
B	666	LEU	-	expression tag	UNP Q7MDD4
B	667	TYR	-	expression tag	UNP Q7MDD4
B	668	PHE	-	expression tag	UNP Q7MDD4
B	669	GLN	-	expression tag	UNP Q7MDD4
B	670	GLY	-	expression tag	UNP Q7MDD4
B	671	LEU	-	expression tag	UNP Q7MDD4
B	672	GLU	-	expression tag	UNP Q7MDD4
B	673	HIS	-	expression tag	UNP Q7MDD4

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Chain	Residue	Modelled	Actual	Comment	Reference
B	674	HIS	-	expression tag	UNP Q7MDD4
B	675	HIS	-	expression tag	UNP Q7MDD4
B	676	HIS	-	expression tag	UNP Q7MDD4
B	677	HIS	-	expression tag	UNP Q7MDD4
B	678	HIS	-	expression tag	UNP Q7MDD4

- Molecule 2 is THIAMINE DIPHOSPHATE (three-letter code: TPP) (formula: C₁₂H₁₉N₄O₇P₂S) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
			Total	C	N	O	P			S
2	A	1	Total	C	N	O	P	S	0	0
			26	12	4	7	2	1		
2	B	1	Total	C	N	O	P	S	0	0
			26	12	4	7	2	1		

- Molecule 3 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C₂H₆O₂).



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

- Molecule 4 is MAGNESIUM ION (three-letter code: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total Mg 1 1	0	0
4	B	1	Total Mg 1 1	0	0

- Molecule 5 is NICKEL (II) ION (three-letter code: NI) (formula: Ni).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total Ni 1 1	0	0

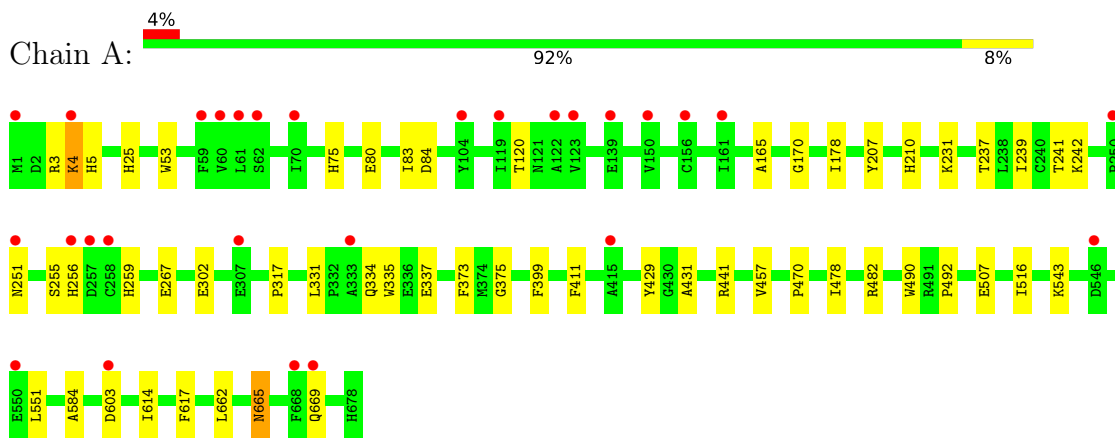
- Molecule 6 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	383	Total O 383 383	0	0
6	B	332	Total O 332 332	0	0

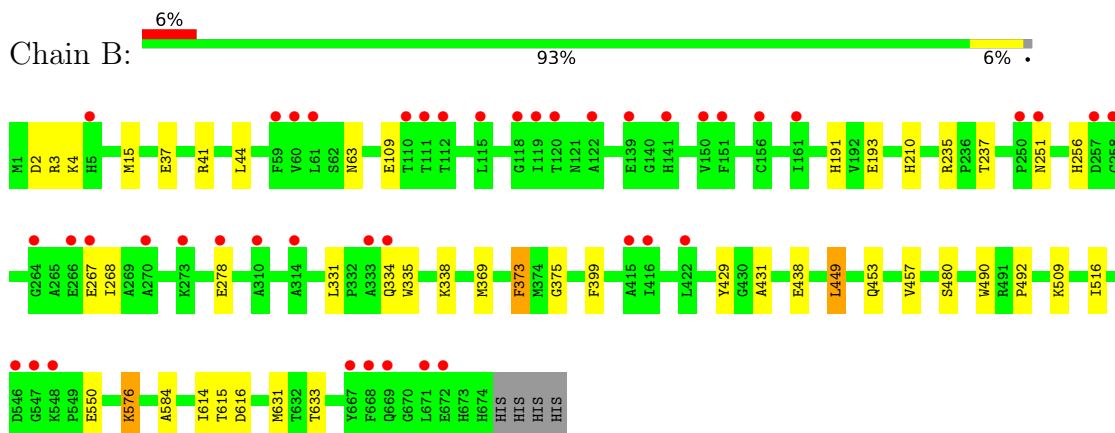
3 Residue-property plots

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: Transketolase 2



- Molecule 1: Transketolase 2



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	69.23Å 75.48Å 130.39Å 90.00° 99.87° 90.00°	Depositor
Resolution (Å)	34.95 – 2.10 34.95 – 2.10	Depositor EDS
% Data completeness (in resolution range)	99.4 (34.95-2.10) 99.4 (34.95-2.10)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.84 (at 2.10Å)	Xtrriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, R_{free}	0.163 , 0.207 0.162 , 0.204	Depositor DCC
R_{free} test set	3849 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	35.1	Xtrriage
Anisotropy	0.168	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 45.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	11174	wwPDB-VP
Average B, all atoms (Å ²)	37.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.27% 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: NI, TPP, MG, 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	0.39	0/5333	0.57	0/7229
1	B	0.37	0/5277	0.56	1/7153 (0.0%)
All	All	0.38	0/10610	0.56	1/14382 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	449	LEU	CA-CB-CG	5.75	128.53	115.30

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	5203	0	5000	32	0
1	B	5153	0	4962	28	0
2	A	26	0	16	4	0
2	B	26	0	16	2	0
3	A	24	0	36	4	0
3	B	24	0	36	4	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	A	1	0	0	0	0
6	A	383	0	0	6	1
6	B	332	0	0	3	1
All	All	11174	0	10066	63	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 3.

All (63) 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:317:PRO:O	6:A:801:HOH:O	1.97	0.81
1:B:235:ARG:O	6:B:802:HOH:O	2.08	0.71
1:A:25:HIS:HE1	3:A:706:EDO:H12	1.58	0.68
2:A:701:TPP:C2	3:A:706:EDO:H11	2.24	0.68
2:A:701:TPP:H2	2:A:701:TPP:HN42	1.58	0.68
1:A:80:GLU:OE1	6:A:803:HOH:O	2.12	0.67
1:A:84:ASP:OD1	6:A:804:HOH:O	2.15	0.63
1:A:25:HIS:CE1	3:A:706:EDO:H12	2.34	0.62
1:B:15:MET:HE2	1:B:268:ILE:HG12	1.83	0.61
1:A:614:ILE:HD11	3:A:707:EDO:H12	1.84	0.59
2:A:701:TPP:C2	2:A:701:TPP:HN42	2.15	0.58
2:B:702:TPP:HN42	2:B:702:TPP:H2	1.69	0.58
1:B:615:THR:HG23	1:B:631:MET:O	2.07	0.54
1:B:278:GLU:OE1	6:B:803:HOH:O	2.18	0.54
1:A:4:LYS:HD2	1:A:5:HIS:N	2.24	0.53
1:B:2:ASP:OD1	1:B:3:ARG:N	2.44	0.51
1:A:334:GLN:HG2	1:A:337:GLU:OE1	2.11	0.51
1:B:251:ASN:HB2	1:B:267:GLU:OE2	2.11	0.50
1:B:37:GLU:OE2	1:B:41:ARG:HD3	2.11	0.49
1:B:44:LEU:HD21	3:B:703:EDO:H22	1.95	0.48
1:B:210:HIS:O	1:B:237:THR:HA	2.13	0.48
1:B:338:LYS:HD3	1:B:369:MET:SD	2.54	0.48
1:B:375:GLY:HA3	1:B:429:TYR:CZ	2.48	0.48
1:B:633:THR:HB	6:B:1029:HOH:O	2.13	0.47
1:A:259:HIS:ND1	2:A:701:TPP:O3B	2.46	0.47
1:B:453:GLN:HB2	1:B:509:LYS:HA	1.94	0.47
1:A:239:ILE:HG22	1:A:241:THR:HG23	1.95	0.47
1:A:478:ILE:HG13	6:A:981:HOH:O	2.14	0.47
2:B:702:TPP:HN42	2:B:702:TPP:C2	2.27	0.47
1:B:109:GLU:OE2	3:B:703:EDO:H11	2.14	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:3:ARG:NH1	1:B:37:GLU:OE2	2.49	0.45
1:A:665:ASN:O	1:A:669:GLN:HG3	2.17	0.45
1:B:191:HIS:HB3	1:B:193:GLU:OE1	2.17	0.45
1:A:543:LYS:NZ	6:A:818:HOH:O	2.49	0.45
1:A:441:ARG:NH1	6:A:806:HOH:O	2.32	0.44
1:B:616:ASP:OD2	3:B:701:EDO:O2	2.25	0.44
1:A:551:LEU:HB2	1:A:662:LEU:HD21	1.99	0.44
1:A:53:TRP:CD1	1:A:302:GLU:HG3	2.53	0.44
1:B:614:ILE:HD11	3:B:701:EDO:H11	2.00	0.43
1:A:210:HIS:O	1:A:237:THR:HA	2.18	0.43
1:A:75:HIS:CE1	1:A:83:ILE:HG12	2.53	0.43
1:A:251:ASN:ND2	1:A:267:GLU:OE1	2.40	0.43
1:B:492:PRO:HD2	1:B:516:ILE:O	2.19	0.43
1:B:490:TRP:CD2	1:B:584:ALA:HB2	2.54	0.43
1:A:470:PRO:HB2	1:B:449:LEU:HD11	2.00	0.42
1:B:550:GLU:OE2	1:B:576:LYS:HE2	2.19	0.42
1:B:431:ALA:HB2	1:B:457:VAL:HB	2.01	0.42
1:A:331:LEU:HD13	1:A:335:TRP:CD1	2.54	0.41
1:A:482:ARG:HD3	1:A:617:PHE:CZ	2.55	0.41
1:B:373:PHE:HD1	1:B:373:PHE:HA	1.79	0.41
1:A:178:ILE:HD11	1:A:231:LYS:HG3	2.02	0.41
1:B:15:MET:HE1	1:B:268:ILE:HA	2.02	0.41
1:B:334:GLN:HB3	1:B:338:LYS:HD2	2.02	0.41
1:A:170:GLY:HA3	1:A:207:TYR:O	2.21	0.41
1:A:375:GLY:HA3	1:A:429:TYR:CZ	2.56	0.41
1:A:431:ALA:HB2	1:A:457:VAL:HB	2.03	0.41
1:A:441:ARG:HE	1:B:438:GLU:CD	2.23	0.41
1:A:490:TRP:CD2	1:A:584:ALA:HB2	2.56	0.41
1:A:331:LEU:HD11	1:A:507:GLU:HG2	2.03	0.41
1:A:492:PRO:HD2	1:A:516:ILE:O	2.21	0.40
1:B:331:LEU:HD13	1:B:335:TRP:CD1	2.57	0.40
1:A:120:THR:HG23	1:A:165:ALA:HB2	2.02	0.40
1:A:242:LYS:HB2	1:A:242:LYS:HE2	1.93	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)
6:A:1144:HOH:O	6:B:993:HOH:O[1_545]	1.82	0.38

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	676/678 (100%)	658 (97%)	18 (3%)	0	100	100
1	B	672/678 (99%)	653 (97%)	19 (3%)	0	100	100
All	All	1348/1356 (99%)	1311 (97%)	37 (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	527/527 (100%)	518 (98%)	9 (2%)	60	67
1	B	521/527 (99%)	514 (99%)	7 (1%)	69	75
All	All	1048/1054 (99%)	1032 (98%)	16 (2%)	65	71

All (16) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	3	ARG
1	A	4	LYS
1	A	255	SER
1	A	256	HIS
1	A	373	PHE
1	A	399	PHE
1	A	411	PHE
1	A	603	ASP

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Mol	Chain	Res	Type
1	A	665	ASN
1	B	4	LYS
1	B	63	ASN
1	B	256	HIS
1	B	373	PHE
1	B	399	PHE
1	B	480	SER
1	B	576	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	5	HIS
1	A	25	HIS
1	A	334	GLN
1	A	341	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 monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 17 ligands modelled in this entry, 3 are monoatomic - leaving 14 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
3	EDO	A	704	-	3,3,3	0.48	0	2,2,2	0.52	0
3	EDO	B	707	-	3,3,3	0.52	0	2,2,2	0.57	0
3	EDO	A	702	-	3,3,3	0.57	0	2,2,2	0.78	0
3	EDO	B	705	-	3,3,3	0.44	0	2,2,2	0.45	0
3	EDO	B	706	-	3,3,3	0.41	0	2,2,2	0.58	0
3	EDO	A	703	-	3,3,3	0.67	0	2,2,2	0.11	0
3	EDO	B	704	-	3,3,3	0.60	0	2,2,2	0.25	0
3	EDO	A	705	-	3,3,3	0.52	0	2,2,2	0.28	0
3	EDO	B	701	-	3,3,3	0.36	0	2,2,2	0.69	0
3	EDO	A	706	-	3,3,3	0.48	0	2,2,2	0.52	0
3	EDO	A	707	-	3,3,3	0.57	0	2,2,2	0.17	0
3	EDO	B	703	-	3,3,3	0.60	0	2,2,2	0.55	0
2	TPP	B	702	4	22,27,27	0.45	0	29,40,40	0.74	1 (3%)
2	TPP	A	701	4	22,27,27	0.60	0	29,40,40	0.83	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	704	-	-	1/1/1/1	-
3	EDO	B	707	-	-	0/1/1/1	-
3	EDO	A	702	-	-	0/1/1/1	-
3	EDO	B	705	-	-	0/1/1/1	-
3	EDO	B	706	-	-	0/1/1/1	-
3	EDO	A	703	-	-	1/1/1/1	-
3	EDO	B	704	-	-	1/1/1/1	-
3	EDO	A	705	-	-	1/1/1/1	-
3	EDO	B	701	-	-	0/1/1/1	-
3	EDO	A	706	-	-	0/1/1/1	-
3	EDO	A	707	-	-	1/1/1/1	-
3	EDO	B	703	-	-	0/1/1/1	-
2	TPP	B	702	4	-	4/16/17/17	0/2/2/2
2	TPP	A	701	4	-	7/16/17/17	0/2/2/2

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	702	TPP	C5-C4-N3	2.06	111.70	107.57

There are no chirality outliers.

All (16) torsion outliers are listed below:

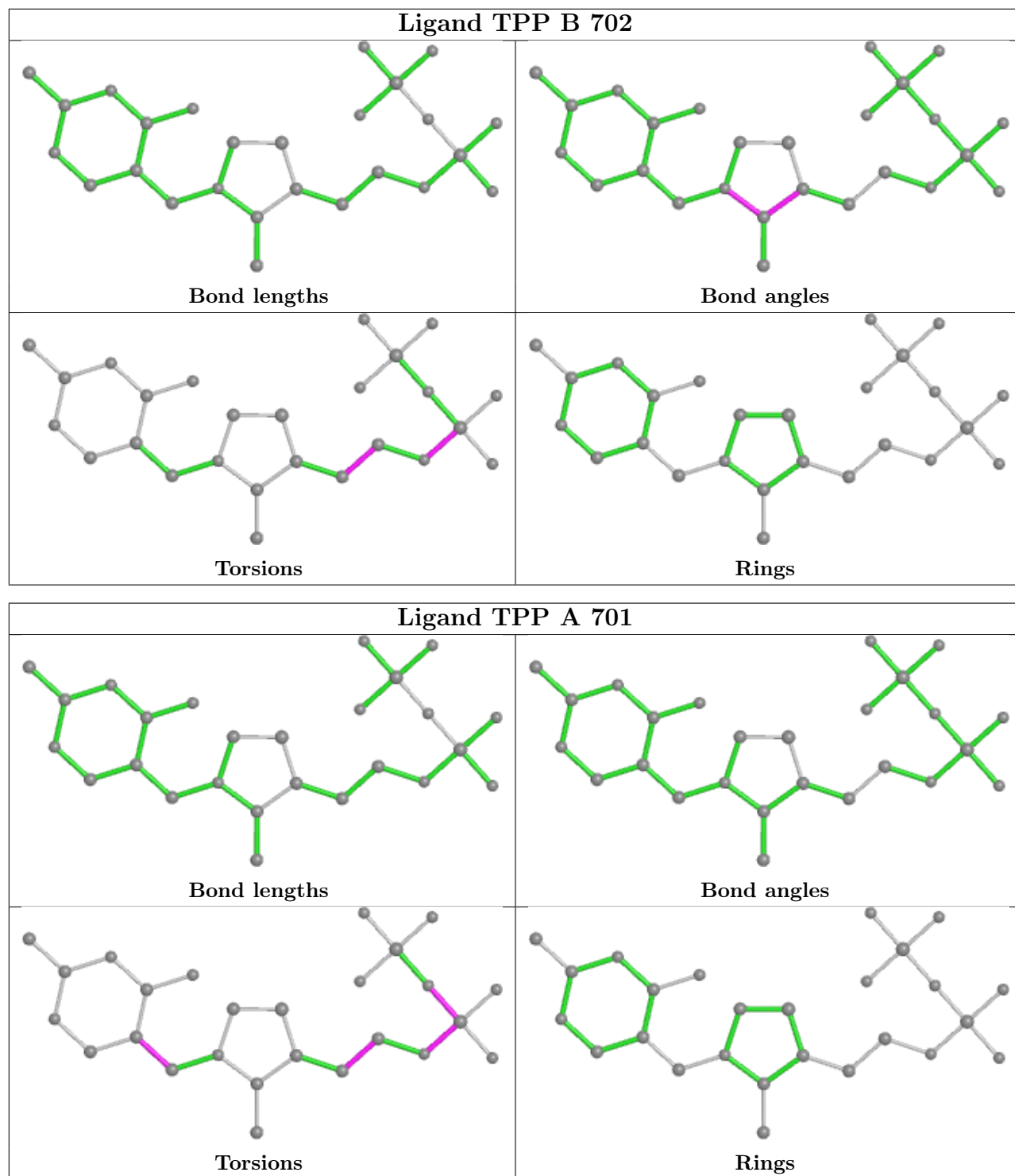
Mol	Chain	Res	Type	Atoms
2	A	701	TPP	C5-C6-C7-O7
2	A	701	TPP	C7-O7-PA-O1A
2	B	702	TPP	C5-C6-C7-O7
2	B	702	TPP	C7-O7-PA-O1A
3	A	705	EDO	O1-C1-C2-O2
3	A	707	EDO	O1-C1-C2-O2
2	A	701	TPP	C7-O7-PA-O3A
2	A	701	TPP	C7-O7-PA-O2A
2	B	702	TPP	C7-O7-PA-O2A
3	B	704	EDO	O1-C1-C2-O2
2	A	701	TPP	PB-O3A-PA-O2A
2	A	701	TPP	PB-O3A-PA-O1A
3	A	704	EDO	O1-C1-C2-O2
2	A	701	TPP	C4'-C5'-C7'-N3
3	A	703	EDO	O1-C1-C2-O2
2	B	702	TPP	C7-O7-PA-O3A

There are no ring outliers.

6 monomers are involved in 13 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	701	EDO	2	0
3	A	706	EDO	3	0
3	A	707	EDO	1	0
3	B	703	EDO	2	0
2	B	702	TPP	2	0
2	A	701	TPP	4	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

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	678/678 (100%)	0.20	28 (4%) 37 43	24, 35, 50, 67	0
1	B	674/678 (99%)	0.34	43 (6%) 19 24	25, 37, 55, 66	0
All	All	1352/1356 (99%)	0.27	71 (5%) 26 32	24, 36, 53, 67	0

All (71) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	671	LEU	5.0
1	B	278	GLU	4.7
1	B	61	LEU	4.3
1	A	256	HIS	4.1
1	B	60	VAL	4.0
1	A	60	VAL	4.0
1	A	61	LEU	3.9
1	B	672	GLU	3.8
1	B	251	ASN	3.7
1	B	273	LYS	3.7
1	A	104	TYR	3.6
1	B	122	ALA	3.6
1	A	546	ASP	3.6
1	B	156	CYS	3.4
1	A	59	PHE	3.3
1	B	139	GLU	3.3
1	B	546	ASP	3.2
1	B	150	VAL	3.2
1	A	1	MET	3.1
1	A	123	VAL	3.1
1	A	161	ILE	3.1
1	A	119	ILE	3.0
1	B	151	PHE	3.0
1	B	250	PRO	3.0

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Mol	Chain	Res	Type	RSRZ
1	B	258	CYS	3.0
1	B	334	GLN	2.9
1	B	668	PHE	2.9
1	A	122	ALA	2.9
1	B	161	ILE	2.9
1	A	251	ASN	2.9
1	A	150	VAL	2.8
1	B	59	PHE	2.8
1	B	257	ASP	2.8
1	B	119	ILE	2.8
1	B	118	GLY	2.7
1	B	314	ALA	2.7
1	B	5	HIS	2.7
1	B	110	THR	2.7
1	A	415	ALA	2.7
1	B	141	HIS	2.6
1	A	333	ALA	2.5
1	A	307	GLU	2.5
1	A	62	SER	2.5
1	B	547	GLY	2.5
1	B	120	THR	2.5
1	B	548	LYS	2.5
1	B	112	THR	2.4
1	B	422	LEU	2.4
1	A	669	GLN	2.4
1	A	257	ASP	2.4
1	B	310	ALA	2.4
1	B	669	GLN	2.4
1	A	156	CYS	2.4
1	A	250	PRO	2.3
1	B	416	ILE	2.3
1	B	115	LEU	2.3
1	A	4	LYS	2.3
1	A	258	CYS	2.3
1	B	111	THR	2.2
1	B	415	ALA	2.2
1	B	264	GLY	2.2
1	B	267	GLU	2.2
1	B	266	GLU	2.2
1	B	333	ALA	2.2
1	A	70	ILE	2.1
1	A	139	GLU	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	550	GLU	2.1
1	B	270	ALA	2.1
1	A	603	ASP	2.1
1	A	668	PHE	2.1
1	B	667	TYR	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](#)

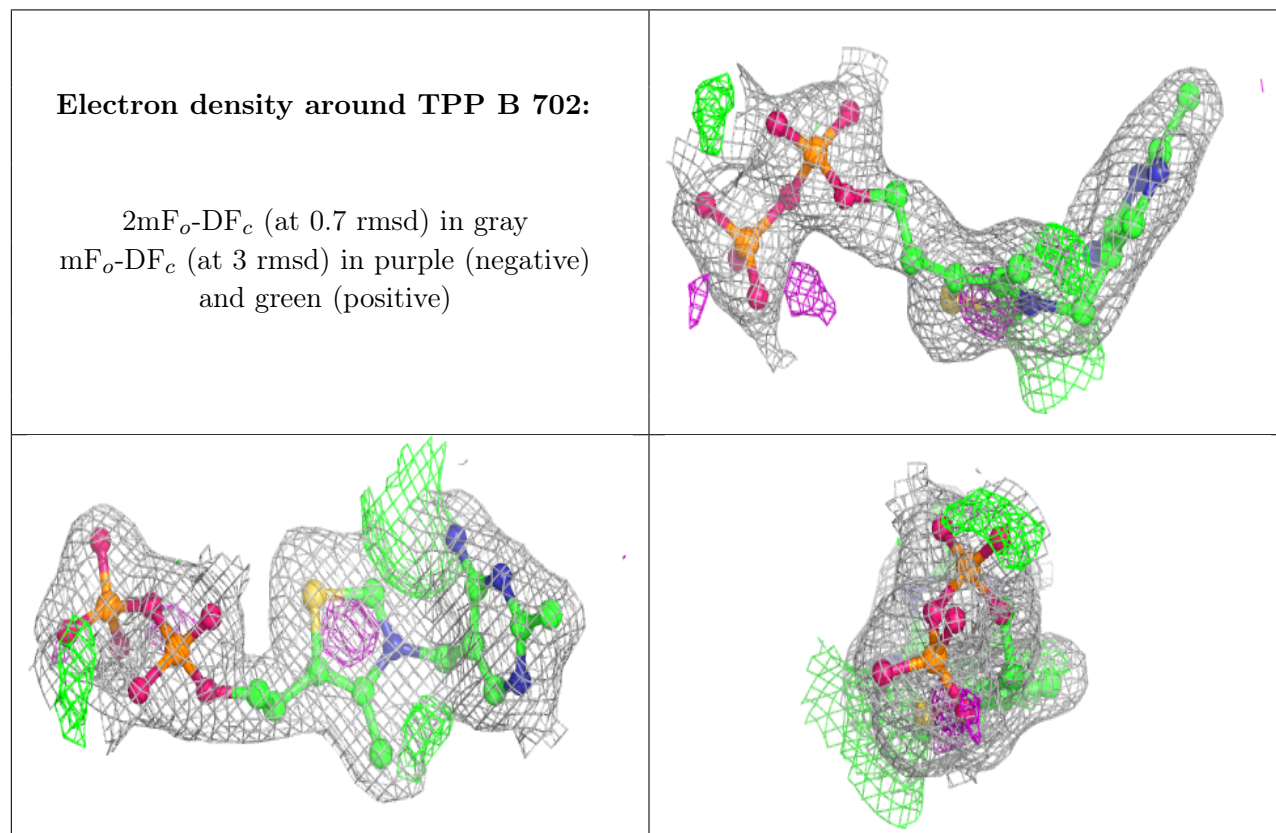
There are no monosaccharides in this entry.

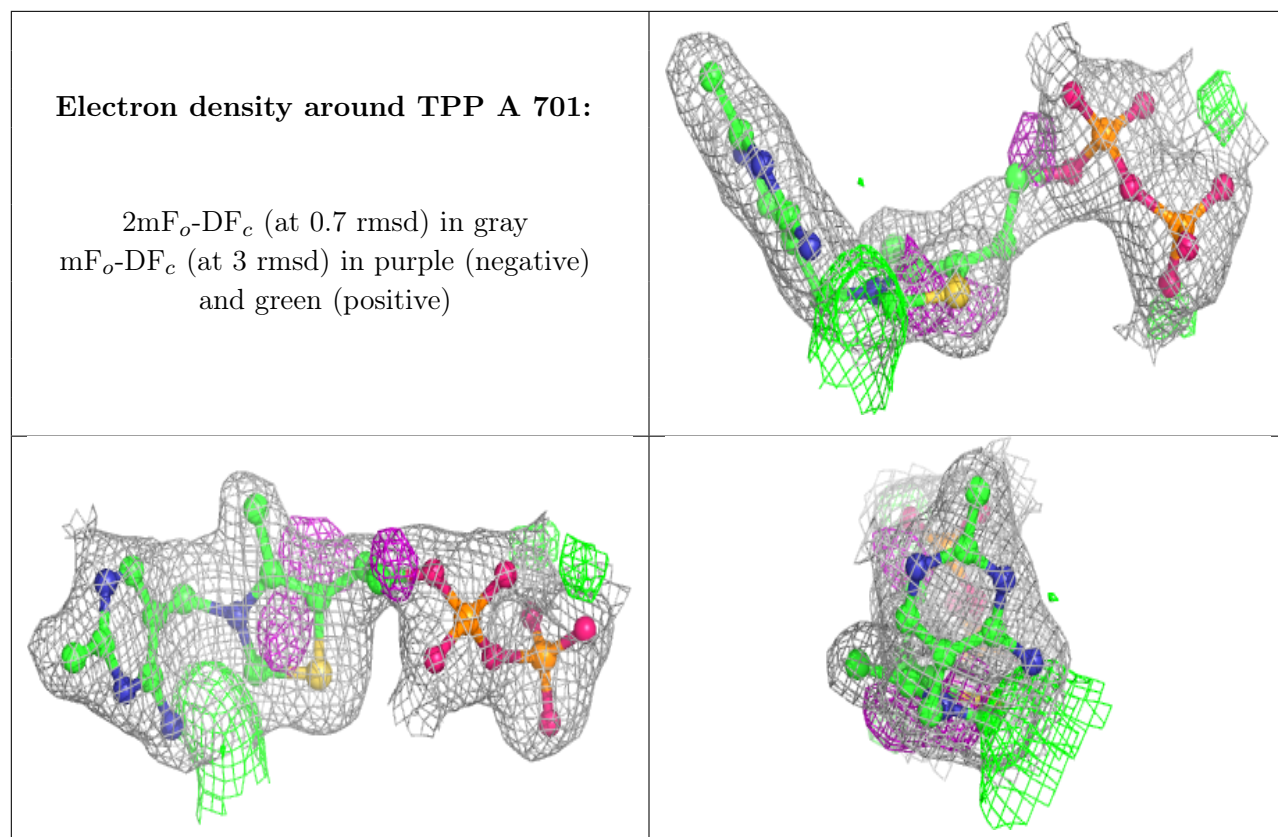
6.4 Ligands [i](#)

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, 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	EDO	B	703	4/4	0.80	0.46	38,39,45,47	0
3	EDO	B	701	4/4	0.81	0.26	36,45,46,54	0
3	EDO	A	706	4/4	0.82	0.13	43,44,48,53	0
3	EDO	A	702	4/4	0.84	0.39	36,37,38,46	0
3	EDO	B	707	4/4	0.85	0.19	46,46,47,50	0
3	EDO	B	704	4/4	0.87	0.15	40,41,42,45	0
3	EDO	A	703	4/4	0.88	0.12	36,37,41,42	0
3	EDO	B	705	4/4	0.91	0.21	47,47,49,51	0
3	EDO	A	707	4/4	0.91	0.20	43,44,46,49	0
2	TPP	B	702	26/26	0.92	0.15	26,41,45,48	0
2	TPP	A	701	26/26	0.93	0.12	28,36,44,47	0
3	EDO	A	705	4/4	0.94	0.12	35,41,43,47	0
3	EDO	A	704	4/4	0.96	0.26	42,43,46,51	0
3	EDO	B	706	4/4	0.97	0.12	36,36,41,47	0
4	MG	B	708	1/1	0.97	0.19	23,23,23,23	0
4	MG	A	708	1/1	1.00	0.18	22,22,22,22	0
5	NI	A	709	1/1	1.00	0.04	33,33,33,33	0

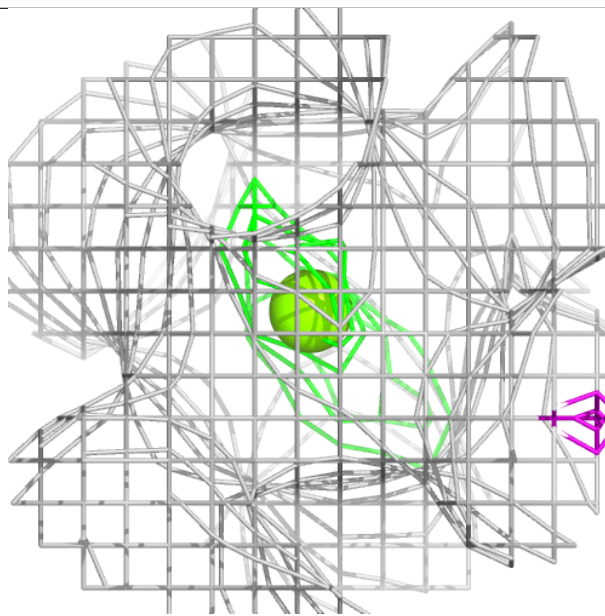
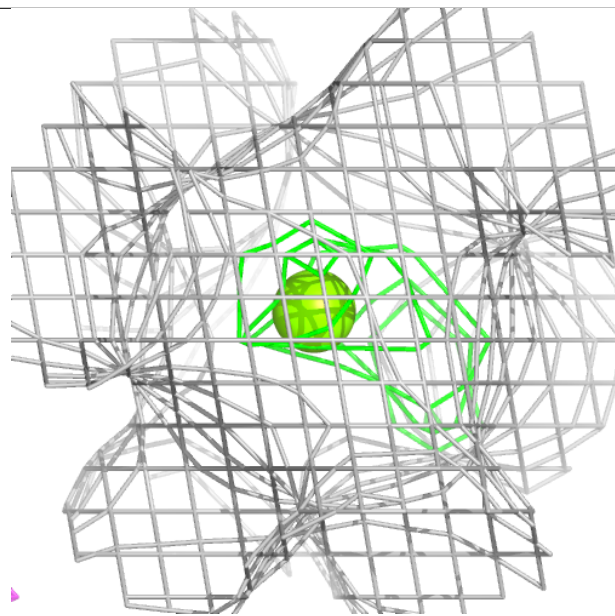
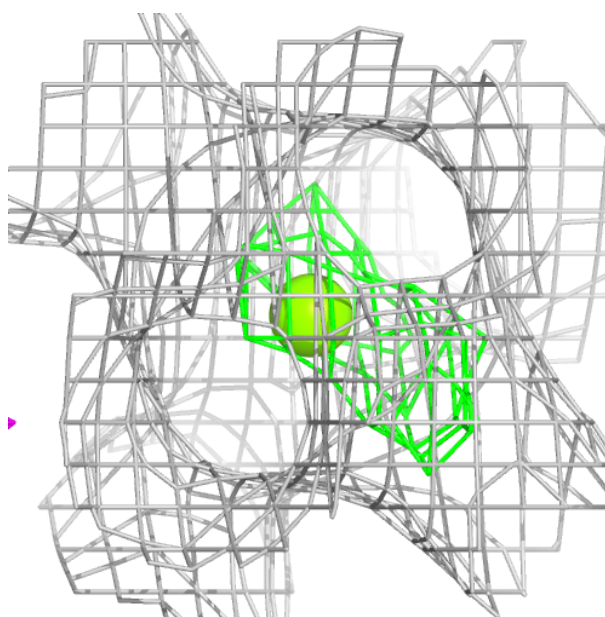
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

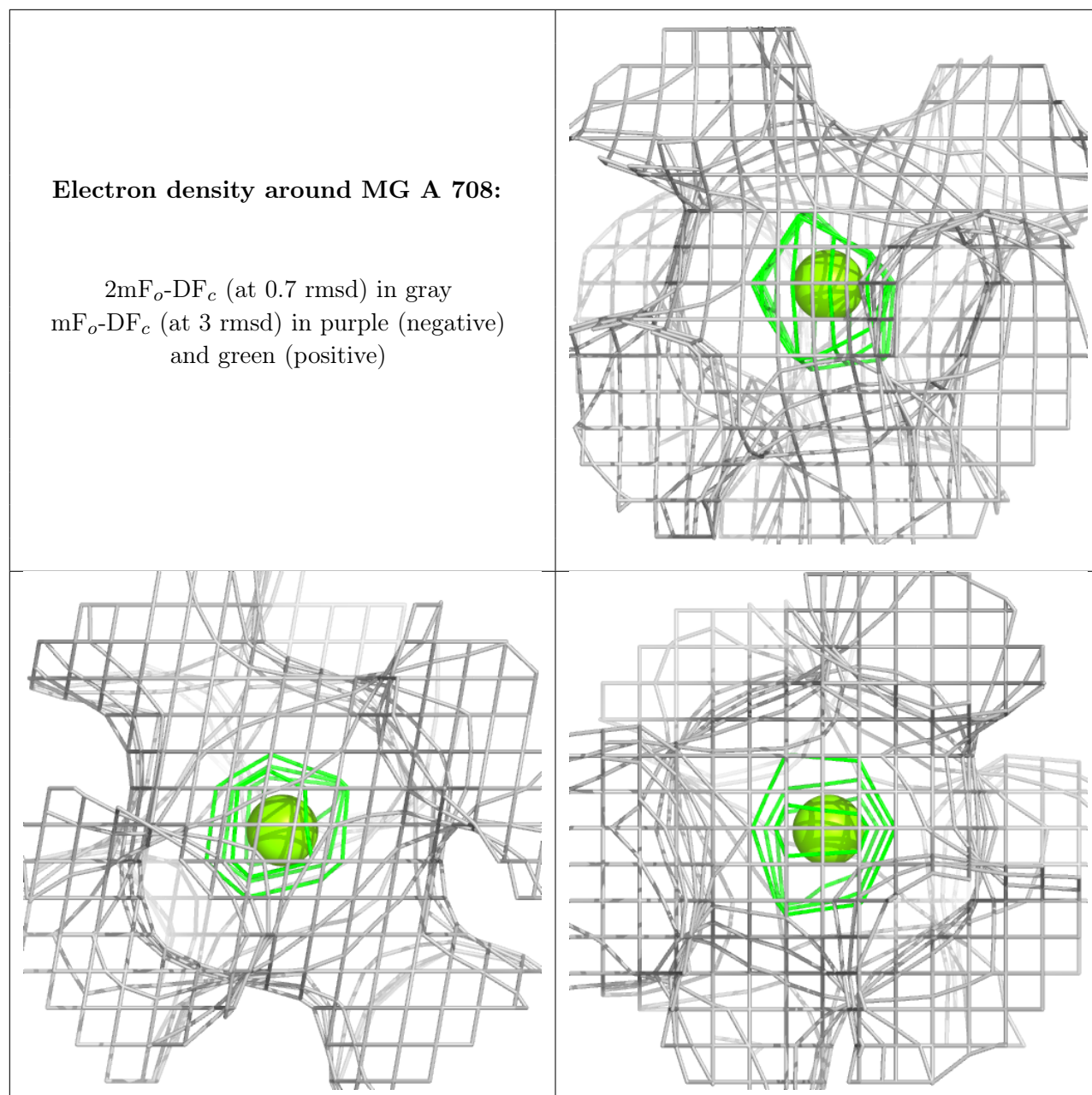




Electron density around MG B 708:

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





6.5 Other polymers ⓘ

There are no such residues in this entry.