



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2023 – 12:25 am GMT

PDB ID : 6YE6
Title : E.coli's Putrescine receptor PotF complexed with Agmatine
Authors : Shanmugaratnam, S.; Kroeger, P.; Hocker, B.
Deposited on : 2020-03-24
Resolution : 1.56 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 : 2.32.1
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) : 2.32.1

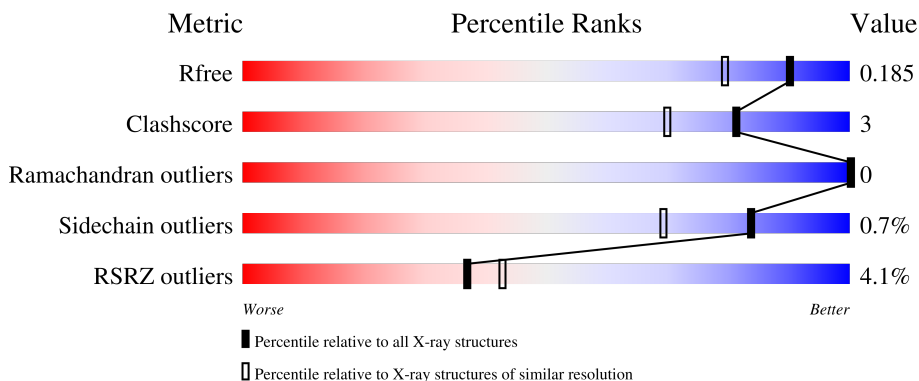
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.56 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	1483 (1.56-1.56)
Clashscore	141614	1529 (1.56-1.56)
Ramachandran outliers	138981	1498 (1.56-1.56)
Sidechain outliers	138945	1495 (1.56-1.56)
RSRZ outliers	127900	1465 (1.56-1.56)

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	352	 2% 90% 6%
1	B	352	 6% 93%

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
2	ONT	B	403[B]	X	-	-	-
3	JFN	A	402	X	-	-	-
3	JFN	A	404	X	-	-	-
3	JFN	A	405	X	-	-	-
3	JFN	A	407	X	-	-	-
3	JFN	A	408	X	-	-	-
3	JFN	A	410	X	-	-	-
3	JFN	B	404	X	-	-	-
3	JFN	B	406	X	-	-	-
3	JFN	B	407	X	-	-	X
3	JFN	B	408	X	-	-	-
3	JFN	B	409	X	-	-	-
3	JFN	B	410	X	-	-	X
3	JFN	B	411	X	-	-	-
6	SO4	B	414	-	-	-	X

2 Entry composition [i](#)

There are 8 unique types of molecules in this entry. The entry contains 11719 atoms, of which 5631 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.

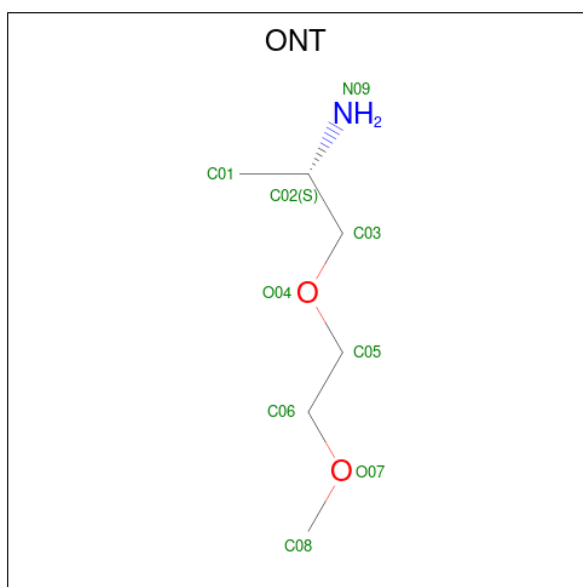
- Molecule 1 is a protein called Putrescine-binding periplasmic protein.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
1	A	341	5375	1739	2673	448	508	7	0	4	0
1	B	340	5345	1731	2654	444	509	7	0	3	0

There are 16 discrepancies between the modelled and reference sequences:

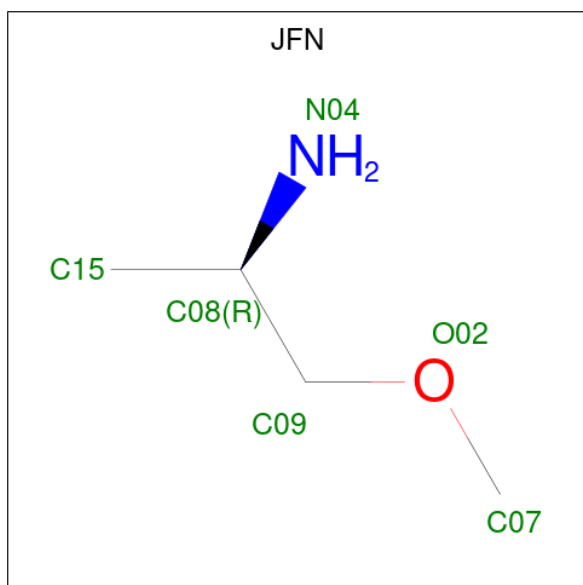
Chain	Residue	Modelled	Actual	Comment	Reference
A	371	LEU	-	expression tag	UNP P31133
A	372	GLU	-	expression tag	UNP P31133
A	373	HIS	-	expression tag	UNP P31133
A	374	HIS	-	expression tag	UNP P31133
A	375	HIS	-	expression tag	UNP P31133
A	376	HIS	-	expression tag	UNP P31133
A	377	HIS	-	expression tag	UNP P31133
A	378	HIS	-	expression tag	UNP P31133
B	371	LEU	-	expression tag	UNP P31133
B	372	GLU	-	expression tag	UNP P31133
B	373	HIS	-	expression tag	UNP P31133
B	374	HIS	-	expression tag	UNP P31133
B	375	HIS	-	expression tag	UNP P31133
B	376	HIS	-	expression tag	UNP P31133
B	377	HIS	-	expression tag	UNP P31133
B	378	HIS	-	expression tag	UNP P31133

- Molecule 2 is (2 {S})-1-(2-methoxyethoxy)propan-2-amine (three-letter code: ONT) (formula: C₆H₁₅NO₂).



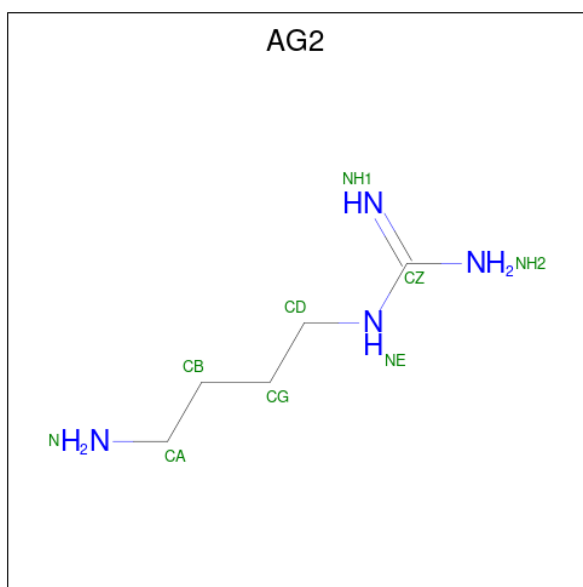
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
			Total	C	H	N	O			
2	A	1	Total	24	6	15	1	2	0	0
2	A	1	Total	48	12	30	2	4	0	1
2	B	1	Total	24	6	15	1	2	0	0
2	B	1	Total	48	12	30	2	4	0	1

- Molecule 3 is (2R)-1-methoxypropan-2-amine (three-letter code: JFN) (formula: C₄H₁₁NO).



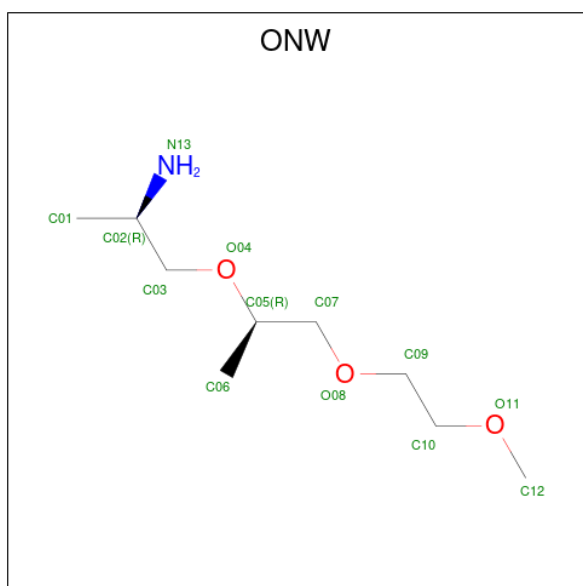
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	H	N	O	0	0
			17	4	11	1	1		
3	A	1	Total	C	H	N	O	0	0
			17	4	11	1	1		
3	A	1	Total	C	H	N	O	0	0
			17	4	11	1	1		
3	A	1	Total	C	H	N	O	0	0
			17	4	11	1	1		
3	A	1	Total	C	H	N	O	0	0
			17	4	11	1	1		
3	A	1	Total	C	H	N	O	0	0
			17	4	11	1	1		
3	B	1	Total	C	H	N	O	0	0
			17	4	11	1	1		
3	B	1	Total	C	H	N	O	0	0
			17	4	11	1	1		
3	B	1	Total	C	H	N	O	0	0
			17	4	11	1	1		
3	B	1	Total	C	H	N	O	0	0
			17	4	11	1	1		
3	B	1	Total	C	H	N	O	0	0
			17	4	11	1	1		
3	B	1	Total	C	H	N	O	0	0
			17	4	11	1	1		

- Molecule 4 is AGMATINE (three-letter code: AG2) (formula: C₅H₁₄N₄) (labeled as "Ligand of Interest" by depositor).



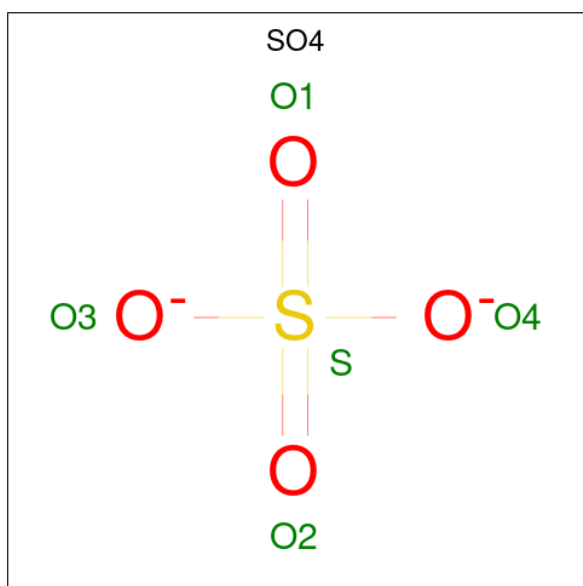
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	H	N		
4	A	1	23	5	14	4	0	0
4	B	1	23	5	14	4	0	0

- Molecule 5 is (2 {R})-1-[(2 {R})-1-(2-methoxyethoxy)propan-2-yl]oxypropan-2-amine (three-letter code: ONW) (formula: C₉H₂₁NO₃).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	H	N	O		
5	A	1	34	9	21	1	3	0	0

- Molecule 6 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



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

- Molecule 7 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	4	Total Cl 5 5	0	1
7	B	1	Total Cl 1 1	0	0

- Molecule 8 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	A	238	Total O 258 258	0	20
8	B	215	Total O 236 236	0	21

4 Data and refinement statistics

Property	Value	Source
Space group	P 32 2 1	Depositor
Cell constants a, b, c, α , β , γ	71.16Å 71.16Å 272.87Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	45.73 – 1.56 45.73 – 1.56	Depositor EDS
% Data completeness (in resolution range)	99.7 (45.73-1.56) 99.7 (45.73-1.56)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.06 (at 1.56Å)	Xtrriage
Refinement program	PHENIX 1.17.1-3660	Depositor
R, R_{free}	0.171 , 0.185 0.171 , 0.185	Depositor DCC
R_{free} test set	2099 reflections (1.82%)	wwPDB-VP
Wilson B-factor (Å ²)	28.5	Xtrriage
Anisotropy	0.085	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.42 , 57.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	0.018 for -h,-k,l	Xtrriage
F_o, F_c correlation	0.98	EDS
Total number of atoms	11719	wwPDB-VP
Average B, all atoms (Å ²)	43.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.47% 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: CL, JFN, AG2, ONT, ONW, SO4

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	0.52	0/2782	0.64	1/3785 (0.0%)
1	B	0.49	0/2768	0.63	0/3767
All	All	0.50	0/5550	0.63	1/7552 (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	91	ARG	NE-CZ-NH2	6.64	123.62	120.30

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	2702	2673	2680	15	0
1	B	2691	2654	2659	12	0
2	A	27	45	0	0	0
2	B	27	45	0	0	0
3	A	42	77	0	2	0
3	B	48	88	0	0	0
4	A	9	14	13	2	0
4	B	9	14	13	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	A	13	21	0	0	0
6	A	5	0	0	0	0
6	B	15	0	0	0	0
7	A	5	0	0	0	0
7	B	1	0	0	0	0
8	A	258	0	0	2	0
8	B	236	0	0	6	0
All	All	6088	5631	5365	28	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 (28) 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:B:52[A]:GLU:OE2	8:B:501[A]:HOH:O	2.03	0.75
1:B:85[A]:SER:HB3	4:B:402:AG2:NH1	2.20	0.56
1:A:30:LYS:HD2	1:A:291:GLU:OE2	2.07	0.55
1:A:212:ASP:O	1:A:216:LYS:HD3	2.07	0.54
1:A:106:LEU:HA	1:A:297:ASN:OD1	2.08	0.54
1:A:113:ASP:OD2	3:A:404:JFN:C07	2.58	0.52
1:A:212:ASP:O	1:A:216:LYS:CD	2.58	0.51
1:A:222[B]:ARG:HG2	8:A:559:HOH:O	2.11	0.51
1:B:352:ASP:OD1	8:B:502:HOH:O	2.20	0.50
3:A:404:JFN:C07	8:A:513:HOH:O	2.59	0.50
1:B:36:ASN:O	1:B:61:VAL:HA	2.12	0.49
1:A:85[A]:SER:HB3	4:A:403:AG2:NH1	2.29	0.47
1:B:212:ASP:O	1:B:216:LYS:CD	2.63	0.47
1:A:324:LEU:HD12	1:A:324:LEU:N	2.30	0.46
1:A:36:ASN:O	1:A:61:VAL:HA	2.15	0.45
1:B:85[A]:SER:HG	1:B:88:PHE:HD1	1.63	0.45
1:A:31:THR:HG22	1:A:32:LEU:N	2.31	0.45
1:B:174:SER:HA	8:B:691[B]:HOH:O	2.18	0.43
1:A:216:LYS:N	1:A:216:LYS:HD2	2.33	0.43
1:B:212:ASP:O	1:B:216:LYS:HD2	2.19	0.42
1:A:85[A]:SER:CB	4:A:403:AG2:NH1	2.82	0.42
1:B:174:SER:CA	8:B:691[B]:HOH:O	2.68	0.41
1:B:263:ASN:HA	8:B:513[B]:HOH:O	2.20	0.41
1:B:106:LEU:HA	1:B:297:ASN:OD1	2.21	0.41
1:A:169:LEU:HD11	1:A:177:VAL:HG11	2.03	0.40
1:A:183:PRO:HB3	1:A:363:TRP:CG	2.56	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:218:ARG:HG2	1:A:369:GLY:HA3	2.03	0.40
1:B:52[A]:GLU:HG3	8:B:583:HOH:O	2.21	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	343/352 (97%)	337 (98%)	6 (2%)	0	100	100
1	B	341/352 (97%)	335 (98%)	6 (2%)	0	100	100
All	All	684/704 (97%)	672 (98%)	12 (2%)	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	292/298 (98%)	289 (99%)	3 (1%)	76	57
1	B	291/298 (98%)	290 (100%)	1 (0%)	92	85
All	All	583/596 (98%)	579 (99%)	4 (1%)	84	69

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	40	TYR
1	A	202	LYS
1	A	297	ASN
1	B	40	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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 34 ligands modelled in this entry, 6 are monoatomic - leaving 28 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
4	AG2	B	402	-	8,8,8	3.40	2 (25%)	7,8,8	0.93	1 (14%)
3	JFN	B	407	-	5,5,5	2.23	2 (40%)	5,5,5	0.43	0
2	ONT	A	406[B]	-	8,8,8	1.82	2 (25%)	8,8,8	0.34	0
6	SO4	B	413	-	4,4,4	0.13	0	6,6,6	0.20	0
3	JFN	A	410	-	5,5,5	1.85	1 (20%)	5,5,5	0.43	0
5	ONW	A	411	-	11,12,12	1.46	2 (18%)	11,13,13	0.83	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	AG2	A	403	-	8,8,8	3.97	2 (25%)	7,8,8	1.24	1 (14%)
3	JFN	A	404	-	5,5,5	1.97	1 (20%)	5,5,5	0.73	0
3	JFN	B	410	-	5,5,5	1.85	1 (20%)	5,5,5	0.58	0
3	JFN	A	408	-	5,5,5	1.55	1 (20%)	5,5,5	0.76	0
3	JFN	B	409	-	5,5,5	1.73	1 (20%)	5,5,5	0.28	0
3	JFN	B	408	-	5,5,5	1.80	1 (20%)	5,5,5	0.59	0
2	ONT	A	401	-	8,8,8	1.55	2 (25%)	8,8,8	0.67	0
2	ONT	B	403[A]	-	8,8,8	2.40	3 (37%)	8,8,8	0.48	0
6	SO4	A	412	-	4,4,4	0.17	0	6,6,6	0.33	0
6	SO4	B	412	-	4,4,4	0.14	0	6,6,6	0.23	0
6	SO4	B	414	-	4,4,4	0.15	0	6,6,6	0.13	0
3	JFN	B	411	-	5,5,5	1.66	1 (20%)	5,5,5	0.56	0
3	JFN	A	405	-	5,5,5	2.02	1 (20%)	5,5,5	0.47	0
3	JFN	A	402	-	5,5,5	2.88	1 (20%)	5,5,5	0.54	0
3	JFN	A	407	-	5,5,5	2.12	2 (40%)	5,5,5	0.29	0
2	ONT	A	406[A]	-	8,8,8	1.77	1 (12%)	8,8,8	0.35	0
3	JFN	A	409	-	5,5,5	1.59	1 (20%)	5,5,5	0.48	0
3	JFN	B	405	-	5,5,5	1.48	1 (20%)	5,5,5	0.47	0
3	JFN	B	404	-	5,5,5	2.01	1 (20%)	5,5,5	0.44	0
3	JFN	B	406	-	5,5,5	2.07	2 (40%)	5,5,5	0.55	0
2	ONT	B	403[B]	-	8,8,8	1.66	2 (25%)	8,8,8	0.29	0
2	ONT	B	401	-	8,8,8	1.74	2 (25%)	8,8,8	0.95	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
4	AG2	B	402	-	-	0/6/6/6	-
3	JFN	B	407	-	1/1/1/1	1/3/3/3	-
2	ONT	A	406[B]	-	-	2/6/6/6	-
3	JFN	A	410	-	1/1/1/1	2/3/3/3	-
5	ONW	A	411	-	-	5/11/11/11	-
4	AG2	A	403	-	-	0/6/6/6	-
3	JFN	A	404	-	1/1/1/1	2/3/3/3	-
3	JFN	B	410	-	1/1/1/1	3/3/3/3	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	JFN	A	408	-	1/1/1/1	3/3/3/3	-
3	JFN	B	409	-	1/1/1/1	2/3/3/3	-
3	JFN	B	408	-	1/1/1/1	2/3/3/3	-
2	ONT	A	401	-	-	2/6/6/6	-
2	ONT	B	403[A]	-	-	4/6/6/6	-
3	JFN	B	411	-	1/1/1/1	0/3/3/3	-
3	JFN	A	405	-	1/1/1/1	3/3/3/3	-
3	JFN	A	402	-	1/1/1/1	2/3/3/3	-
2	ONT	A	406[A]	-	-	3/6/6/6	-
3	JFN	A	407	-	1/1/1/1	2/3/3/3	-
3	JFN	A	409	-	-	3/3/3/3	-
3	JFN	B	405	-	-	0/3/3/3	-
3	JFN	B	404	-	1/1/1/1	0/3/3/3	-
3	JFN	B	406	-	1/1/1/1	2/3/3/3	-
2	ONT	B	403[B]	-	1/1/1/1	2/6/6/6	-
2	ONT	B	401	-	-	4/6/6/6	-

All (36) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	403	AG2	CZ-NE	10.02	1.53	1.33
4	B	402	AG2	CZ-NE	8.28	1.49	1.33
3	A	402	JFN	C09-C08	6.06	1.64	1.51
2	B	403[A]	ONT	C03-C02	5.31	1.63	1.51
4	A	403	AG2	CZ-NH1	4.72	1.51	1.32
4	B	402	AG2	CZ-NH1	4.56	1.50	1.32
2	A	406[A]	ONT	C03-C02	4.37	1.61	1.51
3	B	407	JFN	C09-C08	4.28	1.61	1.51
2	A	406[B]	ONT	C03-C02	4.23	1.60	1.51
3	B	404	JFN	C09-C08	3.96	1.60	1.51
2	B	401	ONT	C03-C02	3.96	1.60	1.51
3	B	406	JFN	C09-C08	3.95	1.60	1.51
3	A	407	JFN	C09-C08	3.86	1.60	1.51
3	A	405	JFN	C09-C08	3.72	1.59	1.51
3	A	404	JFN	C09-C08	3.72	1.59	1.51
5	A	411	ONW	C07-C05	3.56	1.59	1.50
2	B	403[B]	ONT	C03-C02	3.52	1.59	1.51
3	B	410	JFN	C09-C08	3.38	1.59	1.51
3	A	410	JFN	C09-C08	3.36	1.59	1.51

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	401	ONT	C03-C02	3.28	1.58	1.51
3	B	409	JFN	C09-C08	3.23	1.58	1.51
3	B	408	JFN	C09-C08	3.17	1.58	1.51
3	B	411	JFN	C09-C08	2.84	1.57	1.51
2	B	403[A]	ONT	C06-C05	2.73	1.63	1.49
5	A	411	ONW	C03-C02	2.72	1.57	1.51
3	A	409	JFN	C09-C08	2.65	1.57	1.51
3	B	405	JFN	C09-C08	2.59	1.57	1.51
2	A	401	ONT	C06-C05	2.44	1.61	1.49
2	B	403[B]	ONT	C06-C05	2.36	1.61	1.49
3	A	408	JFN	C09-C08	2.36	1.56	1.51
2	B	403[A]	ONT	O04-C03	2.33	1.48	1.42
2	B	401	ONT	C06-C05	2.21	1.60	1.49
2	A	406[B]	ONT	C06-C05	2.04	1.59	1.49
3	B	406	JFN	O02-C09	2.02	1.49	1.41
3	A	407	JFN	O02-C09	2.01	1.49	1.41
3	B	407	JFN	O02-C09	2.01	1.49	1.41

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	403	AG2	NH2-CZ-NE	2.53	125.03	119.19
2	B	401	ONT	O04-C03-C02	2.26	113.45	108.95
4	B	402	AG2	NE-CZ-NH1	-2.05	117.09	120.70

All (14) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
2	B	403[B]	ONT	C02
3	A	402	JFN	C08
3	A	404	JFN	C08
3	A	405	JFN	C08
3	A	407	JFN	C08
3	A	408	JFN	C08
3	A	410	JFN	C08
3	B	404	JFN	C08
3	B	406	JFN	C08
3	B	407	JFN	C08
3	B	408	JFN	C08
3	B	409	JFN	C08
3	B	410	JFN	C08
3	B	411	JFN	C08

All (49) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	406[B]	ONT	N09-C02-C03-O04
2	B	403[A]	ONT	C01-C02-C03-O04
2	B	403[A]	ONT	N09-C02-C03-O04
3	A	402	JFN	N04-C08-C09-O02
3	A	404	JFN	C15-C08-C09-O02
3	A	404	JFN	N04-C08-C09-O02
3	A	405	JFN	C15-C08-C09-O02
3	A	405	JFN	N04-C08-C09-O02
3	A	407	JFN	C15-C08-C09-O02
3	A	407	JFN	N04-C08-C09-O02
3	A	408	JFN	C15-C08-C09-O02
3	A	408	JFN	N04-C08-C09-O02
3	A	409	JFN	C15-C08-C09-O02
3	A	409	JFN	N04-C08-C09-O02
3	A	410	JFN	C15-C08-C09-O02
3	A	410	JFN	N04-C08-C09-O02
3	B	406	JFN	C15-C08-C09-O02
3	B	406	JFN	N04-C08-C09-O02
3	B	408	JFN	C15-C08-C09-O02
3	B	408	JFN	N04-C08-C09-O02
3	B	409	JFN	C15-C08-C09-O02
3	B	409	JFN	N04-C08-C09-O02
3	B	410	JFN	C15-C08-C09-O02
3	B	410	JFN	N04-C08-C09-O02
5	A	411	ONW	C01-C02-C03-O04
5	A	411	ONW	N13-C02-C03-O04
2	B	403[A]	ONT	C06-C05-O04-C03
5	A	411	ONW	O08-C09-C10-O11
2	B	401	ONT	C02-C03-O04-C05
2	A	406[A]	ONT	O04-C05-C06-O07
3	A	408	JFN	C08-C09-O02-C07
3	A	402	JFN	C08-C09-O02-C07
3	B	407	JFN	C08-C09-O02-C07
2	B	403[B]	ONT	C06-C05-O04-C03
3	A	405	JFN	C08-C09-O02-C07
3	A	409	JFN	C08-C09-O02-C07
2	A	401	ONT	O04-C05-C06-O07
2	A	406[A]	ONT	C05-C06-O07-C08
2	B	401	ONT	O04-C05-C06-O07
2	B	403[A]	ONT	O04-C05-C06-O07
2	A	406[A]	ONT	C06-C05-O04-C03
5	A	411	ONW	C10-C09-O08-C07

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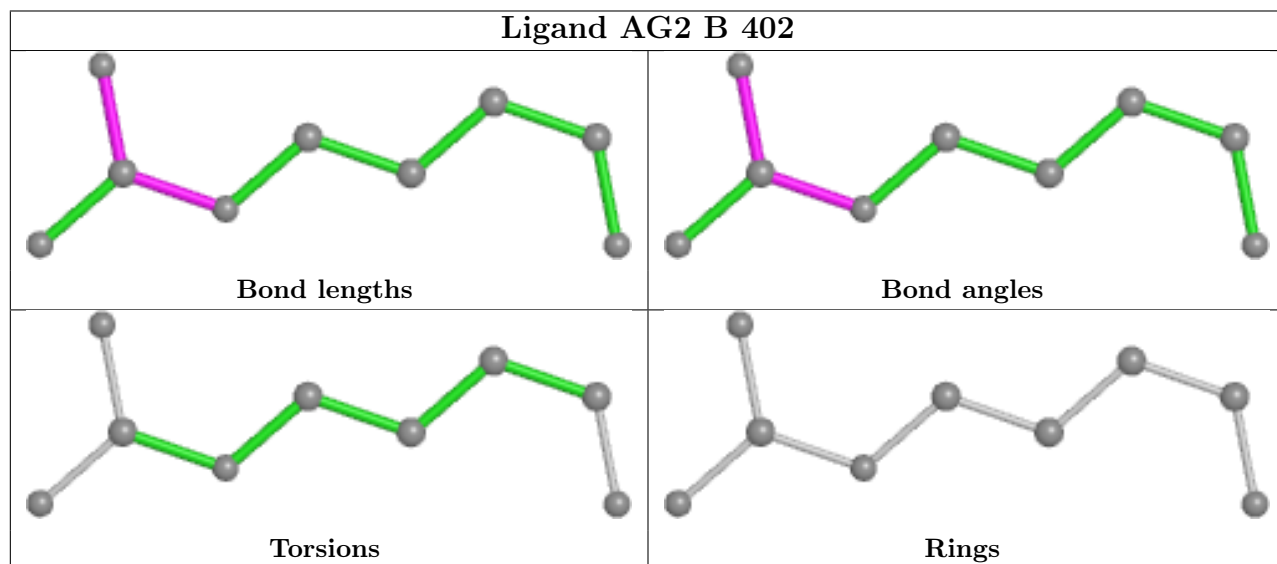
Mol	Chain	Res	Type	Atoms
2	A	401	ONT	C05-C06-O07-C08
2	B	403[B]	ONT	C05-C06-O07-C08
2	A	406[B]	ONT	C06-C05-O04-C03
5	A	411	ONW	C06-C05-O04-C03
2	B	401	ONT	N09-C02-C03-O04
2	B	401	ONT	C05-C06-O07-C08
3	B	410	JFN	C08-C09-O02-C07

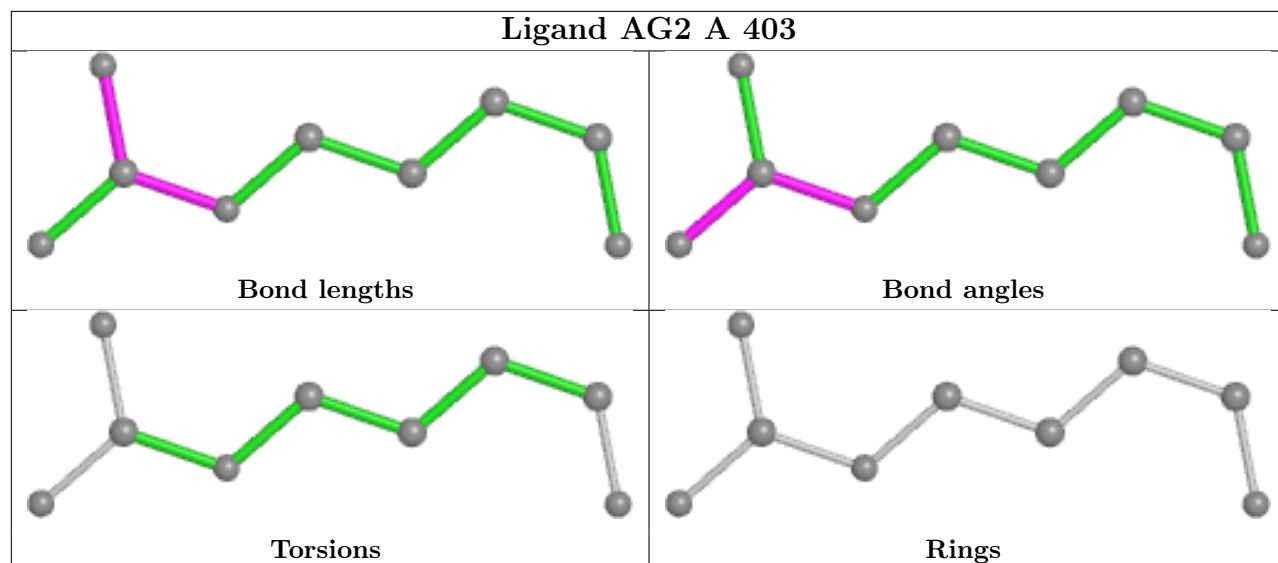
There are no ring outliers.

3 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	402	AG2	1	0
4	A	403	AG2	2	0
3	A	404	JFN	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 [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 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	341/352 (96%)	-0.05	8 (2%) 60 66	24, 34, 54, 69	0
1	B	340/352 (96%)	0.21	20 (5%) 22 26	24, 36, 58, 75	0
All	All	681/704 (96%)	0.08	28 (4%) 37 43	24, 35, 55, 75	0

All (28) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	175	CYS	4.2
1	A	106	LEU	4.2
1	B	29	GLN	3.9
1	A	29	GLN	3.4
1	B	174	SER	3.3
1	B	202	LYS	3.2
1	A	31	THR	3.2
1	A	30	LYS	3.1
1	B	30	LYS	3.0
1	B	204	ASP	3.0
1	B	256	LYS	2.9
1	B	352	ASP	2.7
1	B	259	LYS	2.6
1	B	148	LYS	2.6
1	A	55	ILE	2.6
1	B	216	LYS	2.5
1	B	354	LYS	2.5
1	B	74	ALA	2.4
1	A	287	LYS	2.3
1	B	82	VAL	2.3
1	A	107	PRO	2.3
1	B	97	VAL	2.2
1	B	172	LEU	2.2
1	B	203	ALA	2.1

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Mol	Chain	Res	Type	RSRZ
1	B	96	GLY	2.1
1	B	215	LEU	2.1
1	A	174	SER	2.0
1	B	75	GLY	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 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.

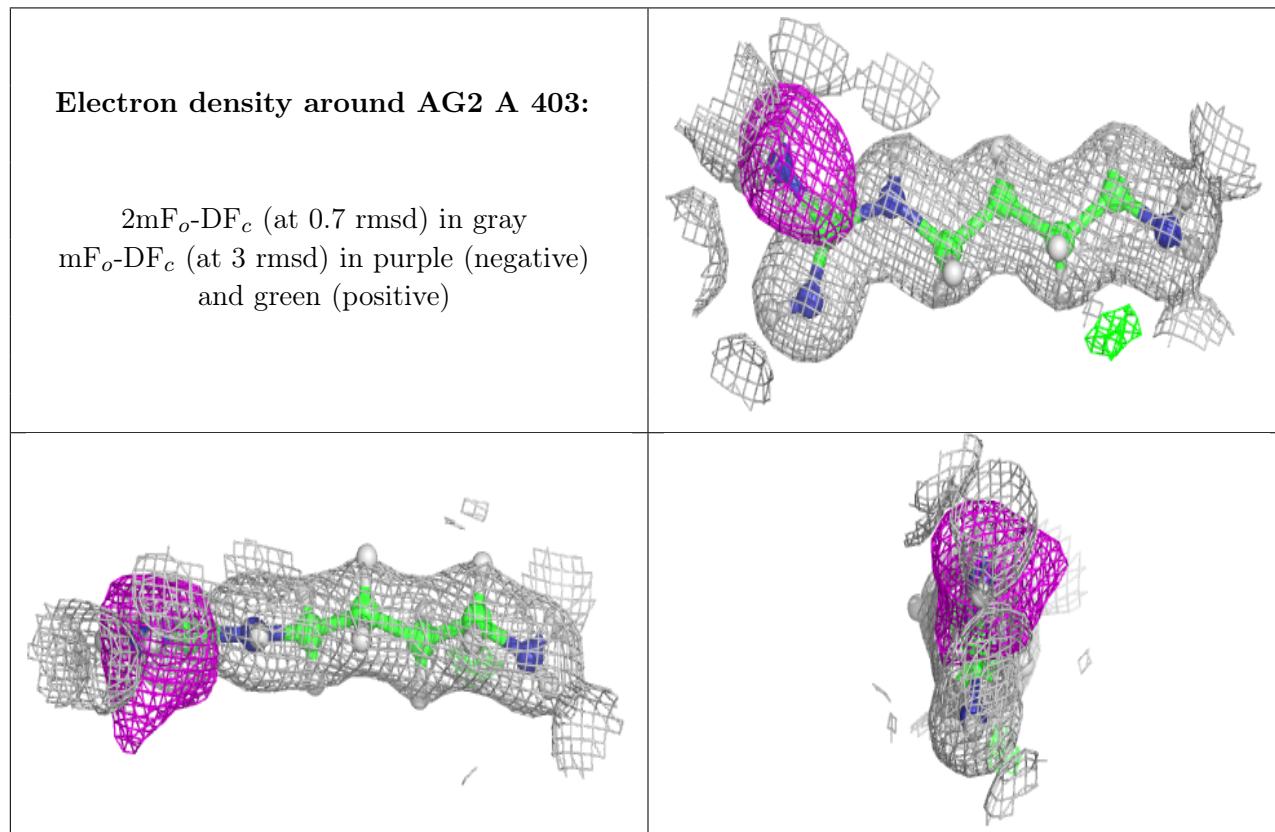
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
5	ONW	A	411	13/13	0.09	0.26	69,88,94,95	0
3	JFN	B	407	6/6	0.40	0.53	75,91,95,95	0
2	ONT	B	403[A]	9/9	0.42	0.25	43,51,56,58	24
2	ONT	B	403[B]	9/9	0.42	0.25	38,47,55,57	24
2	ONT	A	406[A]	9/9	0.44	0.25	37,52,62,62	24
2	ONT	A	406[B]	9/9	0.44	0.25	42,52,62,62	24
7	CL	B	415	1/1	0.44	0.30	101,101,101,101	0
3	JFN	B	409	6/6	0.46	0.33	61,74,79,79	0
3	JFN	B	404	6/6	0.58	0.26	70,84,101,101	0
3	JFN	A	402	6/6	0.67	0.27	43,65,87,87	0
3	JFN	A	409	6/6	0.68	0.25	63,75,89,89	0
3	JFN	A	407	6/6	0.69	0.26	62,76,91,91	0
3	JFN	B	408	6/6	0.71	0.21	80,96,98,98	0
3	JFN	B	410	6/6	0.71	0.48	67,83,101,101	0
6	SO4	B	414	5/5	0.72	0.47	117,117,117,118	0
3	JFN	B	411	6/6	0.74	0.20	61,73,77,77	0
3	JFN	A	404	6/6	0.75	0.23	67,81,83,83	0
3	JFN	B	406	6/6	0.76	0.17	68,82,83,83	0
2	ONT	A	401	9/9	0.78	0.15	55,68,88,88	0

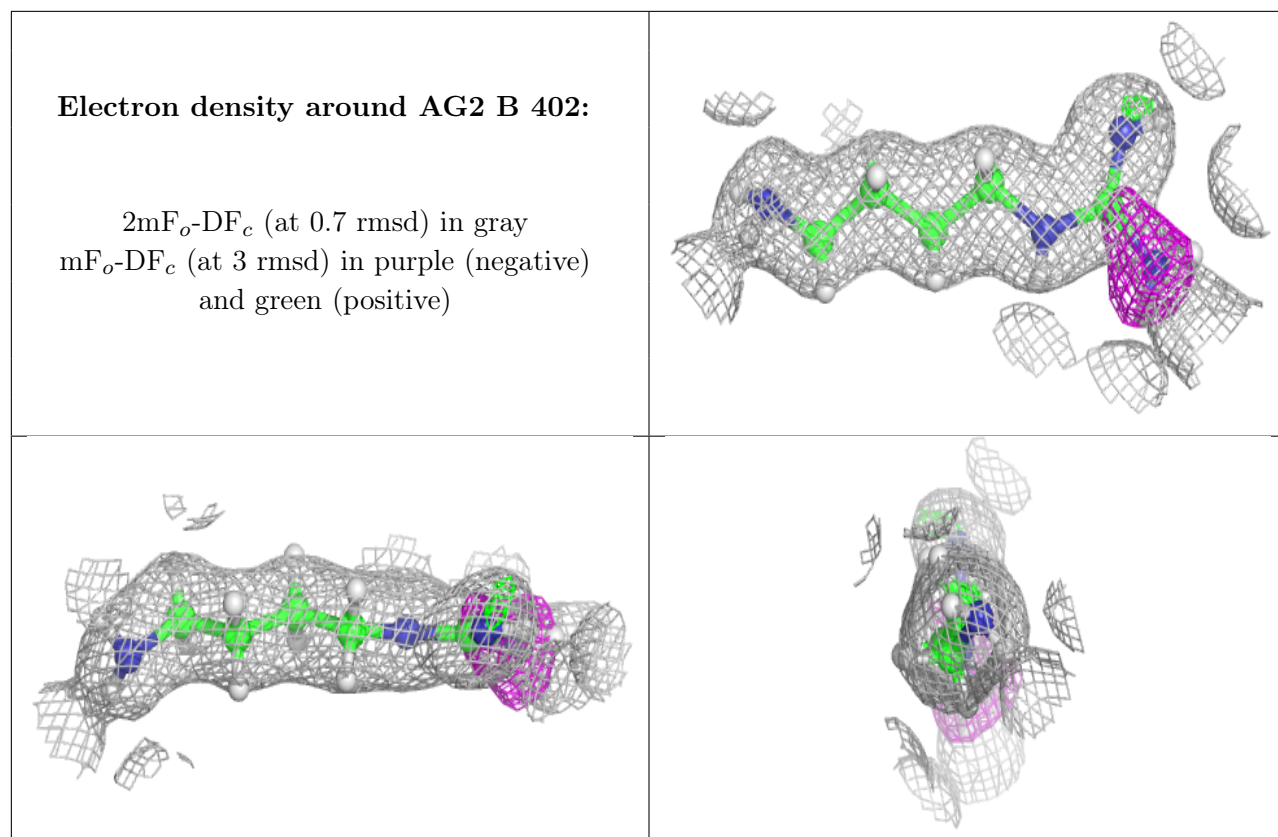
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	AG2	A	403	9/9	0.79	0.16	23,28,42,50	0
3	JFN	A	410	6/6	0.82	0.14	54,65,77,77	0
3	JFN	B	405	6/6	0.82	0.12	56,68,73,73	0
4	AG2	B	402	9/9	0.83	0.16	25,31,42,51	0
7	CL	A	413	1/1	0.83	0.05	67,67,67,67	0
7	CL	A	416	1/1	0.83	0.07	73,73,73,73	0
3	JFN	A	405	6/6	0.83	0.15	51,69,85,85	0
7	CL	A	415	1/1	0.85	0.07	89,89,89,89	0
6	SO4	B	413	5/5	0.87	0.18	97,99,102,103	0
2	ONT	B	401	9/9	0.88	0.14	49,63,76,76	0
7	CL	A	414[A]	1/1	0.88	0.26	58,58,58,58	1
7	CL	A	414[B]	1/1	0.88	0.26	58,58,58,58	1
3	JFN	A	408	6/6	0.93	0.15	50,62,78,78	0
6	SO4	B	412	5/5	0.93	0.26	92,94,94,95	0
6	SO4	A	412	5/5	0.95	0.10	60,61,64,65	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.





6.5 Other polymers [i](#)

There are no such residues in this entry.