



Full wwPDB X-ray Structure Validation Report ⓘ

Nov 21, 2023 – 02:30 AM JST

PDB ID : 7EHN
Title : Human MTHFD2 in complex with compound 21 and 9
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Deposited on : 2021-03-30
Resolution : 2.25 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 : 1.8.5 (274361), 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

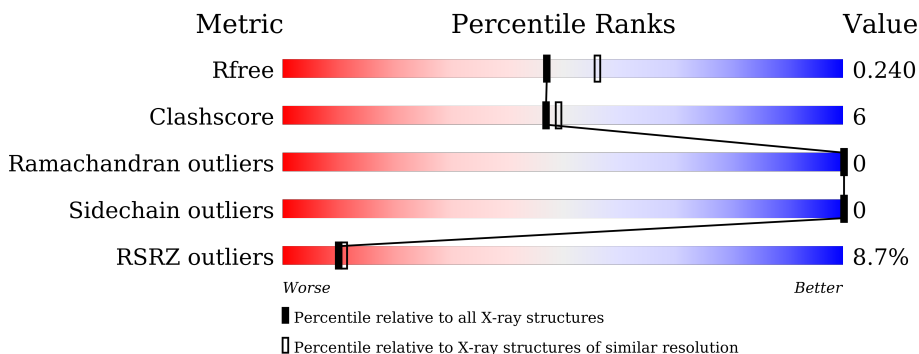
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.25 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	1377 (2.26-2.26)
Clashscore	141614	1487 (2.26-2.26)
Ramachandran outliers	138981	1449 (2.26-2.26)
Sidechain outliers	138945	1450 (2.26-2.26)
RSRZ outliers	127900	1356 (2.26-2.26)

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	315	
1	B	315	

2 Entry composition [i](#)

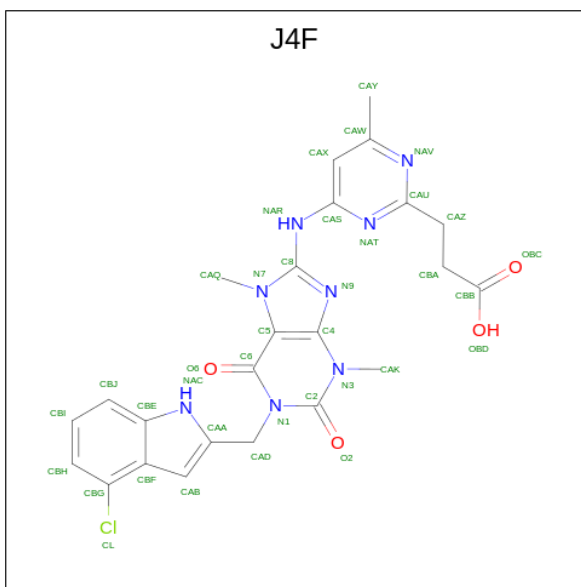
There are 4 unique types of molecules in this entry. The entry contains 4478 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Bifunctional methylenetetrahydrofolate dehydrogenase/cyclohydrolase, mitochondrial.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	282	Total	C	N	O	S	0	0	0
			2102	1327	371	393	11			
1	B	284	Total	C	N	O	S	0	0	0
			2120	1339	379	391	11			

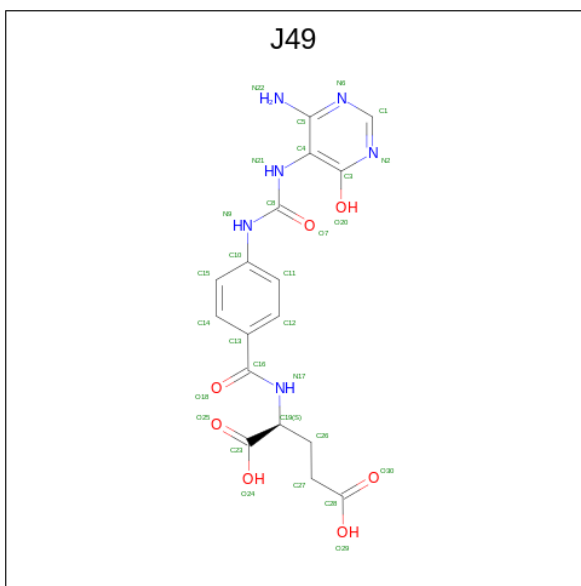
- Molecule 2 is 3-[4-[[1-[(4-chloranyl-1H-indol-2-yl)methyl]-3,7-dimethyl-2,6-bis(oxidanylidene)purin-8-yl]amino]-6-methyl-pyrimidin-2-yl]propanoic acid (three-letter code: J4F) (formula: C₂₄H₂₃ClN₈O₄) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
			Total	C	Cl	N			O
2	A	1	Total	C	Cl	N	O	0	0
			37	24	1	8	4		
2	B	1	Total	C	Cl	N	O	0	0
			37	24	1	8	4		

- Molecule 3 is (2S)-2-[[4-[(4-azanyl-6-oxidanyl-pyrimidin-5-yl)carbamoylamino]phenyl]carbo

nylamino]pentanedioic acid (three-letter code: J49) (formula: C₁₇H₁₈N₆O₇).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	
			Total	C	N			O
3	A	1	30	17	6	7	0	0
3	B	1	30	17	6	7	0	0

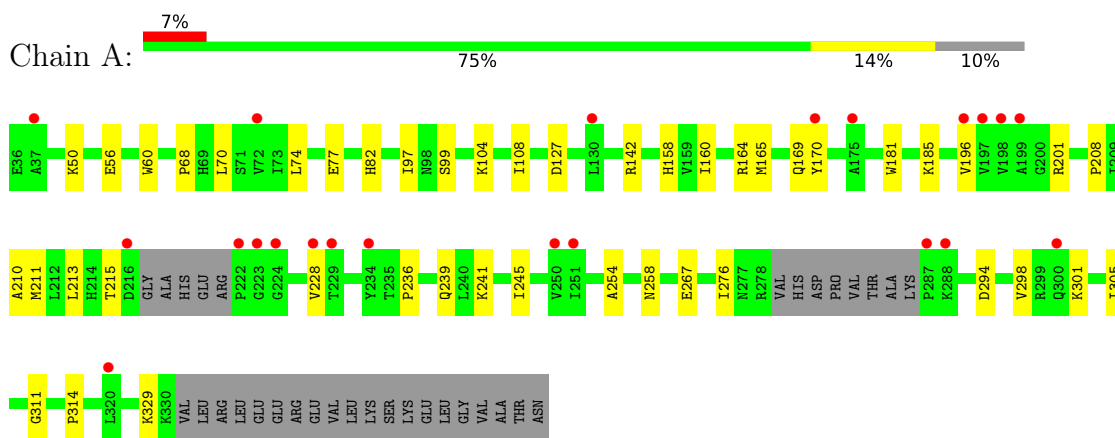
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
4	A	64	64	64	0	0
4	B	58	58	58	0	0

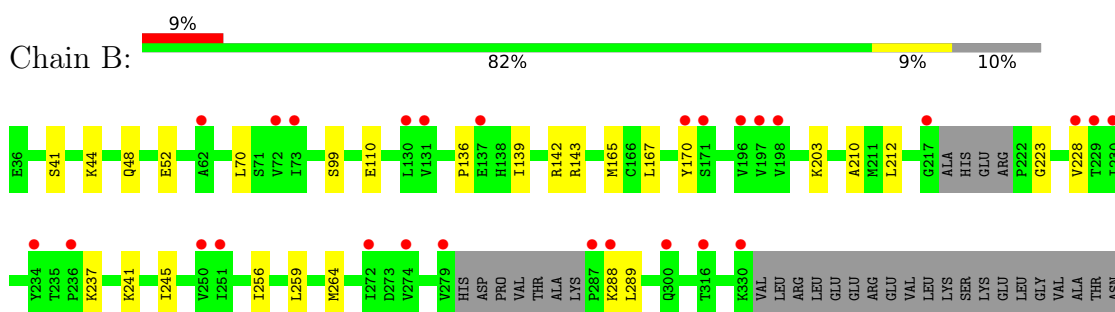
3 Residue-property plots [i](#)

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: Bifunctional methylenetetrahydrofolate dehydrogenase/cyclohydrolase, mitochondrial



- Molecule 1: Bifunctional methylenetetrahydrofolate dehydrogenase/cyclohydrolase, mitochondrial



4 Data and refinement statistics i

Property	Value	Source
Space group	P 65	Depositor
Cell constants a, b, c, α , β , γ	113.17Å 113.17Å 113.67Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	25.39 – 2.25 25.39 – 2.25	Depositor EDS
% Data completeness (in resolution range)	97.5 (25.39-2.25) 97.5 (25.39-2.25)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.25 (at 2.26Å)	Xtrriage
Refinement program	PHENIX 1.18.2_3874	Depositor
R, R_{free}	0.201 , 0.240 0.201 , 0.240	Depositor DCC
R_{free} test set	1987 reflections (5.22%)	wwPDB-VP
Wilson B-factor (Å ²)	46.7	Xtrriage
Anisotropy	0.355	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 47.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.043 for h,-h-k,-l	Xtrriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	4478	wwPDB-VP
Average B, all atoms (Å ²)	51.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.24% 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: J4F, J49

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	0.45	0/2135	0.63	0/2900
1	B	0.43	0/2152	0.61	0/2920
All	All	0.44	0/4287	0.62	0/5820

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	2102	0	2152	34	0
1	B	2120	0	2198	24	0
2	A	37	0	0	1	0
2	B	37	0	0	0	0
3	A	30	0	0	0	0
3	B	30	0	0	0	0
4	A	64	0	0	1	0
4	B	58	0	0	0	0
All	All	4478	0	4350	54	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 6.

All (54) 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:256:ILE:HD11	1:B:259:LEU:HD13	1.69	0.75
1:B:41:SER:HB3	1:B:44:LYS:HG2	1.70	0.74
1:B:41:SER:H	1:B:44:LYS:HZ3	1.38	0.72
1:A:236:PRO:HD2	1:A:239:GLN:HB2	1.75	0.68
1:B:210:ALA:HB1	1:B:228:VAL:HG11	1.77	0.66
1:A:201:ARG:HD2	1:A:254:ALA:O	1.97	0.64
1:B:241:LYS:O	1:B:245:ILE:HG12	1.97	0.63
1:B:41:SER:H	1:B:44:LYS:NZ	1.97	0.62
1:A:169:GLN:OE1	1:B:142:ARG:HD2	2.02	0.60
1:A:241:LYS:O	1:A:245:ILE:HG12	2.05	0.57
1:A:165:MET:HA	1:A:170:TYR:HD1	1.70	0.57
1:B:136:PRO:HD2	1:B:139:ILE:HD12	1.89	0.55
1:B:288:LYS:HD2	1:B:289:LEU:H	1.71	0.55
1:B:110:GLU:OE2	1:B:143:ARG:HD2	2.06	0.54
1:B:110:GLU:OE2	1:B:143:ARG:NH2	2.40	0.54
1:A:181:TRP:CH2	1:A:185:LYS:HD2	2.42	0.54
1:B:212:LEU:O	1:B:223:GLY:HA2	2.07	0.53
1:A:211:MET:O	1:A:215:THR:OG1	2.21	0.53
1:A:210:ALA:HB1	1:A:228:VAL:HG11	1.92	0.51
1:B:48:GLN:NE2	1:B:52:GLU:OE1	2.42	0.51
1:B:210:ALA:CB	1:B:228:VAL:HG11	2.40	0.51
1:A:77:GLU:HA	1:A:82:HIS:CE1	2.47	0.49
1:A:142:ARG:CZ	1:B:167:LEU:HD13	2.43	0.49
1:A:165:MET:HA	1:A:170:TYR:CD1	2.47	0.49
1:A:267:GLU:HA	1:A:301:LYS:HG2	1.95	0.49
1:A:56:GLU:OE1	1:A:329:LYS:NZ	2.44	0.48
1:A:276:ILE:HG13	1:A:276:ILE:O	2.13	0.48
1:A:68:PRO:HB2	1:A:97:ILE:HG12	1.96	0.47
1:B:256:ILE:HG13	1:B:259:LEU:HB2	1.97	0.47
1:A:294:ASP:O	1:A:298:VAL:HG22	2.14	0.47
1:B:237:LYS:HG2	1:B:264:MET:HE1	1.97	0.47
1:A:201:ARG:HB2	1:A:254:ALA:HA	1.96	0.47
1:B:256:ILE:CG1	1:B:259:LEU:HB2	2.44	0.47
1:A:215:THR:HG23	1:B:203:LYS:HZ3	1.79	0.46
1:A:50:LYS:HE2	4:A:546:HOH:O	2.15	0.46
1:A:68:PRO:HA	1:A:127:ASP:OD2	2.16	0.46
1:A:311:GLY:O	1:A:314:PRO:HD2	2.16	0.45
1:A:160:ILE:O	1:A:164:ARG:HG3	2.17	0.45
1:B:70:LEU:O	1:B:99:SER:HA	2.17	0.44
1:B:237:LYS:HG2	1:B:264:MET:CE	2.48	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:104:LYS:HE2	1:A:108:ILE:HD12	2.00	0.44
1:A:258:ASN:OD1	1:A:294:ASP:HB2	2.19	0.43
1:A:70:LEU:O	1:A:99:SER:HA	2.18	0.43
1:A:158:HIS:ND1	1:A:160:ILE:HG22	2.34	0.43
1:A:208:PRO:HG3	2:A:401:J4F:CAB	2.50	0.42
1:A:215:THR:HG23	1:B:203:LYS:NZ	2.34	0.42
1:A:108:ILE:HD13	1:A:108:ILE:HG21	1.86	0.42
1:A:196:VAL:HG11	1:A:213:LEU:HD22	2.02	0.42
1:B:41:SER:O	1:B:44:LYS:HG2	2.19	0.42
1:A:196:VAL:HG11	1:A:213:LEU:CD2	2.51	0.41
1:B:165:MET:HA	1:B:170:TYR:HD1	1.86	0.41
1:A:60:TRP:CZ3	1:A:329:LYS:HG2	2.56	0.40
1:A:74:LEU:HD21	1:A:82:HIS:CD2	2.56	0.40
1:A:298:VAL:HG23	1:A:305:ILE:HD12	2.04	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	276/315 (88%)	273 (99%)	3 (1%)	0	100	100
1	B	278/315 (88%)	275 (99%)	3 (1%)	0	100	100
All	All	554/630 (88%)	548 (99%)	6 (1%)	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	228/264 (86%)	228 (100%)	0	100	100
1	B	231/264 (88%)	231 (100%)	0	100	100
All	All	459/528 (87%)	459 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

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](#)

4 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	J49	B	402	-	29,31,31	3.31	13 (44%)	38,42,42	1.93	15 (39%)
2	J4F	B	401	-	35,41,41	2.29	12 (34%)	38,61,61	2.45	12 (31%)
2	J4F	A	401	-	35,41,41	2.24	9 (25%)	38,61,61	2.30	13 (34%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	J49	A	402	-	29,31,31	3.32	13 (44%)	38,42,42	1.84	11 (28%)

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	J49	B	402	-	-	1/25/25/25	0/2/2/2
2	J4F	B	401	-	-	6/11/13/13	0/5/5/5
2	J4F	A	401	-	-	7/11/13/13	0/5/5/5
3	J49	A	402	-	-	5/25/25/25	0/2/2/2

All (47) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	402	J49	C12-C13	8.29	1.53	1.39
3	A	402	J49	C11-C10	7.81	1.52	1.39
3	B	402	J49	C12-C13	7.81	1.52	1.39
3	B	402	J49	C15-C14	7.20	1.51	1.38
3	A	402	J49	C15-C14	6.88	1.51	1.38
3	B	402	J49	C11-C10	6.65	1.50	1.39
2	A	401	J4F	CBG-CBF	-5.27	1.32	1.42
2	B	401	J4F	C5-C6	-5.06	1.35	1.46
3	B	402	J49	C14-C13	-4.90	1.30	1.39
2	A	401	J4F	C5-C6	-4.90	1.35	1.46
3	B	402	J49	C16-N17	4.82	1.44	1.34
2	B	401	J4F	CBG-CBF	-4.76	1.33	1.42
3	B	402	J49	C15-C10	-4.71	1.31	1.39
3	A	402	J49	C16-N17	4.67	1.44	1.34
2	A	401	J4F	CAB-CAA	-4.58	1.33	1.39
2	A	401	J4F	C4-N3	-4.56	1.33	1.38
3	B	402	J49	C5-N22	4.40	1.45	1.34
2	B	401	J4F	C4-N3	-4.20	1.33	1.38
3	A	402	J49	C1-N6	4.19	1.41	1.33
2	B	401	J4F	CAB-CAA	-4.15	1.34	1.39
3	A	402	J49	C14-C13	-4.12	1.32	1.39
2	A	401	J4F	CBJ-CBE	-4.08	1.34	1.41
3	B	402	J49	C1-N6	4.06	1.41	1.33
3	B	402	J49	C12-C11	-3.88	1.31	1.38
3	A	402	J49	C5-N22	3.87	1.43	1.34

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	402	J49	C15-C10	-3.77	1.32	1.39
2	B	401	J4F	CAZ-CAU	3.57	1.55	1.50
2	B	401	J4F	CBJ-CBE	-3.52	1.35	1.41
3	A	402	J49	C8-N21	3.31	1.44	1.37
2	A	401	J4F	C2-N3	-3.10	1.34	1.38
2	B	401	J4F	CBF-CBE	-3.09	1.34	1.42
2	B	401	J4F	C2-N3	-3.07	1.34	1.38
2	A	401	J4F	C6-N1	-3.05	1.34	1.40
2	A	401	J4F	CBF-CBE	-2.89	1.34	1.42
3	A	402	J49	O18-C16	-2.81	1.17	1.23
2	B	401	J4F	C6-N1	-2.75	1.34	1.40
2	B	401	J4F	CBG-CL	-2.73	1.67	1.74
3	A	402	J49	C8-N9	2.71	1.43	1.37
3	A	402	J49	C12-C11	-2.49	1.34	1.38
3	B	402	J49	C8-N21	2.46	1.42	1.37
2	A	401	J4F	CAZ-CAU	2.44	1.53	1.50
2	B	401	J4F	CAD-CAA	2.21	1.55	1.51
3	B	402	J49	C8-N9	2.18	1.42	1.37
3	B	402	J49	C27-C28	2.15	1.55	1.50
2	B	401	J4F	CAD-N1	2.08	1.50	1.47
3	A	402	J49	O20-C3	2.03	1.38	1.29
3	B	402	J49	O18-C16	-2.03	1.19	1.23

All (51) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	401	J4F	C5-C6-N1	6.78	119.14	113.58
2	A	401	J4F	C5-C6-N1	6.53	118.93	113.58
2	A	401	J4F	O2-C2-N3	-5.59	117.21	122.08
2	B	401	J4F	CAZ-CAU-NAT	5.50	125.09	116.67
2	B	401	J4F	O2-C2-N3	-4.90	117.81	122.08
2	B	401	J4F	NAV-CAU-NAT	-4.56	120.04	126.06
3	B	402	J49	N6-C1-N2	-4.37	121.77	128.60
3	A	402	J49	N6-C1-N2	-4.31	121.87	128.60
3	A	402	J49	C14-C13-C12	3.90	124.15	118.59
2	A	401	J4F	CAB-CBF-CBE	3.89	109.66	106.27
2	A	401	J4F	NAV-CAU-NAT	-3.80	121.04	126.06
3	A	402	J49	C11-C12-C13	-3.74	116.43	120.78
2	A	401	J4F	CAK-N3-C2	3.55	121.09	117.35
2	B	401	J4F	CAB-CBF-CBE	3.40	109.24	106.27
3	B	402	J49	C4-N21-C8	-3.40	116.80	121.82
3	B	402	J49	C26-C19-C23	3.35	118.42	110.35

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	401	J4F	C4-N3-C2	-3.29	119.05	122.20
2	B	401	J4F	N1-C2-N3	3.28	121.39	116.75
3	B	402	J49	C14-C13-C12	3.28	123.26	118.59
3	B	402	J49	O24-C23-O25	-3.25	116.70	124.09
2	B	401	J4F	NAR-CAS-NAT	3.25	126.14	116.95
2	A	401	J4F	N1-C2-N3	3.22	121.31	116.75
2	B	401	J4F	CAK-N3-C2	3.20	120.72	117.35
3	A	402	J49	O20-C3-C4	-3.18	116.97	126.02
3	B	402	J49	O29-C28-O30	-3.09	115.59	123.30
3	A	402	J49	O29-C28-O30	-3.01	115.80	123.30
2	A	401	J4F	C4-N3-C2	-2.91	119.42	122.20
3	B	402	J49	C11-C12-C13	-2.78	117.54	120.78
2	A	401	J4F	CAD-N1-C2	2.77	120.96	116.97
3	B	402	J49	O29-C28-C27	2.75	122.85	114.03
3	B	402	J49	O20-C3-C4	-2.68	118.39	126.02
3	B	402	J49	C19-N17-C16	-2.59	115.26	121.60
3	A	402	J49	O24-C23-O25	-2.54	118.33	124.09
2	A	401	J4F	CAD-CAA-CAB	-2.51	125.86	129.51
3	A	402	J49	C15-C14-C13	-2.47	117.90	120.78
3	A	402	J49	C4-N21-C8	-2.39	118.29	121.82
3	B	402	J49	C15-C10-C11	2.38	122.29	119.03
2	A	401	J4F	NAR-CAS-NAT	2.37	123.64	116.95
3	B	402	J49	C15-C14-C13	-2.36	118.03	120.78
2	B	401	J4F	CAD-N1-C6	2.34	120.43	117.42
3	A	402	J49	O24-C23-C19	2.32	121.12	113.40
3	B	402	J49	O24-C23-C19	2.29	121.02	113.40
2	B	401	J4F	CAX-CAS-NAT	-2.29	118.56	123.41
3	B	402	J49	C4-C5-N22	-2.28	118.12	123.68
3	A	402	J49	O29-C28-C27	2.26	121.30	114.03
2	A	401	J4F	CAX-CAS-NAT	-2.23	118.68	123.41
2	B	401	J4F	CAD-N1-C2	2.18	120.11	116.97
2	A	401	J4F	CAZ-CAU-NAV	2.17	119.99	116.67
3	B	402	J49	N22-C5-N6	2.14	123.03	118.35
3	A	402	J49	C19-N17-C16	-2.10	116.46	121.60
2	A	401	J4F	O6-C6-N1	-2.07	117.20	120.13

There are no chirality outliers.

All (19) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	401	J4F	CAA-CAD-N1-C2
2	A	401	J4F	CAB-CAA-CAD-N1

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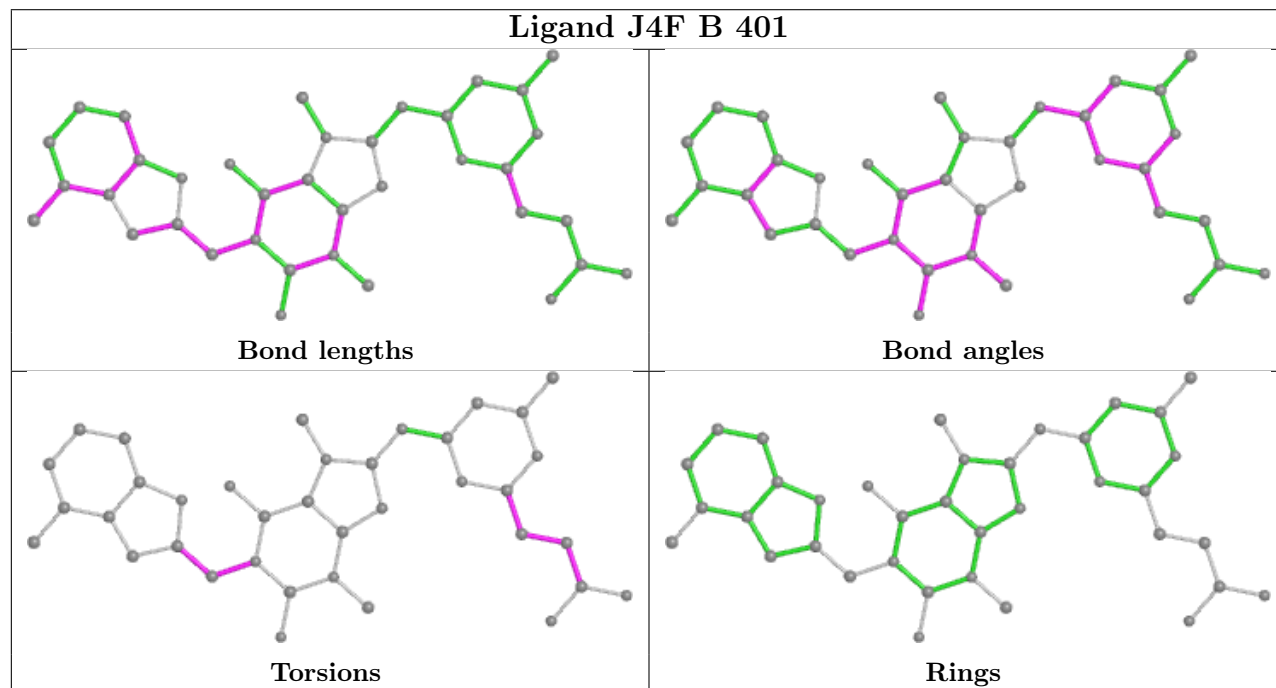
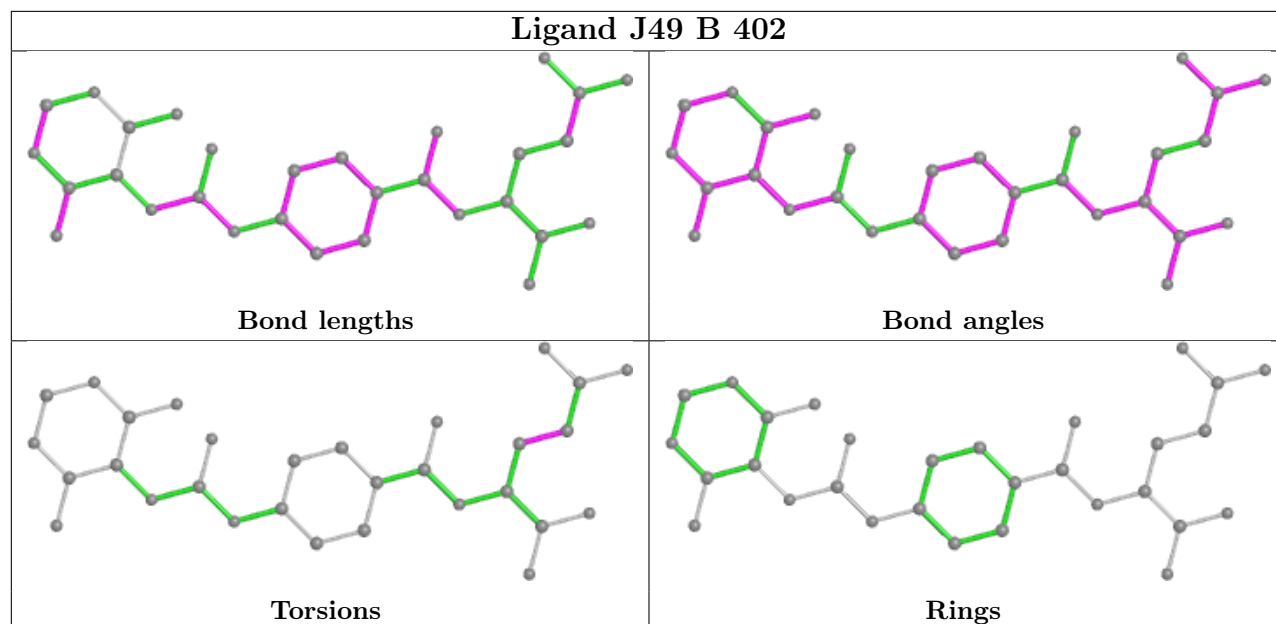
Mol	Chain	Res	Type	Atoms
2	A	401	J4F	NAC-CAA-CAD-N1
2	A	401	J4F	CAU-CAZ-CBA-CBB
2	B	401	J4F	CAA-CAD-N1-C2
2	B	401	J4F	CAB-CAA-CAD-N1
2	B	401	J4F	CAU-CAZ-CBA-CBB
3	A	402	J49	N17-C19-C26-C27
3	A	402	J49	C23-C19-C26-C27
3	B	402	J49	C19-C26-C27-C28
2	B	401	J4F	CAZ-CBA-CBB-OBD
2	A	401	J4F	NAV-CAU-CAZ-CBA
2	B	401	J4F	NAV-CAU-CAZ-CBA
2	B	401	J4F	CAZ-CBA-CBB-OBC
3	A	402	J49	C19-C26-C27-C28
2	A	401	J4F	CAZ-CBA-CBB-OBC
3	A	402	J49	C26-C27-C28-O29
2	A	401	J4F	CAZ-CBA-CBB-OBD
3	A	402	J49	C26-C27-C28-O30

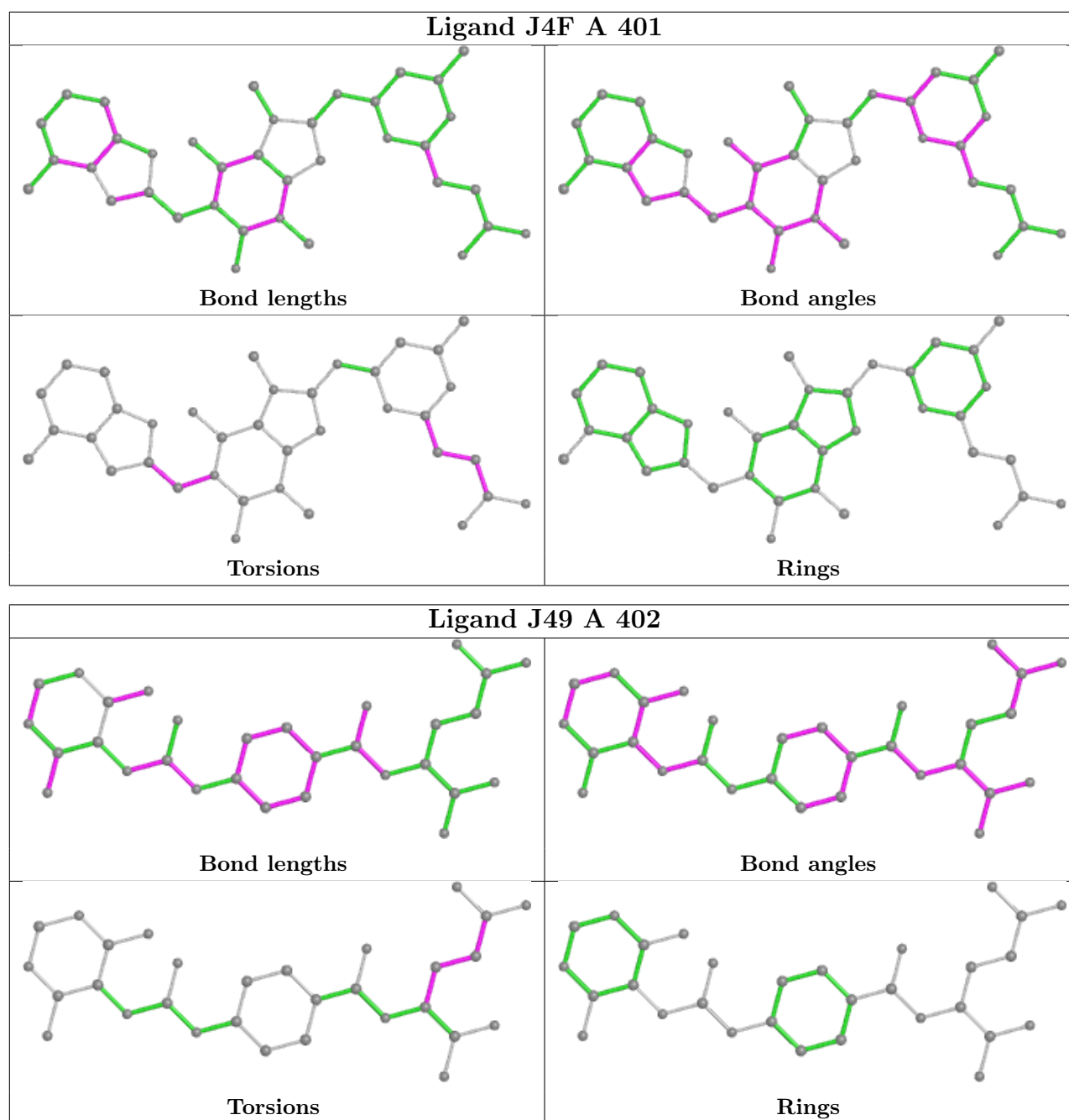
There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	401	J4F	1	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	282/315 (89%)	0.24	22 (7%) 13 14	33, 49, 74, 84	0
1	B	284/315 (90%)	0.33	27 (9%) 8 8	35, 50, 73, 91	0
All	All	566/630 (89%)	0.29	49 (8%) 10 11	33, 50, 74, 91	0

All (49) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	234	TYR	5.2
1	A	250	VAL	4.7
1	B	236	PRO	4.5
1	B	251	ILE	4.2
1	A	197	VAL	4.1
1	B	288	LYS	3.8
1	A	288	LYS	3.6
1	B	171	SER	3.5
1	A	229	THR	3.4
1	A	251	ILE	3.4
1	B	170	TYR	3.3
1	A	287	PRO	3.3
1	A	222	PRO	3.2
1	A	175	ALA	3.2
1	B	229	THR	3.1
1	A	223	GLY	3.1
1	B	196	VAL	3.1
1	B	197	VAL	2.9
1	A	228	VAL	2.9
1	A	198	VAL	2.8
1	A	130	LEU	2.8
1	B	62	ALA	2.8
1	B	279	VAL	2.7
1	A	196	VAL	2.7

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Mol	Chain	Res	Type	RSRZ
1	B	217	GLY	2.6
1	B	250	VAL	2.6
1	B	287	PRO	2.6
1	B	73	ILE	2.5
1	B	272	ILE	2.5
1	A	234	TYR	2.5
1	B	274	VAL	2.5
1	A	216	ASP	2.5
1	B	72	VAL	2.4
1	B	198	VAL	2.4
1	B	300	GLN	2.4
1	A	224	GLY	2.4
1	B	228	VAL	2.4
1	B	230	ILE	2.3
1	A	300	GLN	2.2
1	B	137	GLU	2.1
1	B	130	LEU	2.1
1	A	320	LEU	2.1
1	A	72	VAL	2.1
1	A	37	ALA	2.1
1	B	131	VAL	2.1
1	A	170	TYR	2.1
1	B	316	THR	2.0
1	A	199	ALA	2.0
1	B	330	LYS	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](#)

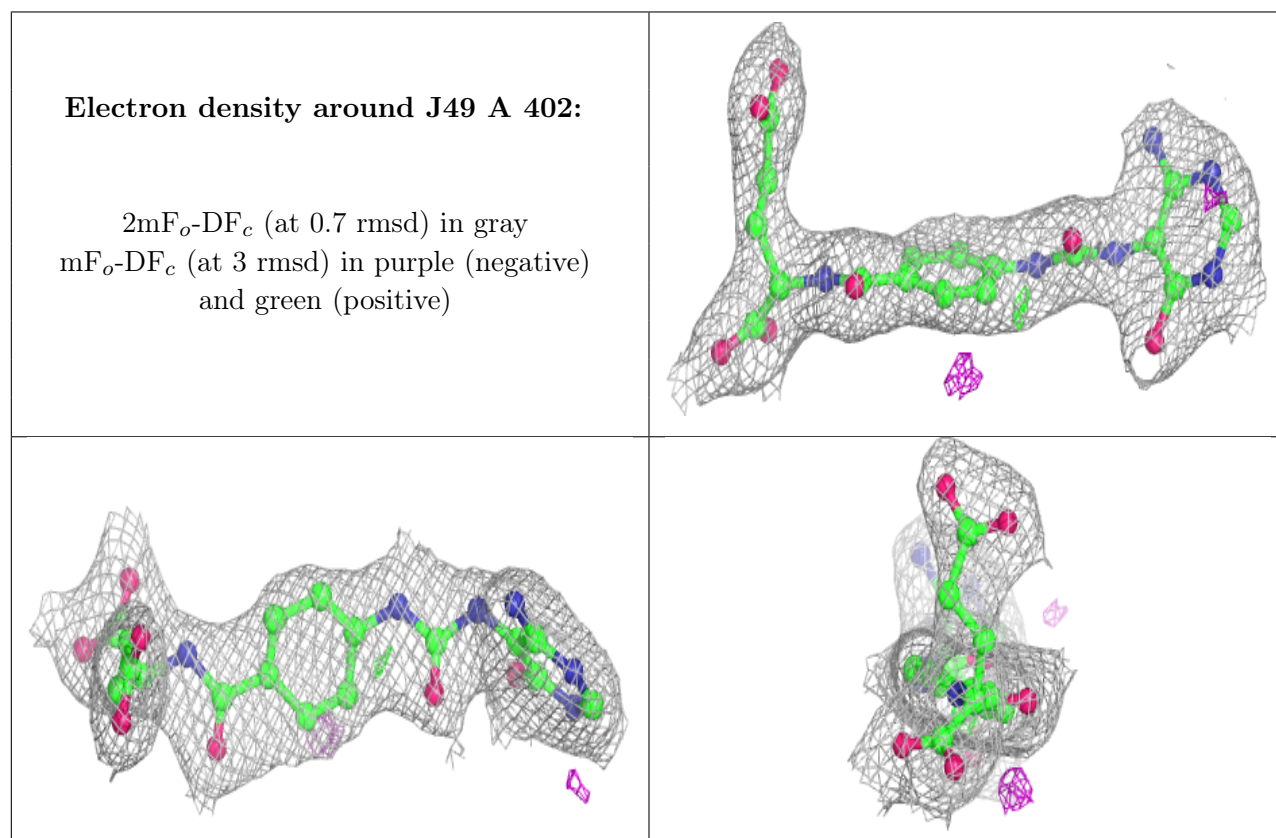
There are no monosaccharides in this entry.

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.

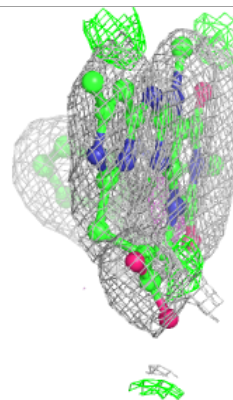
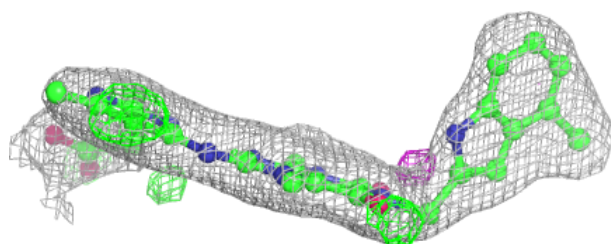
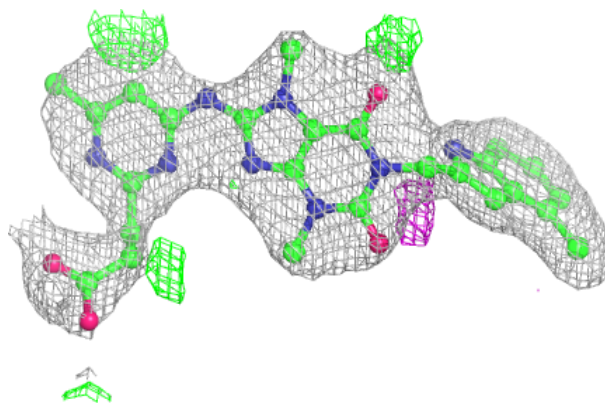
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
3	J49	A	402	30/30	0.89	0.14	31,41,57,61	0
2	J4F	A	401	37/37	0.90	0.15	37,44,54,61	0
3	J49	B	402	30/30	0.90	0.15	34,39,51,55	0
2	J4F	B	401	37/37	0.91	0.15	39,44,53,57	0

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.

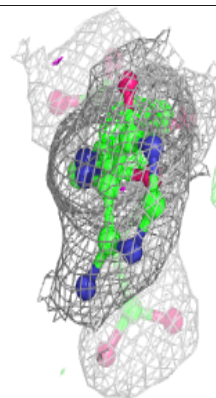
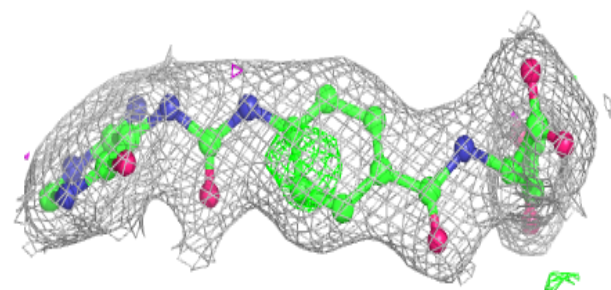
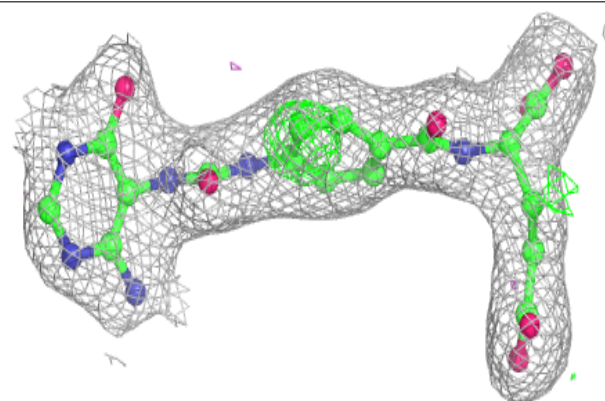


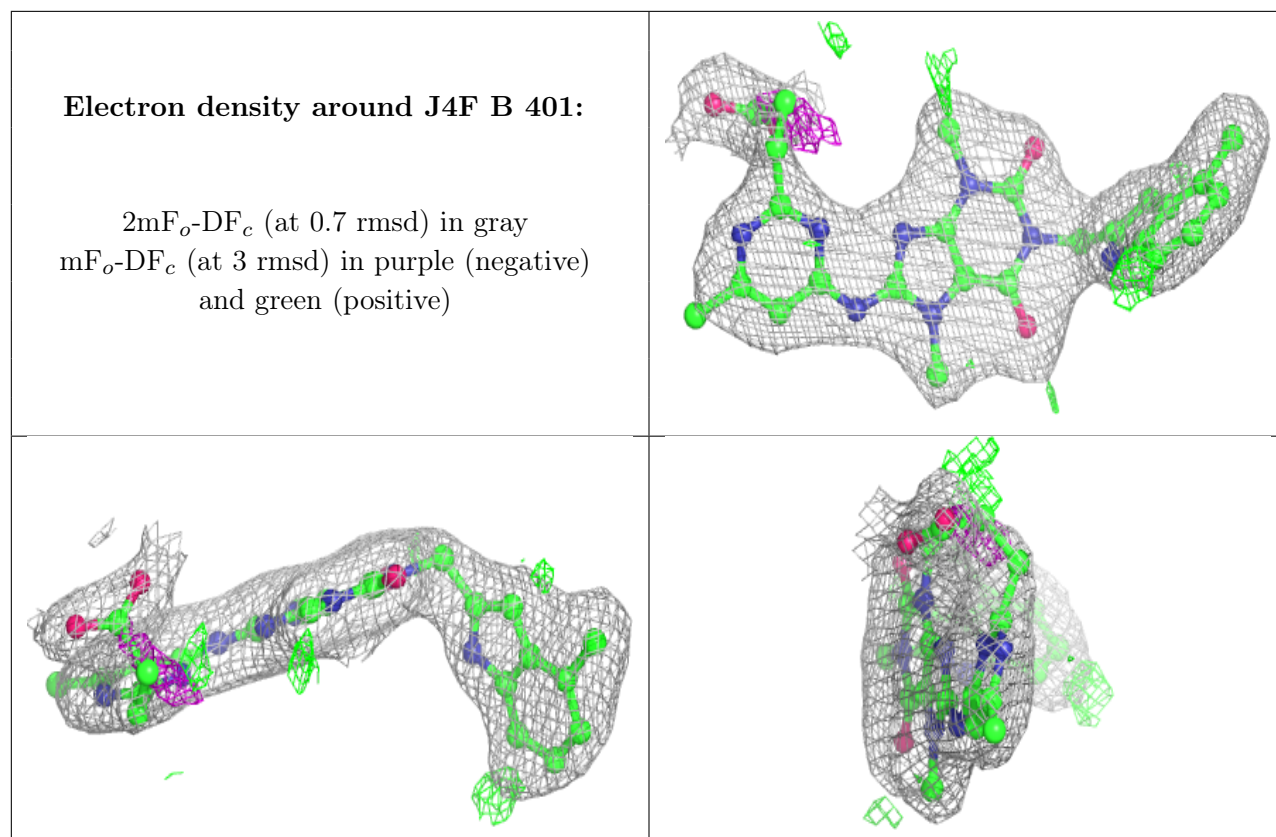
Electron density around J4F A 401:

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

**Electron density around J49 B 402:**

$2mF_o-DF_c$ (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.