



# Full wwPDB X-ray Structure Validation Report ⓘ

Aug 21, 2020 – 06:09 AM BST

PDB ID : 4MUH  
Title : Crystal structure of pantothenate synthetase in complex with 2-(2-(5-acetamido-1,3,4-thiadiazol-2-ylsulfonylcarbamoyl)-5-methoxy-1H-indol-1-yl)acetic acid  
Authors : Silvestre, H.L.; Blundell, T.L.  
Deposited on : 2013-09-21  
Resolution : 1.72 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](mailto: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.

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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 : 2.13.1  
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) : 2.13.1

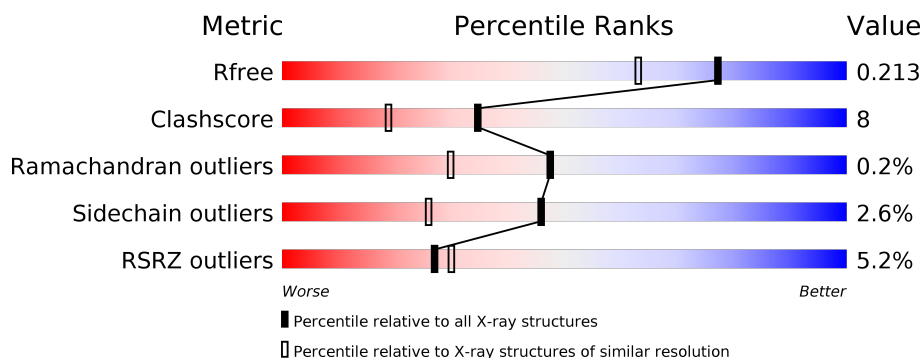
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 1.72 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	5722 (1.74-1.70)
Clashscore	141614	6152 (1.74-1.70)
Ramachandran outliers	138981	6051 (1.74-1.70)
Sidechain outliers	138945	6051 (1.74-1.70)
RSRZ outliers	127900	5629 (1.74-1.70)

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 on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 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	300	<div> <div>3%</div> <div>81% 13% • 5%</div> </div>
1	B	300	<div> <div>7%</div> <div>79% 11% • 9%</div> </div>

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	EOH	A	401	-	-	X	-
2	EOH	B	407	-	-	X	-
3	2DN	B	401	-	-	X	-

## 2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 4737 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.

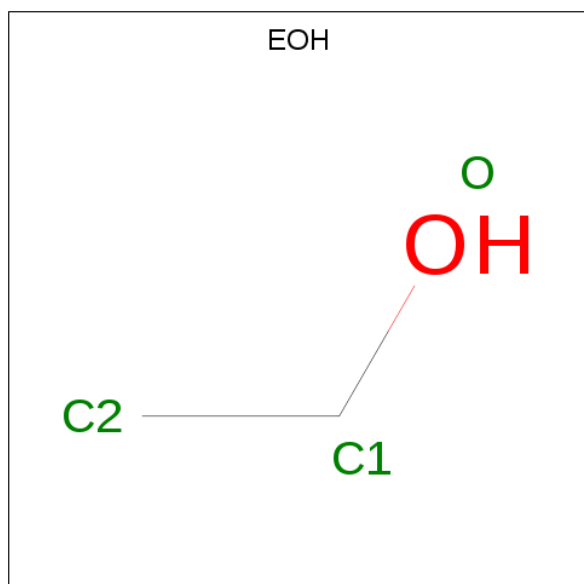
- Molecule 1 is a protein called Pantothenate synthetase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	286	Total	C	N	O	S	0	7	0
			2143	1351	386	400	6			
1	B	274	Total	C	N	O	S	0	9	0
			2083	1316	375	385	7			

There are 4 discrepancies between the modelled and reference sequences:

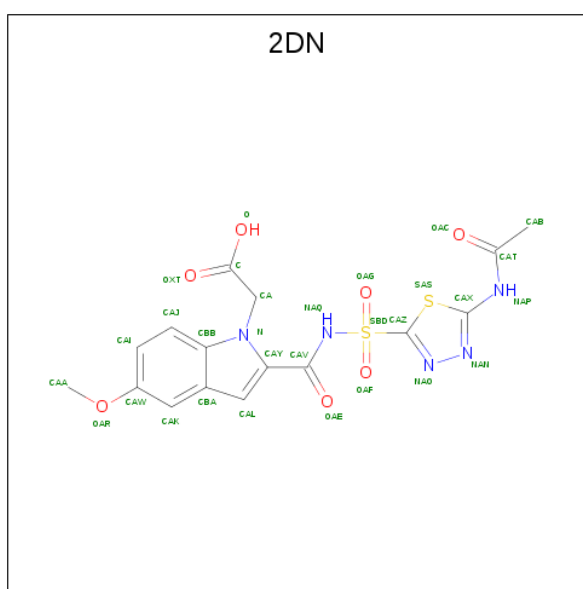
Chain	Residue	Modelled	Actual	Comment	Reference
A	2	ALA	THR	ENGINEERED MUTATION	UNP P0A5R0
A	77	GLY	GLU	ENGINEERED MUTATION	UNP P0A5R0
B	2	ALA	THR	ENGINEERED MUTATION	UNP P0A5R0
B	77	GLY	GLU	ENGINEERED MUTATION	UNP P0A5R0

- Molecule 2 is ETHANOL (three-letter code: EOH) (formula: C<sub>2</sub>H<sub>6</sub>O).



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

- Molecule 3 is [2-([5-(acetylamino)-1,3,4-thiadiazol-2-yl]sulfonyl)carbamoyl]-5-methoxy-1H-indol-1-yl]acetic acid (three-letter code: 2DN) (formula: C<sub>16</sub>H<sub>15</sub>N<sub>5</sub>O<sub>7</sub>S<sub>2</sub>).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C N O S 30 16 5 7 2	0	0
3	B	1	Total C N O S 30 16 5 7 2	0	0
3	B	1	Total C N O S 30 16 5 7 2	0	0

- Molecule 4 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C<sub>2</sub>H<sub>6</sub>O<sub>2</sub>).



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

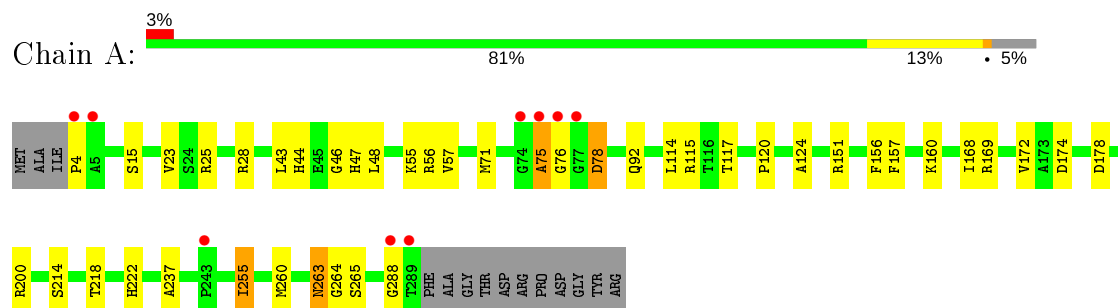
- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	197	Total O 197 197	0	0
5	B	180	Total O 180 180	0	0

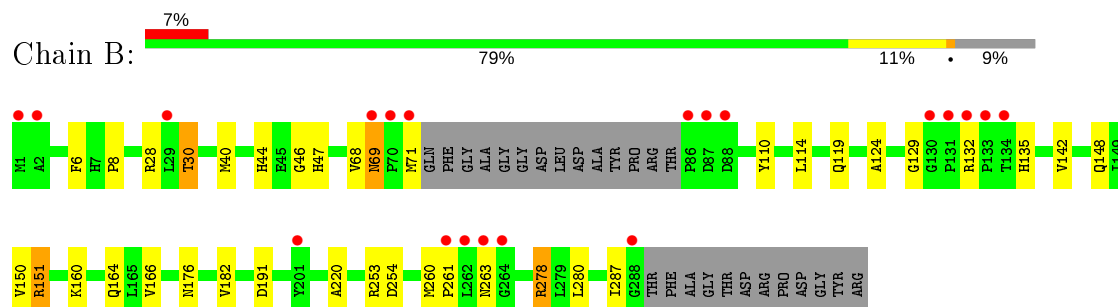
### 3 Residue-property plots [i](#)

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: Pantothenate synthetase



#### • Molecule 1: Pantothenate synthetase



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	48.41Å 71.07Å 81.64Å 90.00° 98.91° 90.00°	Depositor
Resolution (Å)	28.00 – 1.72 27.71 – 1.72	Depositor EDS
% Data completeness (in resolution range)	100.0 (28.00-1.72) 100.0 (27.71-1.72)	Depositor EDS
$R_{merge}$	0.07	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.86 (at 1.72Å)	Xtriage
Refinement program	REFMAC 5.5.0102	Depositor
R, $R_{free}$	0.168 , 0.213 0.168 , 0.213	Depositor DCC
$R_{free}$ test set	2949 reflections (5.08%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	20.4	Xtriage
Anisotropy	0.034	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.38 , 50.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	4737	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	23.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.67% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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: EOH, 2DN, 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	1.22	3/2181 (0.1%)	1.04	3/2978 (0.1%)
1	B	1.19	4/2123 (0.2%)	1.01	4/2898 (0.1%)
All	All	1.20	7/4304 (0.2%)	1.02	7/5876 (0.1%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	150	VAL	CB-CG1	7.07	1.67	1.52
1	A	214	SER	CB-OG	5.95	1.50	1.42
1	B	220	ALA	CA-CB	5.91	1.64	1.52
1	B	182	VAL	CB-CG2	5.46	1.64	1.52
1	B	166	VAL	CB-CG2	5.42	1.64	1.52
1	A	237	ALA	CA-CB	5.34	1.63	1.52
1	A	172	VAL	CB-CG1	5.01	1.63	1.52

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	253	ARG	NE-CZ-NH1	7.58	124.09	120.30
1	B	191	ASP	CB-CG-OD1	7.51	125.06	118.30
1	A	169	ARG	NE-CZ-NH2	-7.08	116.76	120.30
1	A	160[A]	LYS	CD-CE-NZ	-6.15	97.56	111.70

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	278	ARG	NE-CZ-NH1	-5.93	117.33	120.30
1	B	280	LEU	CA-CB-CG	5.38	127.67	115.30
1	A	56	ARG	NE-CZ-NH2	5.31	122.95	120.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	288	GLY	Peptide

## 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	2143	0	2176	38	0
1	B	2083	0	2140	35	0
2	A	9	0	18	4	0
2	B	3	0	6	2	0
3	A	30	0	14	1	0
3	B	60	0	28	9	0
4	A	16	0	24	3	0
4	B	16	0	24	3	0
5	A	197	0	0	5	1
5	B	180	0	0	4	0
All	All	4737	0	4430	73	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 8.

All (73) 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:151:ARG:CG	1:B:151:ARG:HH21	1.60	1.12
1:A:75:ALA:HB1	1:A:76:GLY:HA3	1.10	1.09
1:A:75:ALA:CB	1:A:76:GLY:HA3	1.90	1.02

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:151:ARG:NH2	1:B:151:ARG:HG2	1.46	1.02
3:B:401:2DN:H14	5:B:671:HOH:O	1.63	0.98
1:A:255:ILE:HD13	1:A:255:ILE:H	1.38	0.89
1:A:263:ASN:CG	1:A:264:GLY:H	1.77	0.87
1:B:164:GLN:HE22	3:B:401:2DN:H12	1.18	0.85
1:A:75:ALA:HB1	1:A:76:GLY:CA	2.03	0.82
1:A:92[A]:GLN:NE2	5:A:660:HOH:O	2.12	0.81
1:B:44:HIS:HE1	3:B:401:2DN:OXT	1.63	0.79
1:A:263:ASN:CG	1:A:264:GLY:N	2.38	0.75
1:B:160:LYS:HG2	5:B:653:HOH:O	1.88	0.72
1:A:151:ARG:HH22	1:B:151:ARG:NH2	1.86	0.72
1:A:55:LYS:HE3	5:A:641:HOH:O	1.92	0.68
1:B:44:HIS:HD2	1:B:46:GLY:H	1.41	0.67
1:A:151:ARG:HH22	1:B:151:ARG:CZ	2.08	0.66
1:A:44:HIS:HD2	1:A:46:GLY:H	1.43	0.65
1:A:75:ALA:CB	1:A:76:GLY:CA	2.69	0.65
1:A:218[B]:THR:HG21	2:A:402:EOH:H23	1.78	0.65
1:A:115:ARG:O	2:A:401:EOH:H22	1.97	0.64
1:B:151:ARG:HH21	1:B:151:ARG:HG2	0.67	0.62
1:B:254:ASP:HB3	1:B:261:PRO:HD3	1.80	0.61
1:A:117:THR:OG1	2:A:401:EOH:H21	2.01	0.61
1:B:135:HIS:NE2	3:B:401:2DN:CAB	2.65	0.59
1:B:124:ALA:O	1:B:129:GLY:HA3	2.04	0.58
1:B:40:MET:HE3	1:B:68:VAL:HA	1.86	0.57
1:B:44:HIS:HD2	1:B:46:GLY:N	2.03	0.56
1:A:157:PHE:CZ	1:A:168:ILE:HD13	2.41	0.55
1:A:255:ILE:CD1	1:A:255:ILE:H	2.15	0.55
1:B:151:ARG:CG	1:B:151:ARG:NH2	2.31	0.55
1:A:178[A]:ASP:HB3	1:B:151:ARG:HH11	1.71	0.55
1:A:15[B]:SER:O	5:A:532:HOH:O	2.14	0.54
1:A:151:ARG:NH2	1:B:151:ARG:NH2	2.55	0.53
1:A:44:HIS:HD2	1:A:46:GLY:N	2.07	0.53
1:B:260:MET:SD	1:B:261:PRO:HD2	2.49	0.52
1:A:71:MET:SD	1:A:114:LEU:HD21	2.50	0.52
1:B:176:ASN:HD22	2:B:407:EOH:H21	1.75	0.52
1:B:44:HIS:CE1	3:B:401:2DN:OXT	2.54	0.51
4:B:404:EDO:H22	5:B:592:HOH:O	2.10	0.51
1:B:47:HIS:HE2	3:B:401:2DN:H11	1.58	0.50
1:A:174:ASP:HB3	4:B:402:EDO:H22	1.93	0.50
1:B:30:THR:CG2	1:B:30:THR:O	2.60	0.49
1:B:278:ARG:HG2	1:B:278:ARG:NH1	2.26	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:401:EOH:H21	1:B:119:GLN:HG2	1.95	0.49
1:B:71:MET:CE	1:B:110:TYR:OH	2.62	0.48
1:A:75:ALA:HB3	1:A:78:ASP:HB2	1.95	0.47
1:A:57:VAL:HG22	4:A:406:EDO:H12	1.96	0.47
3:B:401:2DN:OAC	3:B:401:2DN:SAS	2.72	0.47
1:A:156:PHE:CE2	4:A:406:EDO:H11	2.49	0.47
1:B:148:GLN:O	1:B:151:ARG:CD	2.63	0.46
3:B:401:2DN:CAB	5:B:671:HOH:O	2.39	0.46
1:A:25:ARG:HA	1:A:28:ARG:NH1	2.31	0.45
1:B:44:HIS:CD2	1:B:46:GLY:H	2.29	0.45
1:A:114:LEU:HD23	1:A:114:LEU:HA	1.81	0.45
1:A:4:PRO:HG2	1:A:23:VAL:HG23	1.99	0.45
1:A:218[B]:THR:O	1:A:222:HIS:HD2	2.00	0.44
1:A:156:PHE:CZ	4:A:406:EDO:H11	2.52	0.44
1:A:200:ARG:NH2	5:A:581:HOH:O	2.49	0.44
1:B:69[B]:ASN:CG	1:B:142[B]:VAL:HG21	2.38	0.44
1:B:71:MET:SD	1:B:114:LEU:HD21	2.57	0.44
1:A:92[B]:GLN:OE1	1:A:92[B]:GLN:HA	2.17	0.44
1:B:135:HIS:NE2	3:B:401:2DN:H13	2.34	0.43
1:A:43:LEU:HA	1:A:47:HIS:ND1	2.34	0.42
1:A:120:PRO:HB2	1:A:124:ALA:HB2	2.01	0.42
1:A:178[A]:ASP:HB3	1:B:151:ARG:NH1	2.33	0.42
1:A:255:ILE:HD12	1:A:265:SER:HB2	2.01	0.42
1:B:176:ASN:HD22	2:B:407:EOH:C2	2.33	0.41
3:A:403:2DN:C	3:A:403:2DN:OAE	2.68	0.41
1:B:287:ILE:HA	1:B:287:ILE:HD13	1.84	0.41
1:B:110:TYR:CD1	4:B:402:EDO:H12	2.56	0.41
1:A:151:ARG:NH1	5:A:690:HOH:O	2.23	0.41
1:B:6:PHE:O	1:B:8:PRO:HD3	2.20	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)
5:A:637:HOH:O	5:A:685:HOH:O[2_645]	1.96	0.24

## 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	289/300 (96%)	285 (99%)	3 (1%)	1 (0%)	41	24
1	B	279/300 (93%)	275 (99%)	4 (1%)	0	100	100
All	All	568/600 (95%)	560 (99%)	7 (1%)	1 (0%)	47	30

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	75	ALA

### 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	218/223 (98%)	213 (98%)	5 (2%)	50	31
1	B	214/223 (96%)	207 (97%)	7 (3%)	38	17
All	All	432/446 (97%)	420 (97%)	12 (3%)	46	23

All (12) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	48	LEU
1	A	78	ASP
1	A	255	ILE
1	A	260	MET
1	A	263	ASN

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Mol	Chain	Res	Type
1	B	28	ARG
1	B	30	THR
1	B	69[A]	ASN
1	B	69[B]	ASN
1	B	132	ARG
1	B	151	ARG
1	B	263	ASN

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	44	HIS
1	A	119	GLN
1	A	222	HIS
1	B	44	HIS
1	B	164	GLN

### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

## 5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

## 5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

## 5.6 Ligand geometry ⓘ

15 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
4	EDO	A	406	-	3,3,3	0.34	0	2,2,2	0.98	0
3	2DN	B	406	-	23,32,32	3.14	11 (47%)	26,47,47	1.76	6 (23%)
4	EDO	B	402	-	3,3,3	0.20	0	2,2,2	1.06	0
3	2DN	B	401	-	23,32,32	2.87	7 (30%)	26,47,47	2.91	11 (42%)
2	EOH	A	401	-	2,2,2	0.62	0	1,1,1	0.20	0
4	EDO	B	405	-	3,3,3	0.78	0	2,2,2	0.56	0
4	EDO	B	404	-	3,3,3	0.37	0	2,2,2	0.84	0
2	EOH	B	407	-	2,2,2	0.42	0	1,1,1	0.24	0
3	2DN	A	403	-	23,32,32	2.83	7 (30%)	26,47,47	3.89	6 (23%)
2	EOH	A	402	-	2,2,2	0.60	0	1,1,1	0.41	0
2	EOH	A	407	-	2,2,2	0.39	0	1,1,1	0.18	0
4	EDO	A	404	-	3,3,3	0.47	0	2,2,2	0.58	0
4	EDO	A	405	-	3,3,3	0.58	0	2,2,2	0.97	0
4	EDO	A	408	-	3,3,3	0.45	0	2,2,2	0.81	0
4	EDO	B	403	-	3,3,3	0.54	0	2,2,2	0.53	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
4	EDO	A	406	-	-	1/1/1/1	-
3	2DN	B	406	-	-	2/12/25/25	0/3/3/3
4	EDO	B	402	-	-	0/1/1/1	-
3	2DN	B	401	-	-	0/12/25/25	0/3/3/3
4	EDO	B	405	-	-	0/1/1/1	-
4	EDO	B	404	-	-	1/1/1/1	-
3	2DN	A	403	-	-	4/12/25/25	0/3/3/3
4	EDO	A	404	-	-	1/1/1/1	-
4	EDO	A	405	-	-	0/1/1/1	-
4	EDO	A	408	-	-	0/1/1/1	-
4	EDO	B	403	-	-	1/1/1/1	-

All (25) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	401	2DN	OAG-SBD	10.37	1.55	1.43
3	A	403	2DN	OAF-SBD	8.43	1.53	1.43
3	B	406	2DN	OAG-SBD	8.34	1.53	1.43
3	B	406	2DN	OAF-SBD	7.35	1.51	1.43

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	403	2DN	OAG-SBD	5.74	1.50	1.43
3	B	401	2DN	OAF-SBD	5.28	1.49	1.43
3	B	406	2DN	NAN-NAO	5.22	1.47	1.37
3	A	403	2DN	CAV-NAQ	-4.08	1.34	1.39
3	B	406	2DN	SBD-NAQ	4.07	1.73	1.64
3	A	403	2DN	SBD-NAQ	3.88	1.72	1.64
3	A	403	2DN	CAK-CAW	3.77	1.43	1.37
3	B	406	2DN	CAL-CAY	-3.08	1.34	1.39
3	B	406	2DN	CBA-CBB	-3.07	1.34	1.41
3	B	406	2DN	CAK-CAW	2.94	1.42	1.37
3	B	401	2DN	CAK-CBA	-2.77	1.35	1.42
3	A	403	2DN	CAL-CAY	-2.68	1.35	1.39
3	B	401	2DN	CA-N	2.68	1.53	1.48
3	A	403	2DN	CBA-CBB	-2.57	1.35	1.41
3	B	406	2DN	CAK-CBA	-2.44	1.36	1.42
3	B	406	2DN	CAJ-CBB	-2.39	1.36	1.41
3	B	401	2DN	SBD-NAQ	2.38	1.69	1.64
3	B	401	2DN	CAI-CAW	2.25	1.43	1.38
3	B	406	2DN	CAV-NAQ	-2.20	1.36	1.39
3	B	406	2DN	CAY-CAV	-2.20	1.37	1.50
3	B	401	2DN	CAK-CAW	2.07	1.40	1.37

All (23) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	403	2DN	OAG-SBD-CAZ	12.01	120.71	108.78
3	A	403	2DN	C-CA-N	10.54	128.92	114.00
3	A	403	2DN	OAG-SBD-OAF	-10.07	107.18	119.55
3	B	401	2DN	OAG-SBD-OAF	-9.26	108.16	119.55
3	B	406	2DN	OAF-SBD-CAZ	-6.13	102.69	108.78
3	B	401	2DN	CAA-OAR-CAW	5.66	129.79	117.51
3	B	401	2DN	OAG-SBD-CAZ	-4.36	104.45	108.78
3	B	401	2DN	CAL-CBA-CBB	3.59	109.40	106.27
3	A	403	2DN	OAF-SBD-CAZ	-3.30	105.51	108.78
3	B	401	2DN	C-CA-N	3.15	118.47	114.00
3	B	401	2DN	OAC-CAT-NAP	3.13	127.16	123.04
3	B	401	2DN	CAV-NAQ-SBD	-3.08	119.38	123.36
3	B	401	2DN	OAG-SBD-NAQ	2.99	115.14	106.74
3	B	401	2DN	OAF-SBD-CAZ	2.68	111.44	108.78
3	B	401	2DN	CAJ-CAI-CAW	-2.58	116.70	120.17
3	B	406	2DN	OAG-SBD-OAF	-2.54	116.42	119.55
3	A	403	2DN	OAC-CAT-NAP	2.30	126.07	123.04

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	406	2DN	CAI-CAJ-CBB	2.29	123.21	119.70
3	A	403	2DN	CAA-OAR-CAW	2.24	122.38	117.51
3	B	401	2DN	CAW-CAK-CBA	2.15	122.81	119.70
3	B	406	2DN	CAJ-CAI-CAW	-2.14	117.29	120.17
3	B	406	2DN	CAI-CAW-CAK	-2.06	118.05	120.81
3	B	406	2DN	CAV-NAQ-SBD	-2.05	120.71	123.36

There are no chirality outliers.

All (10) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	B	406	2DN	CAI-CAW-OAR-CAA
3	B	406	2DN	CAK-CAW-OAR-CAA
3	A	403	2DN	CAV-NAQ-SBD-OAG
4	A	404	EDO	O1-C1-C2-O2
3	A	403	2DN	C-CA-N-CAY
4	A	406	EDO	O1-C1-C2-O2
3	A	403	2DN	CAK-CAW-OAR-CAA
4	B	404	EDO	O1-C1-C2-O2
4	B	403	EDO	O1-C1-C2-O2
3	A	403	2DN	C-CA-N-CBB

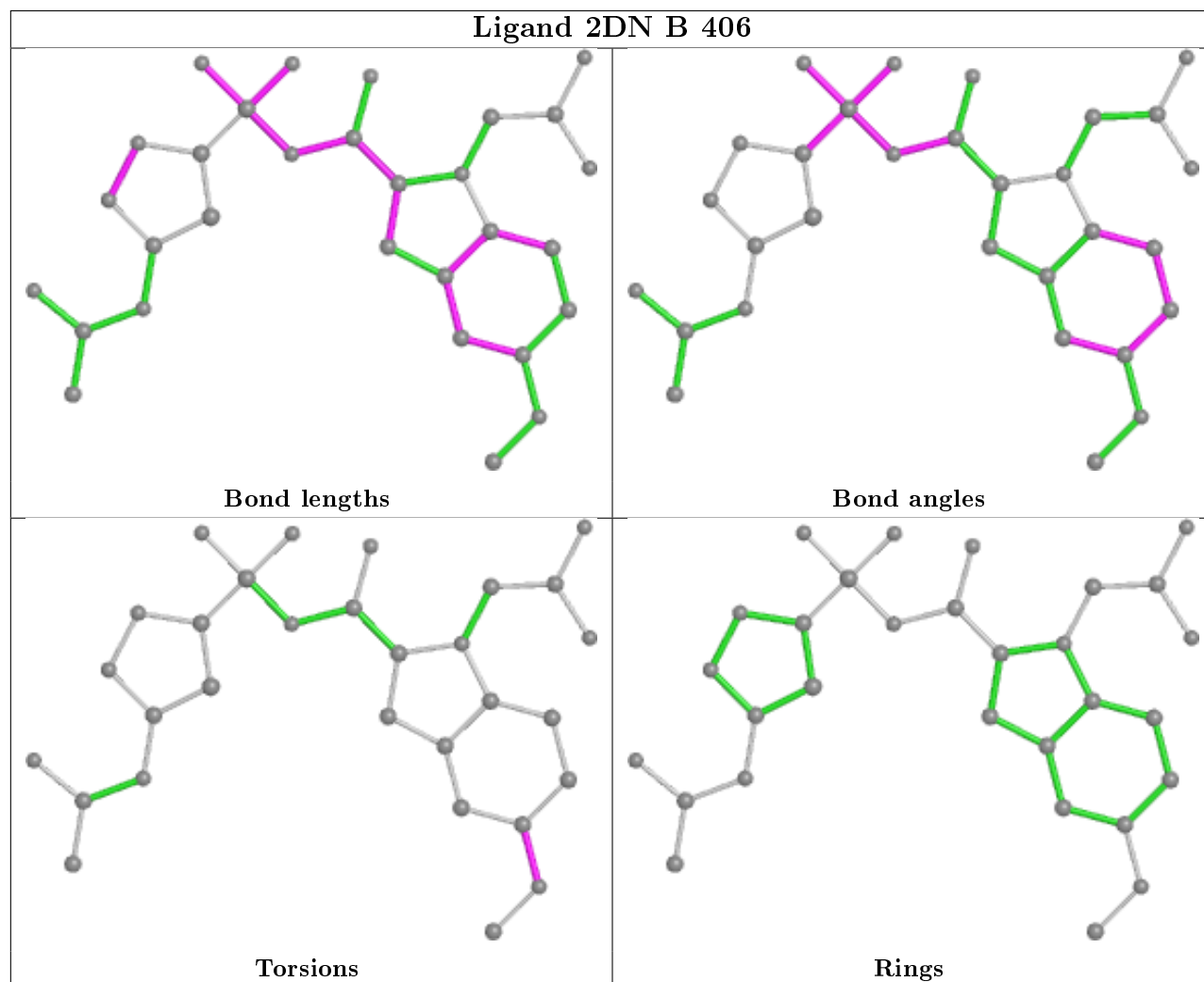
There are no ring outliers.

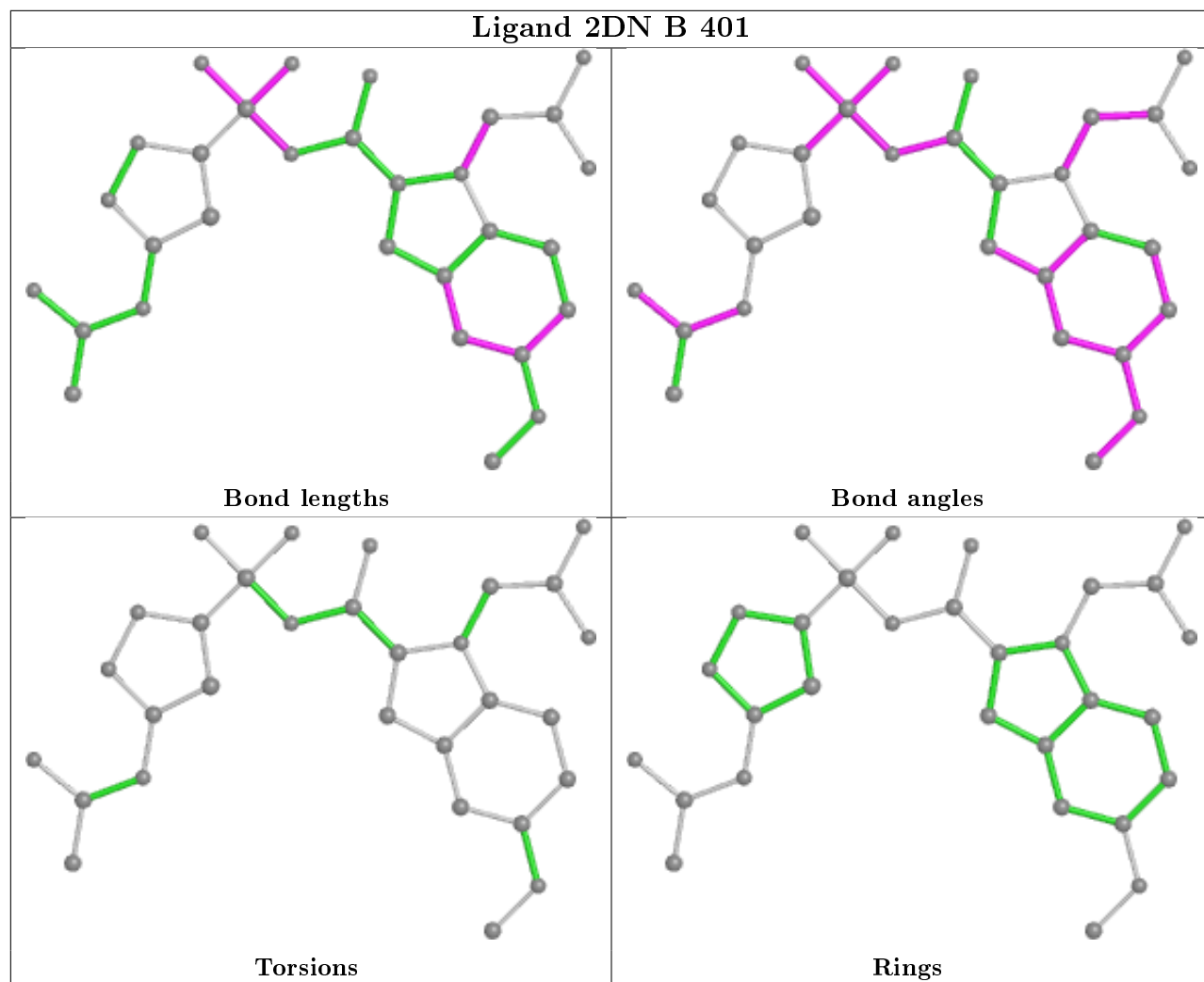
8 monomers are involved in 22 short contacts:

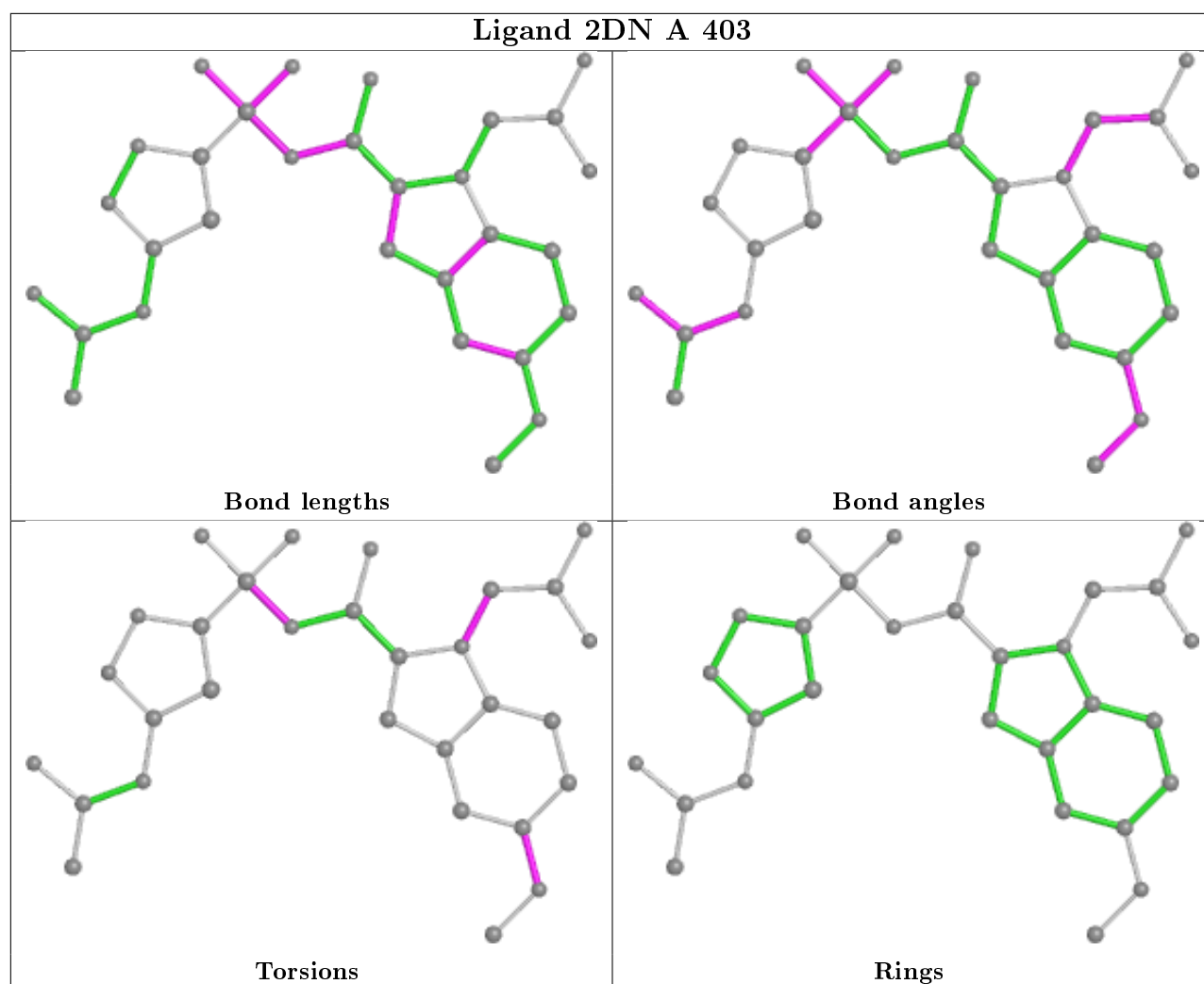
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	406	EDO	3	0
4	B	402	EDO	2	0
3	B	401	2DN	9	0
2	A	401	EOH	3	0
4	B	404	EDO	1	0
2	B	407	EOH	2	0
3	A	403	2DN	1	0
2	A	402	EOH	1	0

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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	286/300 (95%)	-0.05	9 (3%) 49 53	10, 19, 36, 48	4 (1%)
1	B	274/300 (91%)	0.20	20 (7%) 15 17	12, 20, 44, 63	1 (0%)
All	All	560/600 (93%)	0.07	29 (5%) 27 30	10, 20, 40, 63	5 (0%)

All (29) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	262	LEU	8.5
1	B	1	MET	7.5
1	B	133	PRO	6.4
1	B	71	MET	6.2
1	B	261	PRO	5.8
1	A	76	GLY	5.3
1	B	86	PRO	4.9
1	A	75	ALA	4.7
1	A	74	GLY	4.5
1	B	131	PRO	4.5
1	B	132	ARG	4.5
1	A	4	PRO	4.4
1	B	2	ALA	4.3
1	B	87	ASP	4.1
1	A	289	THR	4.0
1	B	70	PRO	3.5
1	B	263	ASN	3.1
1	B	134	THR	3.1
1	A	77	GLY	3.1
1	B	69[A]	ASN	2.6
1	B	264	GLY	2.6
1	A	5	ALA	2.5
1	A	288	GLY	2.4
1	A	243	PRO	2.3

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Mol	Chain	Res	Type	RSRZ
1	B	130	GLY	2.2
1	B	288	GLY	2.2
1	B	29	LEU	2.0
1	B	201	TYR	2.0
1	B	88	ASP	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, 95<sup>th</sup> 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.

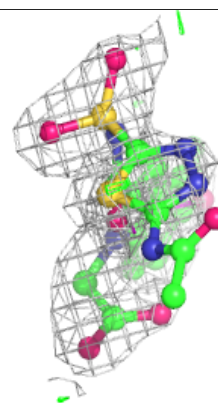
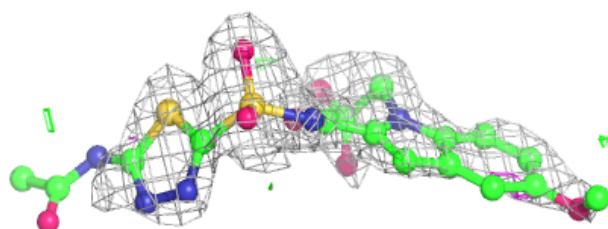
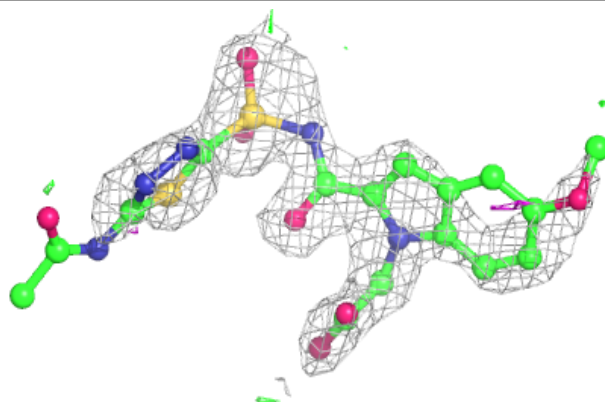
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
2	EOH	A	401	3/3	0.82	0.18	27,27,35,36	0
3	2DN	B	406	30/30	0.84	0.27	25,45,59,61	30
4	EDO	B	403	4/4	0.86	0.11	42,42,43,47	0
2	EOH	A	402	3/3	0.90	0.24	33,33,34,36	0
4	EDO	B	404	4/4	0.90	0.22	42,44,44,45	0
4	EDO	A	408	4/4	0.91	0.15	34,34,39,40	0
3	2DN	A	403	30/30	0.92	0.12	18,27,53,55	0
4	EDO	B	405	4/4	0.93	0.09	27,30,32,32	0
4	EDO	A	406	4/4	0.93	0.20	35,38,39,39	0
4	EDO	B	402	4/4	0.94	0.14	25,27,32,33	0
4	EDO	A	405	4/4	0.94	0.13	28,33,36,42	0
2	EOH	B	407	3/3	0.95	0.10	39,39,40,40	0
3	2DN	B	401	30/30	0.95	0.09	15,23,46,49	0
4	EDO	A	404	4/4	0.97	0.10	21,23,24,27	0
2	EOH	A	407	3/3	0.98	0.11	27,27,28,29	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.

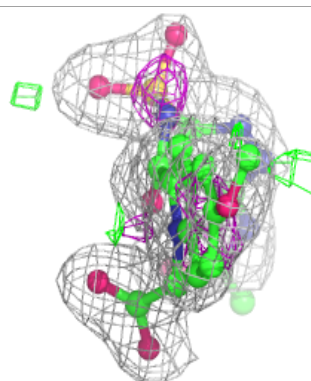
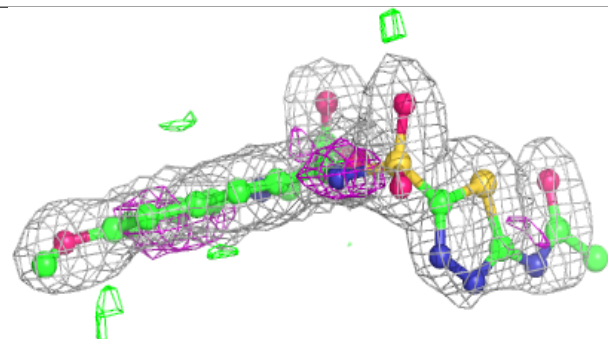
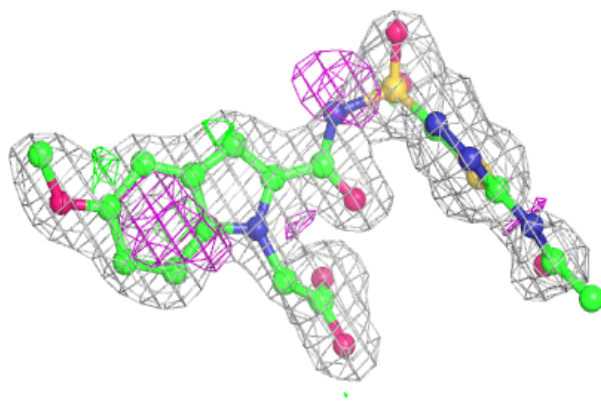
**Electron density around 2DN B 406:**

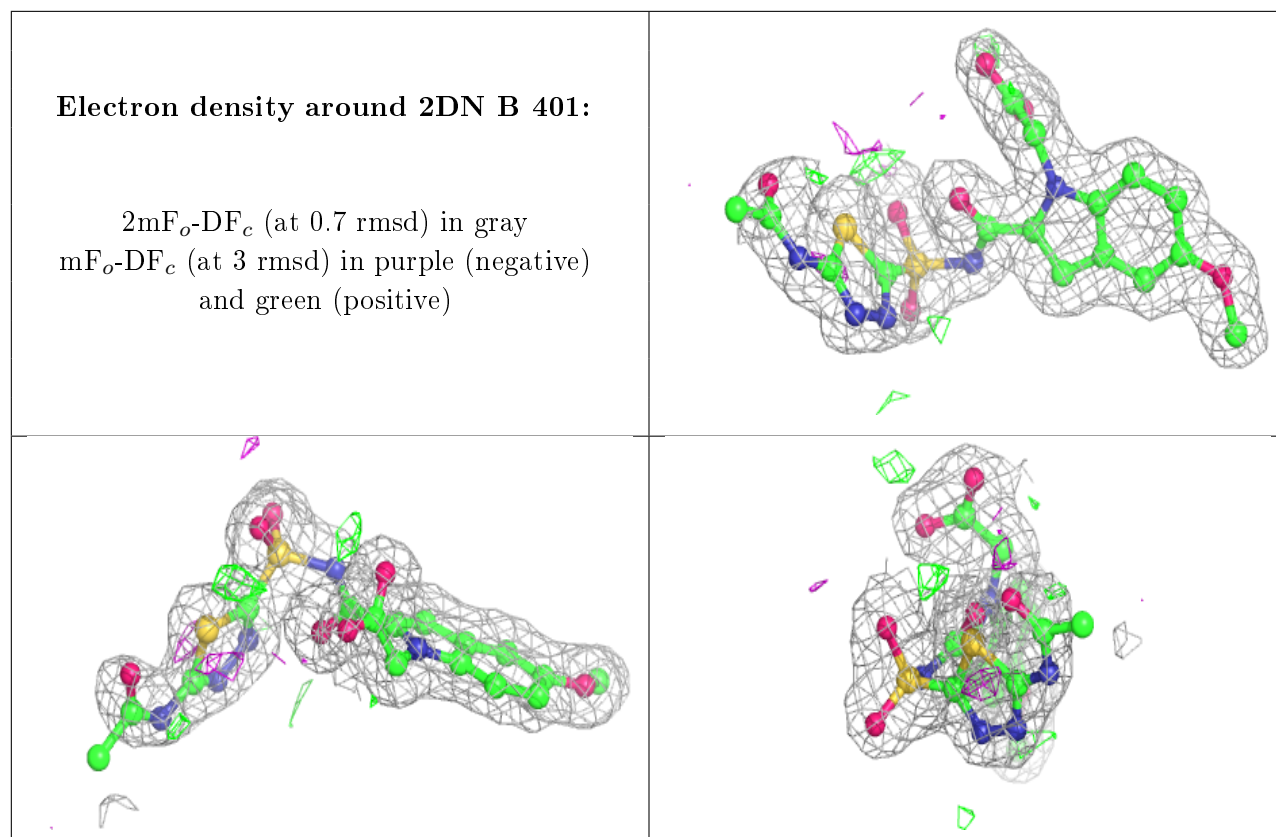
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around 2DN A 403:**

$2mF_o-DF_c$  (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.