



# Full wwPDB X-ray Structure Validation Report ⓘ

May 17, 2020 – 11:28 am BST

PDB ID : 6GRH  
Title : E. coli Microcin synthetase MccBCD complex with truncated pro-MccB17 bound  
Authors : Ghilarov, D.; Stevenson, C.E.M.; Travin, D.Y.; Piskunova, J.; Serebryakova, M.; Maxwell, A.; Lawson, D.M.; Severinov, K.  
Deposited on : 2018-06-11  
Resolution : 1.85 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 : 2.11  
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) : 2.11

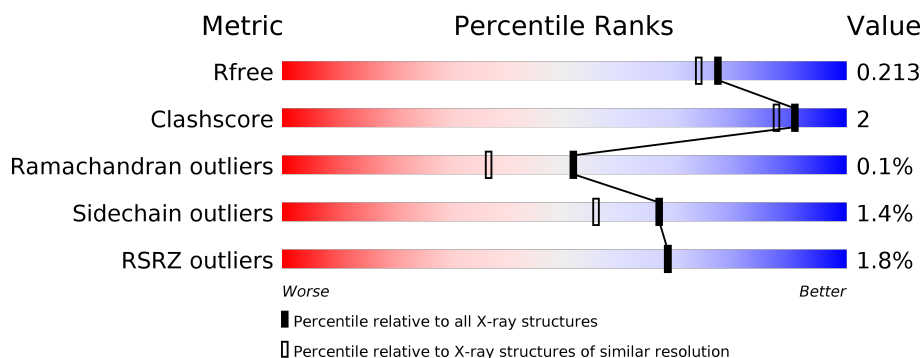
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 1.85 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	2469 (1.86-1.86)
Clashscore	141614	2625 (1.86-1.86)
Ramachandran outliers	138981	2592 (1.86-1.86)
Sidechain outliers	138945	2592 (1.86-1.86)
RSRZ outliers	127900	2436 (1.86-1.86)

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	52	<div> <div>2%</div> <div>38%</div> <div>60%</div> </div>
2	1	295	<div> <div>%</div> <div>92%</div> <div>• • •</div> </div>
2	2	295	<div> <div>5%</div> <div>92%</div> <div>• •</div> </div>
3	C	272	<div> <div>%</div> <div>96%</div> <div>• •</div> </div>
4	D	396	<div> <div>%</div> <div>93%</div> <div>5% •</div> </div>

## 2 Entry composition

There are 11 unique types of molecules in this entry. The entry contains 10888 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 Bacteriocin microcin B17.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	21	Total	C	N	O	S	0	1	0
			160	100	28	31	1			

There are 11 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-7	MET	-	initiating methionine	UNP P05834
A	-6	GLY	-	expression tag	UNP P05834
A	-5	HIS	-	expression tag	UNP P05834
A	-4	HIS	-	expression tag	UNP P05834
A	-3	HIS	-	expression tag	UNP P05834
A	-2	HIS	-	expression tag	UNP P05834
A	-1	HIS	-	expression tag	UNP P05834
A	0	HIS	-	expression tag	UNP P05834
A	39	OTZ	GLY	modified residue	UNP P05834
A	39	OTZ	SER	modified residue	UNP P05834
A	39	OTZ	CYS	modified residue	UNP P05834

- Molecule 2 is a protein called Microcin B17-processing protein McbB.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	1	284	Total	C	N	O	S	0	19	0
			2403	1537	400	452	14			
2	2	284	Total	C	N	O	S	0	10	0
			2316	1482	391	432	11			

- Molecule 3 is a protein called Microcin B17-processing protein McbC.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	C	266	Total	C	N	O	S	0	6	0
			2141	1372	365	395	9			

- Molecule 4 is a protein called Microcin B17-processing protein McdD.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	D	396	Total	C	N	O	S	0	17	0
			3273	2092	536	623	22			

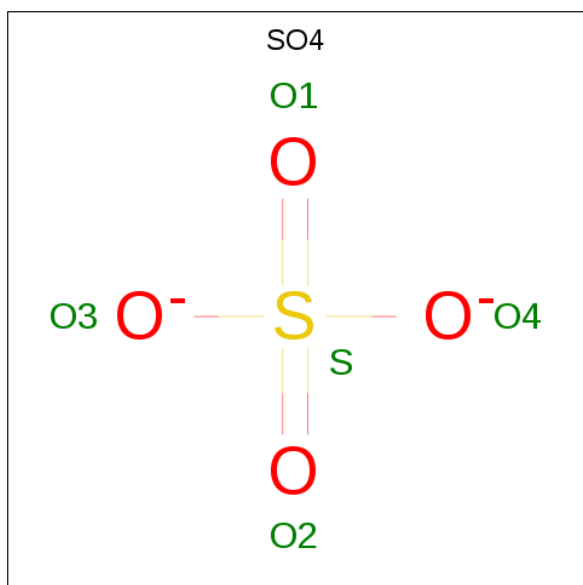
There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
D	171	ARG	THR	engineered mutation	UNP P23186

- Molecule 5 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	2	1	Total	Zn	0	0
			1	1		
5	1	1	Total	Zn	0	0
			1	1		

- Molecule 6 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).



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

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

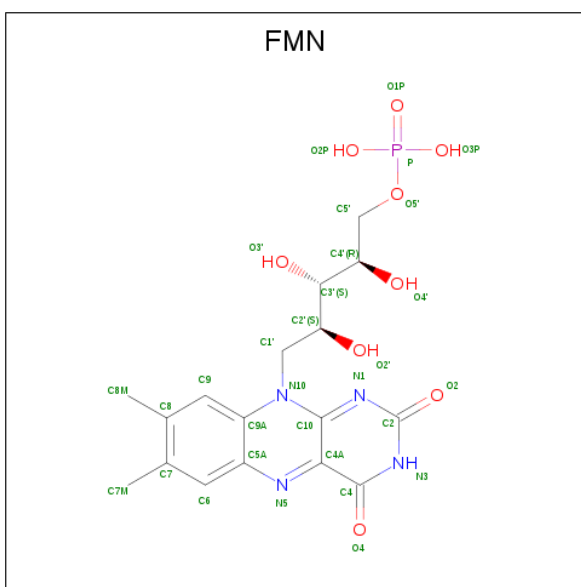
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	1	1	Total Cl 1 1	0	0
7	D	1	Total Cl 1 1	0	0

- Molecule 8 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C<sub>2</sub>H<sub>6</sub>O<sub>2</sub>).



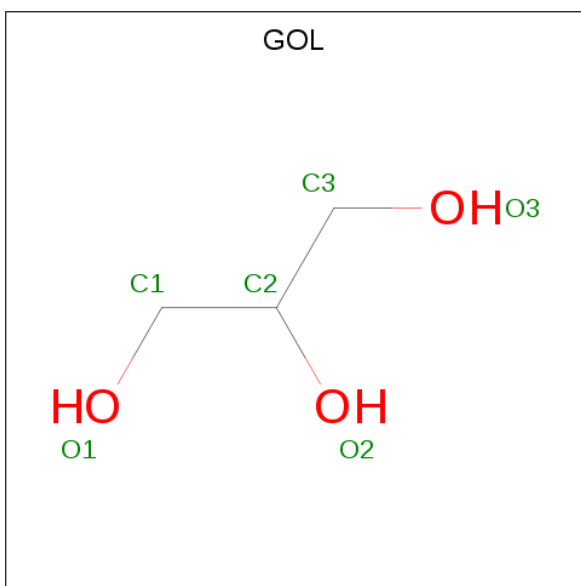
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	1	1	Total C O 4 2 2	0	0
8	1	1	Total C O 8 4 4	0	1
8	2	1	Total C O 4 2 2	0	0
8	2	1	Total C O 4 2 2	0	0
8	2	1	Total C O 4 2 2	0	0
8	C	1	Total C O 4 2 2	0	0
8	D	1	Total C O 4 2 2	0	0

- Molecule 9 is FLAVIN MONONUCLEOTIDE (three-letter code: FMN) (formula: C<sub>17</sub>H<sub>21</sub>N<sub>4</sub>O<sub>9</sub>P).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
9	C	1	Total	C	N	O	P	0	0
			31	17	4	9	1		

- Molecule 10 is GLYCEROL (three-letter code: GOL) (formula:  $\text{C}_3\text{H}_8\text{O}_3$ ).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
10	D	1	Total	C	O	0	0
			6	3	3		

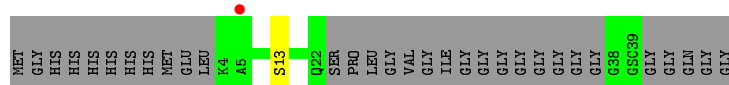
- Molecule 11 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
11	A	8	Total 8	O 8	0	0
11	1	142	Total 142	O 142	0	0
11	2	110	Total 111	O 111	0	1
11	C	124	Total 127	O 127	0	3
11	D	128	Total 129	O 129	0	1

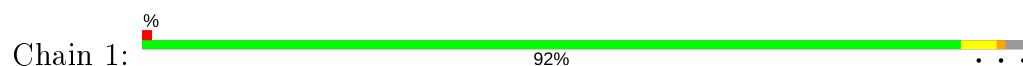
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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: Bacteriocin microcin B17



- Molecule 2: Microcin B17-processing protein McbB



- Molecule 2: Microcin B17-processing protein McbB



- Molecule 3: Microcin B17-processing protein McbC



- Molecule 4: Microcin B17-processing protein McbD





## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	180.74Å 83.76Å 87.12Å 90.00° 91.33° 90.00°	Depositor
Resolution (Å)	57.54 – 1.85 57.54 – 1.85	Depositor EDS
% Data completeness (in resolution range)	99.8 (57.54-1.85) 99.8 (57.54-1.85)	Depositor EDS
$R_{merge}$	0.09	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.46 (at 1.86Å)	Xtriage
Refinement program	REFMAC	Depositor
R, $R_{free}$	0.172 , 0.207 0.179 , 0.213	Depositor DCC
$R_{free}$ test set	5645 reflections (5.10%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	32.0	Xtriage
Anisotropy	0.219	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 42.5	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.018 for -h,-k,l	Xtriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	10888	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	37.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.65% 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 [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: GOL, ZN, CL, EDO, FMN, OTZ, 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	0.56	0/145	0.73	0/192
2	1	0.54	0/2453	0.74	1/3324 (0.0%)
2	2	0.54	0/2367	0.69	1/3215 (0.0%)
3	C	0.53	0/2194	0.71	0/2983
4	D	0.50	0/3343	0.68	1/4530 (0.0%)
All	All	0.52	0/10502	0.70	3/14244 (0.0%)

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	D	288	ARG	NE-CZ-NH1	5.81	123.21	120.30
2	1	199	ARG	NE-CZ-NH1	5.03	122.81	120.30
2	2	249	ARG	NE-CZ-NH2	-5.03	117.79	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	160	0	144	1	0
2	1	2403	0	2347	9	0
2	2	2316	0	2221	4	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	C	2141	0	2078	2	0
4	D	3273	0	3185	20	0
5	1	1	0	0	0	0
5	2	1	0	0	0	0
6	1	5	0	0	0	0
7	1	1	0	0	0	0
7	D	1	0	0	0	0
8	1	12	0	18	0	0
8	2	12	0	18	0	0
8	C	4	0	6	0	0
8	D	4	0	6	0	0
9	C	31	0	19	0	0
10	D	6	0	8	0	0
11	1	142	0	0	0	0
11	2	111	0	0	0	0
11	A	8	0	0	0	0
11	C	127	0	0	1	0
11	D	129	0	0	0	0
All	All	10888	0	10050	34	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 2.

All (34) 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)
2:1:197[A]:ILE:HD11	2:1:229:LEU:HD11	1.62	0.82
4:D:169[A]:MET:CE	4:D:331:LEU:HD21	2.18	0.73
4:D:319[A]:GLU:HA	4:D:319[A]:GLU:OE1	1.88	0.72
4:D:368:ASN:ND2	4:D:391:LYS:O	2.30	0.65
2:1:87:ASN:C	2:1:87:ASN:HD22	2.01	0.63
4:D:319[A]:GLU:CA	4:D:319[A]:GLU:OE1	2.45	0.62
2:1:112:ARG:HD2	2:1:125:ILE:HG12	1.85	0.57
4:D:176[B]:LEU:HG	4:D:378:ILE:HD12	1.91	0.53
4:D:8:LEU:HD12	4:D:8:LEU:C	2.30	0.52
4:D:169[A]:MET:HE3	4:D:331:LEU:HD21	1.91	0.52
2:1:265[A]:ASN:C	2:1:265[A]:ASN:HD22	2.15	0.50
2:2:64:LYS:O	2:2:68:GLU:HG3	2.12	0.49
2:2:79:PHE:CE1	2:2:83:THR:HG21	2.48	0.49
4:D:64:PHE:HB3	4:D:131[A]:LEU:HD22	1.95	0.49
4:D:272:PHE:CE2	4:D:282:ILE:HD11	2.49	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:D:131[A]:LEU:HD21	4:D:148:THR:HG22	1.96	0.46
4:D:57:GLU:OE2	4:D:61:ARG:NH1	2.50	0.45
3:C:110:SER:HB2	3:C:117[B]:ARG:O	2.16	0.45
4:D:129[B]:ILE:HD12	4:D:356:LYS:HD3	1.98	0.45
4:D:176[B]:LEU:HD12	4:D:218:LEU:CD2	2.47	0.43
4:D:291[A]:MET:HB2	4:D:291[A]:MET:HE3	1.92	0.43
4:D:131[A]:LEU:HD12	4:D:146:ARG:HB3	2.00	0.43
4:D:131[A]:LEU:HA	4:D:131[A]:LEU:HD12	1.77	0.43
1:A:13[B]:SER:HB2	2:1:35[B]:SER:HG	1.83	0.43
4:D:27:PRO:HG3	4:D:201:ILE:HD11	2.01	0.42
2:1:198:GLU:HG3	2:1:287:TRP:CE3	2.54	0.42
4:D:129[A]:ILE:HG13	4:D:356:LYS:HD3	2.01	0.42
2:1:286:HIS:NE2	2:1:293[A]:LEU:HD21	2.35	0.41
2:2:221:LEU:HD11	2:2:225:TYR:CZ	2.55	0.41
2:1:87:ASN:C	2:1:87:ASN:ND2	2.72	0.41
4:D:40:PRO:O	4:D:61:ARG:NH2	2.53	0.41
2:2:286:HIS:HD2	4:D:346:ARG:HB3	1.84	0.41
2:1:197[A]:ILE:CD1	2:1:229:LEU:HD11	2.41	0.40
3:C:54:LYS:NZ	11:C:502:HOH:O	2.55	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	18/52 (35%)	17 (94%)	1 (6%)	0	100	100
2	1	301/295 (102%)	297 (99%)	4 (1%)	0	100	100
2	2	292/295 (99%)	282 (97%)	8 (3%)	2 (1%)	22	9
3	C	270/272 (99%)	267 (99%)	3 (1%)	0	100	100
4	D	411/396 (104%)	403 (98%)	8 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
All	All	1292/1310 (99%)	1266 (98%)	24 (2%)	2 (0%)	51 33

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	2	56[A]	ILE
2	2	56[B]	ILE

### 5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	15/32 (47%)	15 (100%)	0	100 100
2	1	270/276 (98%)	266 (98%)	4 (2%)	65 53
2	2	251/276 (91%)	247 (98%)	4 (2%)	62 49
3	C	231/239 (97%)	228 (99%)	3 (1%)	69 58
4	D	357/351 (102%)	349 (98%)	8 (2%)	52 36
All	All	1124/1174 (96%)	1105 (98%)	19 (2%)	67 47

All (19) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	1	87	ASN
2	1	170	GLN
2	1	265[A]	ASN
2	1	265[B]	ASN
2	2	97	ASN
2	2	154	LYS
2	2	176	GLU
2	2	208	PHE
3	C	167[A]	THR
3	C	167[B]	THR
3	C	266	ASN
4	D	8	LEU

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Mol	Chain	Res	Type
4	D	129[A]	ILE
4	D	129[B]	ILE
4	D	131[A]	LEU
4	D	131[B]	LEU
4	D	146	ARG
4	D	344	ARG
4	D	368	ASN

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
2	1	14	ASN
2	1	87	ASN
2	1	97	ASN
2	1	131	ASN
2	1	217	ASN
2	2	286	HIS
4	D	158	ASN
4	D	180	GLN

### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

1 non-standard protein/DNA/RNA residue is 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	$\# Z  > 2$
1	OTZ	A	39	1	10,15,16	0.85	0	2,20,22	5.44	1 (50%)

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
1	OTZ	A	39	1	-	0/0/8/10	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(°)
1	A	39	OTZ	O-C-CA2	-7.69	116.93	124.22

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

## 5.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

## 5.6 Ligand geometry [i](#)

Of 15 ligands modelled in this entry, 4 are monoatomic - leaving 11 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	$\# Z  > 2$
8	EDO	2	404	-	3,3,3	0.48	0	2,2,2	0.10	0
8	EDO	1	404	-	3,3,3	0.43	0	2,2,2	0.23	0
10	GOL	D	703	-	5,5,5	0.25	0	5,5,5	0.24	0
8	EDO	C	402	-	3,3,3	0.33	0	2,2,2	0.44	0
8	EDO	1	405[B]	-	3,3,3	0.48	0	2,2,2	0.17	0
8	EDO	2	402	-	3,3,3	0.36	0	2,2,2	0.55	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
8	EDO	1	405[A]	-	3,3,3	0.39	0	2,2,2	0.41	0
6	SO4	1	402	-	4,4,4	0.33	0	6,6,6	0.38	0
8	EDO	D	701	-	3,3,3	0.48	0	2,2,2	0.26	0
9	FMN	C	401	-	31,33,33	2.45	6 (19%)	40,50,50	2.21	7 (17%)
8	EDO	2	403	-	3,3,3	0.42	0	2,2,2	0.44	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
8	EDO	2	404	-	-	1/1/1/1	-
8	EDO	1	404	-	-	0/1/1/1	-
10	GOL	D	703	-	-	2/4/4/4	-
8	EDO	C	402	-	-	0/1/1/1	-
8	EDO	1	405[B]	-	-	1/1/1/1	-
8	EDO	2	402	-	-	1/1/1/1	-
8	EDO	1	405[A]	-	-	1/1/1/1	-
8	EDO	D	701	-	-	1/1/1/1	-
9	FMN	C	401	-	-	0/18/18/18	0/3/3/3
8	EDO	2	403	-	-	0/1/1/1	-

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
9	C	401	FMN	C4A-C10	10.35	1.49	1.38
9	C	401	FMN	C4-C4A	4.35	1.48	1.41
9	C	401	FMN	C9A-C5A	4.00	1.50	1.42
9	C	401	FMN	C8-C7	3.29	1.49	1.40
9	C	401	FMN	C9A-N10	3.24	1.42	1.38
9	C	401	FMN	C10-N1	2.40	1.36	1.33

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
9	C	401	FMN	C4-N3-C2	8.25	122.11	115.14
9	C	401	FMN	C4-C4A-C10	-5.57	116.26	119.95
9	C	401	FMN	C1'-N10-C9A	5.27	122.44	118.29
9	C	401	FMN	C4A-N5-C5A	4.10	120.87	116.77
9	C	401	FMN	C4-C4A-N5	3.45	122.54	118.60
9	C	401	FMN	C4A-C4-N3	-3.44	118.72	123.43

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
9	C	401	FMN	C9A-N10-C10	-2.55	118.57	121.91

There are no chirality outliers.

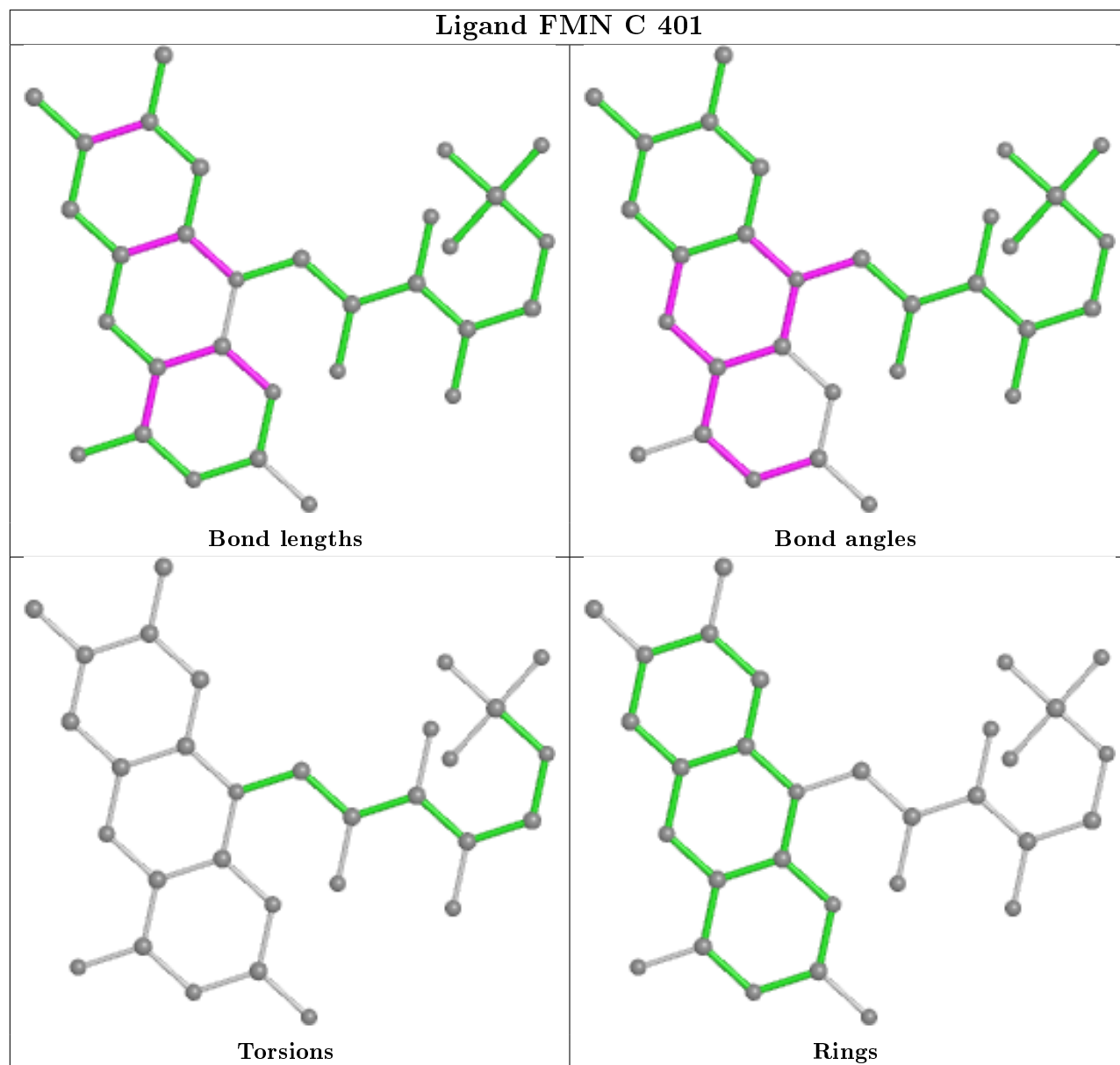
All (7) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
10	D	703	GOL	C1-C2-C3-O3
10	D	703	GOL	O2-C2-C3-O3
8	2	404	EDO	O1-C1-C2-O2
8	1	405[B]	EDO	O1-C1-C2-O2
8	2	402	EDO	O1-C1-C2-O2
8	D	701	EDO	O1-C1-C2-O2
8	1	405[A]	EDO	O1-C1-C2-O2

There are no ring outliers.

No monomer is involved in short contacts.

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	20/52 (38%)	0.24	1 (5%) 28 27	30, 40, 60, 69	0
2	1	284/295 (96%)	-0.09	2 (0%) 87 88	22, 33, 50, 70	0
2	2	284/295 (96%)	0.01	16 (5%) 24 23	23, 36, 64, 75	0
3	C	266/272 (97%)	0.04	2 (0%) 86 86	22, 35, 50, 73	0
4	D	396/396 (100%)	-0.10	2 (0%) 91 91	24, 39, 55, 64	0
All	All	1250/1310 (95%)	-0.04	23 (1%) 68 68	22, 36, 57, 75	0

All (23) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	2	259	VAL	8.2
2	2	60	TYR	4.1
2	2	257	SER	3.8
2	2	61	LEU	3.7
4	D	97	SER	3.6
2	2	258	LEU	3.3
2	2	96	VAL	2.9
1	A	5	ALA	2.8
2	2	89	THR	2.8
2	2	256	THR	2.7
2	2	215[A]	TRP	2.6
2	2	40	HIS	2.6
2	1	60[A]	TYR	2.5
2	1	131	ASN	2.5
2	2	63	ASP	2.5
2	2	57[A]	ILE	2.4
4	D	138	ASP	2.3
2	2	12	MET	2.3
3	C	19	VAL	2.2
2	2	41	GLU	2.2

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Mol	Chain	Res	Type	RSRZ
2	2	65	LEU	2.1
3	C	267	ASP	2.1
2	2	255	GLY	2.1

## 6.2 Non-standard residues in protein, DNA, RNA chains [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
1	OTZ	A	39	14/15	0.86	0.18	66,68,72,72	0

## 6.3 Carbohydrates [i](#)

There are no carbohydrates 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.

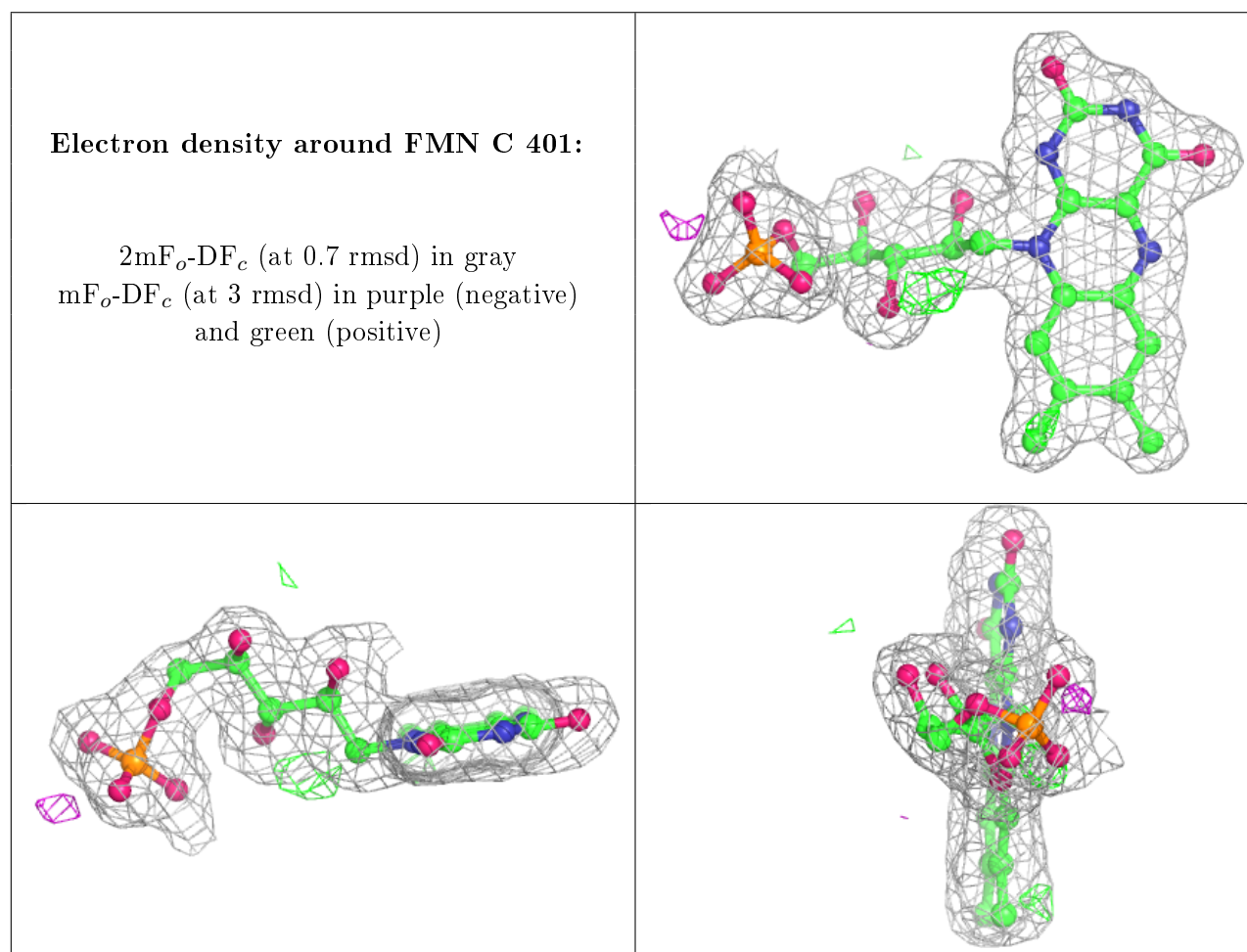
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
8	EDO	2	404	4/4	0.77	0.20	60,60,61,62	0
10	GOL	D	703	6/6	0.86	0.16	47,54,56,60	0
7	CL	D	702	1/1	0.88	0.07	64,64,64,64	0
8	EDO	2	403	4/4	0.88	0.13	44,45,45,46	0
8	EDO	1	405[A]	4/4	0.90	0.28	37,38,38,39	4
8	EDO	C	402	4/4	0.90	0.13	39,41,42,44	0
8	EDO	1	405[B]	4/4	0.90	0.28	50,51,51,51	4
8	EDO	2	402	4/4	0.93	0.10	36,39,40,42	0
8	EDO	D	701	4/4	0.94	0.11	38,41,41,41	0
8	EDO	1	404	4/4	0.94	0.13	39,41,42,42	0
7	CL	1	403	1/1	0.95	0.09	60,60,60,60	0
9	FMN	C	401	31/31	0.96	0.09	29,31,33,34	0
6	SO4	1	402	5/5	0.98	0.08	49,51,53,54	0
5	ZN	1	401	1/1	0.99	0.09	26,26,26,26	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
5	ZN	2	401	1/1	1.00	0.06	28,28,28,28	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 ⓘ

There are no such residues in this entry.