



wwPDB X-ray Structure Validation Summary Report ⓘ

Jul 25, 2023 – 12:59 AM EDT

PDB ID : 2FMT
Title : METHIONYL-TRNAFMET FORMYLTRANSFERASE COMPLEXED
WITH FORMYL-METHIONYL-TRNAFMET
Authors : Schmitt, E.; Mechulam, Y.; Blanquet, S.
Deposited on : 1998-07-29
Resolution : 2.80 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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)
Xtrriage (Phenix) : **NOT EXECUTED**
EDS : **NOT EXECUTED**
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.34

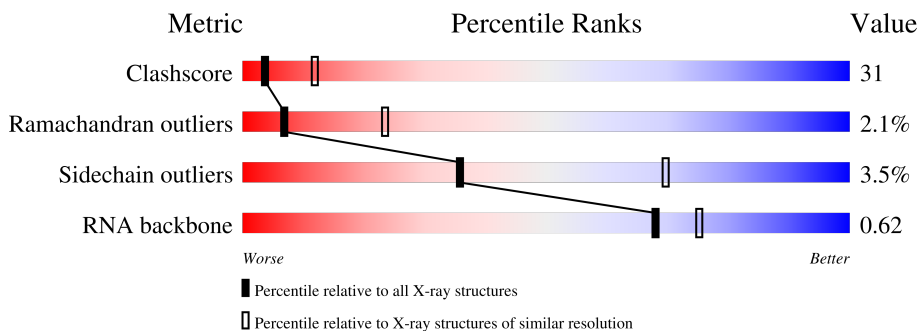
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.80 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))
Clashscore	141614	3569 (2.80-2.80)
Ramachandran outliers	138981	3498 (2.80-2.80)
Sidechain outliers	138945	3500 (2.80-2.80)
RNA backbone	3102	1227 (3.10-2.50)

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 $\leq 5\%$.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	C	77	21% 57% 19% .
1	D	77	19% 60% 19% .
2	A	314	57% 40% .
2	B	314	52% 44% .

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
1	OMC	C	32	-	-	X	-
1	OMC	D	32	-	-	X	-

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 8179 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 RNA chain called FORMYL-METHIONYL-TRNAFMET2.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	N	O	P	S			
1	C	77	Total	C	N	O	P	S	0	0	0
			1645	734	297	536	77	1			
1	D	77	Total	C	N	O	P	S	0	0	0
			1645	734	297	536	77	1			

- Molecule 2 is a protein called METHIONYL-TRNA FMET FORMYLTRANSFERASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	A	314	Total	C	N	O	S	0	0	0
			2392	1517	414	450	11			
2	B	314	Total	C	N	O	S	0	0	0
			2392	1517	414	450	11			

- Molecule 3 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	C	1	Total	Mg	0	0
			1	1		
3	D	1	Total	Mg	0	0
			1	1		

- Molecule 4 is N-FORMYLMETHIONINE (three-letter code: FME) (formula: C₆H₁₁NO₃S).

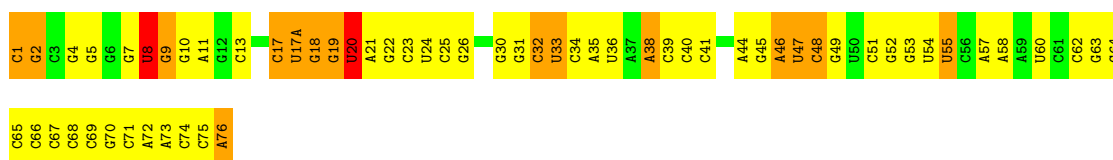
3 Residue-property plots

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. 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. 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.

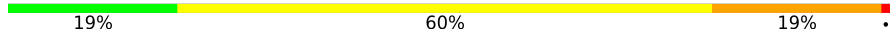
Note EDS was not executed.

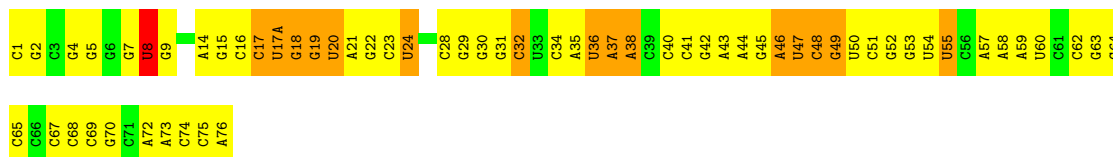
- Molecule 1: FORMYL-METHIONYL-TRNAFMET2

Chain C: 



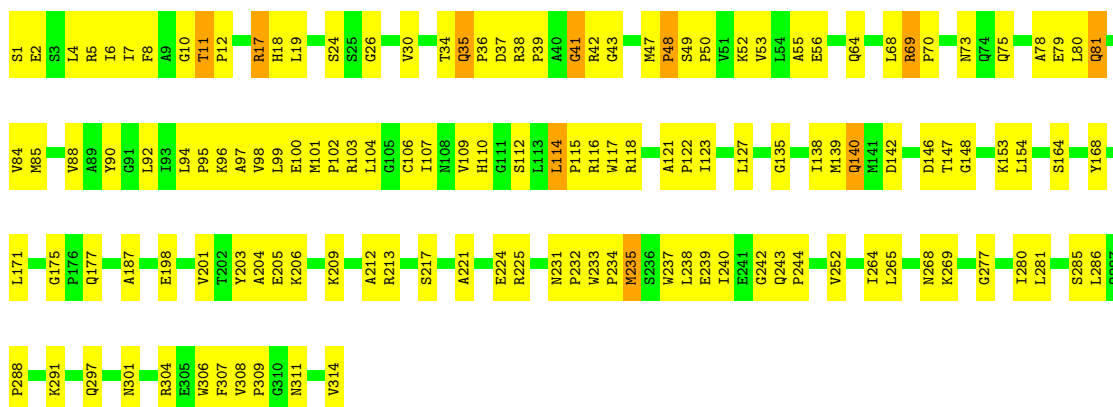
- Molecule 1: FORMYL-METHIONYL-TRNAFMET2

Chain D: 



- Molecule 2: METHIONYL-TRNA FMET FORMYLTRANSFERASE

Chain A: 



- Molecule 2: METHIONYL-TRNA FMET FORMYLTRANSFERASE

Chain B: 

S1	E2	S3	L4	R5	I6	I7	G10	T11	P12	R17	H18	N28	V29	V30	G31	T34	Q35	P36	D37	R38	P39	A40	G41	R42	M47	P48	S49	P50	V51	K52	A55	E56	P61	V62	F63	Q64	P65	V66	S67	L68	R69	P70	N73	Q74	Q75	A78	E79	L80	Q81	A82					
D83	V84	M85	V86	V87	Y80	G91	L92	I93	L94	P95	K96	A97	V98	L99	E100	M101	P102	R103	L104	G105	C106	I107	M108	Y109	H110	G111	S112	L113	L114	P115	R116	W117	R118	G119	A120	A121	P122	I123	Q124	R125	S126	L127	W128	G135	M139	Q140	M141	D142	V143	G144	L145	D146	T147	G148	I158
S164	Y168	L171	G175	P176	L179	L186	A187	A191	E198	V201	T202	Y203	A204	L207	S288	K209	A212	D215	W216	S217	L218	S219	Q222	L223	E224	R225	N231	P232	W233	P234	M235	S236	W237	L238	E239	L240	E241	G242	Q243	P244	I253	A256													
A260	P261	G262	T263	I264	L265	I272	Q273	Q274	V274	A275	T276	G277	D278	G279	I280	L281	N282	L283	L284	S285	L286	A289	S302	R303	R304	E305	W306	F307	V308	N311	R312	L313	V314																						

4 Data and refinement statistics

Xtrriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, α , β , γ	201.71Å 68.06Å 86.35Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	19.00 – 2.80	Depositor
% Data completeness (in resolution range)	87.2 (19.00-2.80)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	0.05	Depositor
Refinement program	CNS 0.3C	Depositor
R, R_{free}	0.247 , 0.292	Depositor
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	8179	wwPDB-VP
Average B, all atoms (Å ²)	62.0	wwPDB-VP

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: MG, OMC, 4SU, 5MU, FME, PSU, H2U

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	C	0.52	2/1725 (0.1%)	0.73	2/2687 (0.1%)
1	D	0.51	1/1725 (0.1%)	0.76	2/2687 (0.1%)
2	A	0.49	0/2439	0.77	1/3317 (0.0%)
2	B	0.48	0/2439	0.76	2/3317 (0.1%)
All	All	0.50	3/8328 (0.0%)	0.76	7/12008 (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	D	0	1

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	1	C	OP3-P	-7.45	1.52	1.61
1	C	1	C	OP3-P	-6.99	1.52	1.61
1	C	76	A	C3'-O3'	5.93	1.50	1.42

The worst 5 of 7 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	1	C	OP2-P-O3'	6.52	119.53	105.20
1	C	1	C	OP1-P-O3'	6.11	118.64	105.20
2	B	41	GLY	N-CA-C	5.87	127.77	113.10
2	A	41	GLY	N-CA-C	5.70	127.34	113.10
1	D	2	G	O5'-P-OP2	-5.24	100.99	105.70

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	D	24	U	Sidechain

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	C	1645	0	839	89	0
1	D	1645	0	839	75	0
2	A	2392	0	2442	140	0
2	B	2392	0	2442	176	0
3	C	1	0	0	0	0
3	D	1	0	0	0	0
4	C	10	0	10	1	0
4	D	10	0	10	1	0
5	A	35	0	0	0	0
5	B	18	0	0	0	0
5	C	17	0	0	0	0
5	D	13	0	0	0	0
All	All	8179	0	6582	459	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 31.

The worst 5 of 459 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:C:32:OMC:CM2	1:C:32:OMC:O2'	1.68	1.42
1:C:32:OMC:O2'	1:C:32:OMC:C2'	1.68	1.41
1:D:32:OMC:O2'	1:D:32:OMC:CM2	1.71	1.37
1:C:1:C:H3'	1:C:2:G:C5'	1.78	1.13
1:C:1:C:C3'	1:C:2:G:H5'	1.80	1.10

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	
2	A	312/314 (99%)	262 (84%)	45 (14%)	5 (2%)	9	31
2	B	312/314 (99%)	264 (85%)	40 (13%)	8 (3%)	5	18
All	All	624/628 (99%)	526 (84%)	85 (14%)	13 (2%)	7	23

5 of 13 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	256	ALA
2	B	175	GLY
2	A	11	THR
2	B	42	ARG
2	A	235	MET

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	
2	A	257/257 (100%)	248 (96%)	9 (4%)	36	70
2	B	257/257 (100%)	248 (96%)	9 (4%)	36	70
All	All	514/514 (100%)	496 (96%)	18 (4%)	36	70

5 of 18 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	B	140	GLN

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Mol	Chain	Res	Type
2	B	238	LEU
2	B	203	TYR
2	A	268	ASN
2	B	103	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 15 such sidechains are listed below:

Mol	Chain	Res	Type
2	B	27	HIS
2	B	268	ASN
2	B	35	GLN
2	B	270	GLN
2	B	222	GLN

5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	C	76/77 (98%)	14 (18%)	3 (3%)
1	D	76/77 (98%)	14 (18%)	4 (5%)
All	All	152/154 (98%)	28 (18%)	7 (4%)

5 of 28 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	C	2	G
1	C	8	4SU
1	C	9	G
1	C	17	C
1	C	17(A)	U

5 of 7 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
1	D	17	C
1	D	17(A)	U
1	D	46	A
1	D	36	U
1	C	46	A

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

10 non-standard protein/DNA/RNA residues 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
1	5MU	D	54	1	19,22,23	0.24	0	28,32,35	0.33	0
1	OMC	D	32	1	19,22,23	2.23	2 (10%)	26,31,34	0.68	0
1	PSU	D	55	1	18,21,22	1.75	1 (5%)	22,30,33	0.73	1 (4%)
1	H2U	D	20	1	18,21,22	1.09	1 (5%)	21,30,33	0.76	0
1	PSU	C	55	1	18,21,22	1.71	1 (5%)	22,30,33	0.75	1 (4%)
1	OMC	C	32	1	19,22,23	2.94	2 (10%)	26,31,34	0.80	1 (3%)
1	5MU	C	54	1	19,22,23	0.24	0	28,32,35	0.33	0
1	4SU	D	8	1	18,21,22	5.41	1 (5%)	26,30,33	0.28	0
1	H2U	C	20	1	18,21,22	0.81	1 (5%)	21,30,33	0.69	0
1	4SU	C	8	1	18,21,22	5.08	1 (5%)	26,30,33	0.42	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
1	5MU	D	54	1	-	0/7/25/26	0/2/2/2
1	OMC	D	32	1	-	1/9/27/28	0/2/2/2
1	PSU	D	55	1	-	2/7/25/26	0/2/2/2
1	H2U	D	20	1	-	5/7/38/39	0/2/2/2
1	PSU	C	55	1	-	1/7/25/26	0/2/2/2
1	OMC	C	32	1	-	1/9/27/28	0/2/2/2
1	5MU	C	54	1	-	0/7/25/26	0/2/2/2
1	4SU	D	8	1	-	0/7/25/26	0/2/2/2
1	H2U	C	20	1	-	3/7/38/39	0/2/2/2
1	4SU	C	8	1	-	0/7/25/26	0/2/2/2

The worst 5 of 10 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	8	4SU	C4-S4	-22.92	1.25	1.68
1	C	8	4SU	C4-S4	-21.47	1.27	1.68
1	C	32	OMC	O2'-C2'	10.18	1.68	1.42
1	D	32	OMC	O2'-CM2	8.15	1.71	1.42
1	C	32	OMC	O2'-CM2	7.40	1.68	1.42

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	55	PSU	C5-C6-N1	2.23	125.45	122.11
1	C	55	PSU	C5-C6-N1	2.21	125.42	122.11
1	C	32	OMC	O3'-C3'-C4'	-2.19	104.73	111.05

There are no chirality outliers.

5 of 13 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	C	20	H2U	C3'-C4'-C5'-O5'
1	C	32	OMC	C1'-C2'-O2'-CM2
1	C	55	PSU	O4'-C1'-C5-C6
1	D	20	H2U	O4'-C1'-N1-C6
1	D	20	H2U	C2'-C1'-N1-C2

There are no ring outliers.

9 monomers are involved in 38 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	D	54	5MU	2	0
1	D	32	OMC	9	0
1	D	55	PSU	4	0
1	C	55	PSU	4	0
1	C	32	OMC	11	0
1	C	54	5MU	3	0
1	D	8	4SU	2	0
1	C	20	H2U	4	0
1	C	8	4SU	3	0

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry

Of 4 ligands modelled in this entry, 2 are monoatomic - leaving 2 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	FME	D	586	1	8,9,10	1.07	1 (12%)	7,9,11	1.89	2 (28%)
4	FME	C	585	1	8,9,10	1.55	3 (37%)	7,9,11	1.59	2 (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
4	FME	D	586	1	-	2/7/9/11	-
4	FME	C	585	1	-	5/7/9/11	-

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	C	585	FME	CN-N	2.84	1.42	1.33
4	C	585	FME	O1-CN	-2.58	1.15	1.22
4	D	586	FME	O1-CN	-2.03	1.16	1.22
4	C	585	FME	O-C	2.00	1.27	1.19

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	D	586	FME	C-CA-N	3.55	116.14	109.73
4	D	586	FME	O-C-CA	-3.03	116.84	124.78
4	C	585	FME	O-C-CA	-2.65	117.82	124.78
4	C	585	FME	C-CA-N	2.45	114.16	109.73

There are no chirality outliers.

5 of 7 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	C	585	FME	O1-CN-N-CA
4	C	585	FME	N-CA-CB-CG
4	C	585	FME	C-CA-CB-CG
4	C	585	FME	O-C-CA-CB
4	D	586	FME	O1-CN-N-CA

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	D	586	FME	1	0
4	C	585	FME	1	0

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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

EDS was not executed - this section is therefore empty.

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates [i](#)

EDS was not executed - this section is therefore empty.

6.4 Ligands [i](#)

EDS was not executed - this section is therefore empty.

6.5 Other polymers [i](#)

EDS was not executed - this section is therefore empty.