



# Full wwPDB X-ray Structure Validation Report ⓘ

Nov 30, 2023 – 08:20 AM EST

PDB ID : 4MFL  
Title : The crystal structure of acyltransferase in complex with decanoyl-CoA and Tei pseudoaglycone  
Authors : Lyu, S.Y.; Liu, Y.C.; Chang, C.Y.; Huang, C.J.; Li, T.L.  
Deposited on : 2013-08-28  
Resolution : 1.90 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.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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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 : 2.36  
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

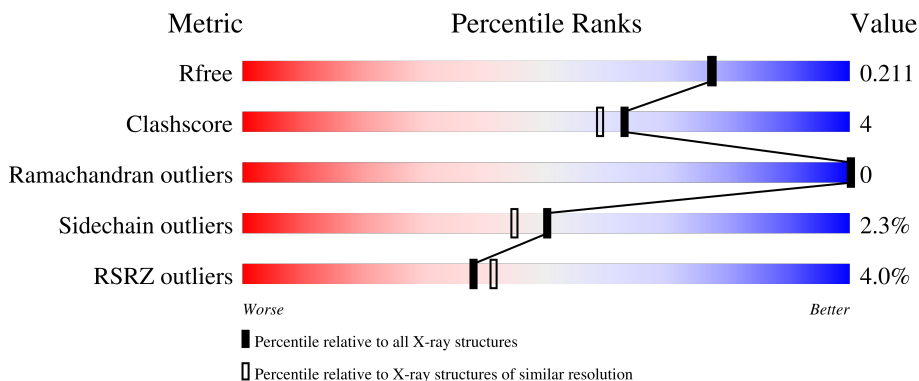
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.90 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	6207 (1.90-1.90)
Clashscore	141614	6847 (1.90-1.90)
Ramachandran outliers	138981	6760 (1.90-1.90)
Sidechain outliers	138945	6760 (1.90-1.90)
RSRZ outliers	127900	6082 (1.90-1.90)

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  $\geq 3$ , 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	345	 4% 85% 9% 6%
2	B	7	 57% 43%

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	GHP	B	397	-	-	-	X
2	3FG	B	399	-	-	-	X
2	3FG	B	403	-	-	-	X
3	SO4	A	402	-	-	-	X
6	GCS	B	502	-	-	X	-
7	MAN	B	503	-	-	-	X

## 2 Entry composition [i](#)

There are 8 unique types of molecules in this entry. The entry contains 3228 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 Putative uncharacterized protein tcp24.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	323	2670	1705	485	472	8	0	8	0

There are 23 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-21	MET	-	expression tag	UNP Q70AY4
A	-20	GLY	-	expression tag	UNP Q70AY4
A	-19	SER	-	expression tag	UNP Q70AY4
A	-18	SER	-	expression tag	UNP Q70AY4
A	-17	HIS	-	expression tag	UNP Q70AY4
A	-16	HIS	-	expression tag	UNP Q70AY4
A	-15	HIS	-	expression tag	UNP Q70AY4
A	-14	HIS	-	expression tag	UNP Q70AY4
A	-13	HIS	-	expression tag	UNP Q70AY4
A	-12	HIS	-	expression tag	UNP Q70AY4
A	-11	SER	-	expression tag	UNP Q70AY4
A	-10	SER	-	expression tag	UNP Q70AY4
A	-9	GLY	-	expression tag	UNP Q70AY4
A	-8	LEU	-	expression tag	UNP Q70AY4
A	-7	VAL	-	expression tag	UNP Q70AY4
A	-6	PRO	-	expression tag	UNP Q70AY4
A	-5	ARG	-	expression tag	UNP Q70AY4
A	-4	GLY	-	expression tag	UNP Q70AY4
A	-3	SER	-	expression tag	UNP Q70AY4
A	-2	HIS	-	expression tag	UNP Q70AY4
A	-1	MET	-	expression tag	UNP Q70AY4
A	0	MET	-	expression tag	UNP Q70AY4
A	196	ALA	HIS	engineered mutation	UNP Q70AY4

- Molecule 2 is a protein called Teicoplanin pseudoaglycone.

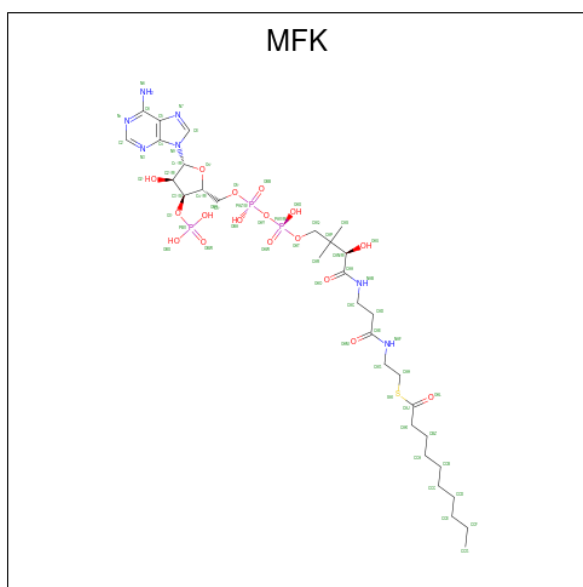
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace	
			Total	C	Cl	N				O
2	B	7	85	58	2	7	18	0	0	0

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).



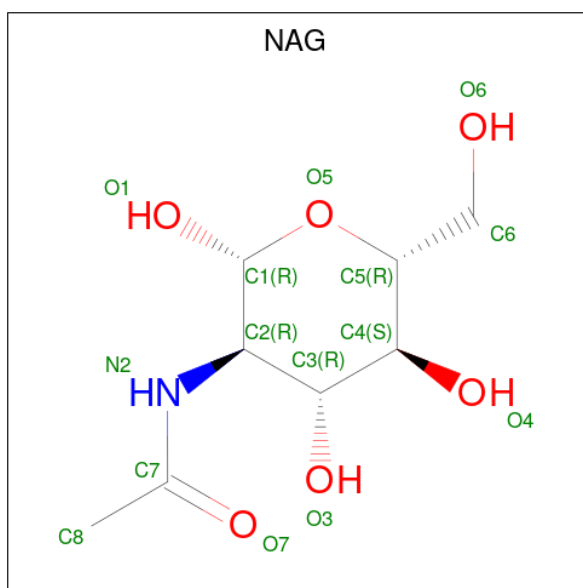
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	O	S		
3	A	1	5	4	1	0	0
3	A	1	5	4	1	0	0
3	A	1	5	4	1	0	0

- Molecule 4 is decanoyl-CoA (three-letter code: MFK) (formula: C<sub>31</sub>H<sub>54</sub>N<sub>7</sub>O<sub>17</sub>P<sub>3</sub>S).



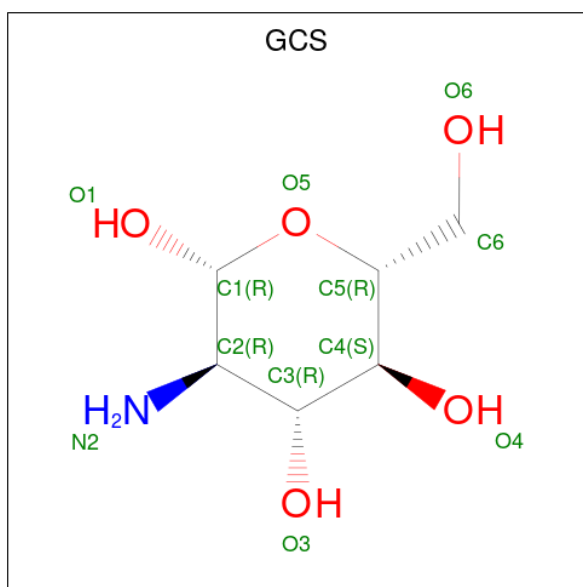
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
			Total	C	N	O	P			S
4	A	1	59	31	7	17	3	1	0	0

- Molecule 5 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula:  $C_8H_{15}NO_6$ ).



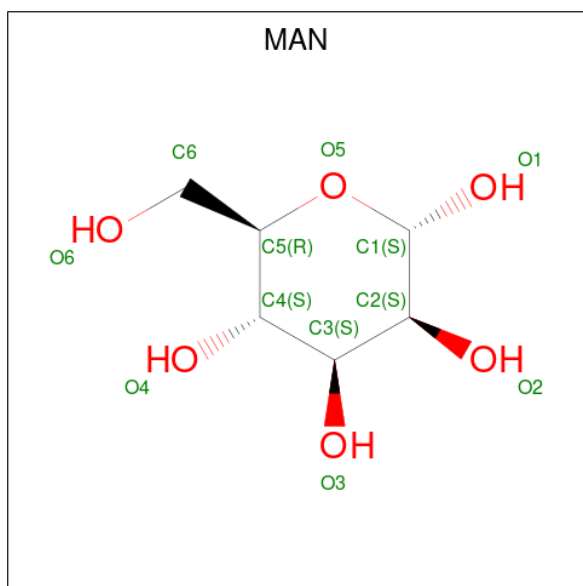
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
5	B	1	14	8	1	5	0	0

- Molecule 6 is 2-amino-2-deoxy-beta-D-glucopyranose (three-letter code: GCS) (formula:  $C_6H_{13}NO_5$ ).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
6	B	1	11	6	1	4	0	0

- Molecule 7 is alpha-D-mannopyranose (three-letter code: MAN) (formula:  $C_6H_{12}O_6$ ).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
7	B	1	11	6	5	0	0

- Molecule 8 is water.

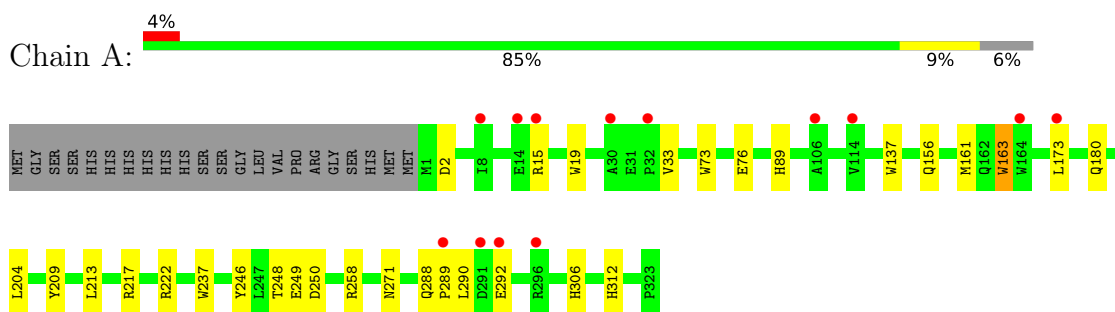
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	355	Total 355	O 355	0	0
8	B	8	Total 8	O 8	0	0



### 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: Putative uncharacterized protein tcp24



- Molecule 2: Teicoplanin pseudoaglycone



## 4 Data and refinement statistics i

Property	Value	Source
Space group	P 65	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	133.58Å 133.58Å 49.25Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	30.00 – 1.90 26.88 – 1.90	Depositor EDS
% Data completeness (in resolution range)	99.8 (30.00-1.90) 99.9 (26.88-1.90)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.41 (at 1.91Å)	Xtrriage
Refinement program	REFMAC 5.6.0117	Depositor
R, $R_{free}$	0.174 , 0.211 0.174 , 0.211	Depositor DCC
$R_{free}$ test set	1999 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	29.1	Xtrriage
Anisotropy	0.006	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 46.5	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.032 for h,-h-k,-l	Xtrriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	3228	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	35.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.15% 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: OMY, GHP, 3MY, 3FG, NAG, GCS, MAN, MFK, 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	0.67	5/2761 (0.2%)	0.63	0/3759

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	237	TRP	CD2-CE2	5.68	1.48	1.41
1	A	19	TRP	CD2-CE2	5.35	1.47	1.41
1	A	137	TRP	CD2-CE2	5.35	1.47	1.41
1	A	73	TRP	CD2-CE2	5.22	1.47	1.41
1	A	163	TRP	CD2-CE2	5.02	1.47	1.41

There are no bond angle outliers.

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	2670	0	2593	19	0
2	B	85	0	31	3	0
3	A	15	0	0	0	0
4	A	59	0	50	2	0
5	B	14	0	13	0	0
6	B	11	0	11	6	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
7	B	11	0	10	0	0
8	A	355	0	0	4	0
8	B	8	0	0	0	0
All	All	3228	0	2708	24	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 4.

All (24) 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:A:161[B]:MET:HE1	6:B:502:GCS:H62	1.53	0.88
4:A:404:MFK:CAJ	6:B:502:GCS:HN22	1.91	0.83
1:A:161[B]:MET:CE	6:B:502:GCS:H62	2.19	0.72
1:A:248:THR:OG1	1:A:250:ASP:OD1	2.10	0.69
1:A:222:ARG:HG2	8:A:625:HOH:O	1.95	0.65
1:A:163:TRP:HD1	8:A:518:HOH:O	1.79	0.65
4:A:404:MFK:CAJ	6:B:502:GCS:N2	2.59	0.64
1:A:89:HIS:HD2	8:A:517:HOH:O	1.86	0.59
1:A:246:TYR:OH	1:A:306:HIS:HD2	1.86	0.58
1:A:161[B]:MET:CE	6:B:502:GCS:C6	2.87	0.52
2:B:397:GHP:C2	2:B:399:3FG:HG2	2.39	0.52
1:A:173[B]:LEU:HD11	1:A:180:GLN:HB3	1.92	0.52
1:A:33:VAL:HG21	1:A:76:GLU:HA	1.93	0.51
2:B:402:OMY:CD2	2:B:402:OMY:N	2.75	0.49
1:A:161[B]:MET:HE1	6:B:502:GCS:C6	2.34	0.49
1:A:249:GLU:CD	1:A:258[A]:ARG:HH22	2.15	0.49
2:B:397:GHP:C2	2:B:399:3FG:CG2	2.86	0.49
1:A:209:TYR:CE1	1:A:213[A]:LEU:HD12	2.49	0.47
1:A:246:TYR:OH	1:A:306:HIS:CD2	2.67	0.46
1:A:249:GLU:OE2	1:A:258[A]:ARG:NH2	2.33	0.45
1:A:288:GLN:HB2	1:A:289:PRO:HD2	1.99	0.44
1:A:289:PRO:HG2	1:A:292:GLU:HB2	2.02	0.42
1:A:306:HIS:HE1	1:A:312:HIS:O	2.03	0.42
1:A:217:ARG:HD2	8:A:816:HOH:O	2.19	0.42

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	329/345 (95%)	326 (99%)	3 (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	272/283 (96%)	266 (98%)	6 (2%)	52   47

All (6) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	2	ASP
1	A	15	ARG
1	A	156	GLN
1	A	204	LEU
1	A	271	ASN
1	A	290	LEU

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

Mol	Chain	Res	Type
1	A	89	HIS
1	A	242	GLN

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Mol	Chain	Res	Type
1	A	271	ASN
1	A	286	ASN
1	A	306	HIS

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

7 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
2	3FG	B	399	2	11,12,13	1.61	1 (9%)	13,16,18	1.12	1 (7%)
2	3MY	B	398	2	12,13,14	2.06	1 (8%)	14,17,19	1.10	0
2	GHP	B	397	2	10,11,12	1.62	1 (10%)	11,14,16	1.01	0
2	OMY	B	402	2,5	12,14,15	2.80	2 (16%)	17,19,21	2.03	3 (17%)
2	GHP	B	400	2,6	10,11,12	0.51	0	11,14,16	1.40	2 (18%)
2	3FG	B	403	7,2	12,13,13	1.29	2 (16%)	14,18,18	1.22	2 (14%)
2	GHP	B	401	2	10,11,12	1.63	1 (10%)	11,14,16	1.04	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
2	3FG	B	399	2	-	0/4/6/8	0/1/1/1
2	3MY	B	398	2	-	0/5/6/8	0/1/1/1
2	GHP	B	397	2	-	4/4/6/8	0/1/1/1
2	OMY	B	402	2,5	-	1/9/10/12	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	GHP	B	400	2,6	-	1/4/6/8	0/1/1/1
2	3FG	B	403	7,2	-	2/8/8/8	0/1/1/1
2	GHP	B	401	2	-	0/4/6/8	0/1/1/1

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	402	OMY	CZ-CE1	8.40	1.47	1.39
2	B	398	3MY	CZ-CE2	6.61	1.45	1.39
2	B	399	3FG	CB-CA	-5.01	1.47	1.52
2	B	397	GHP	C1-CA	-4.92	1.47	1.52
2	B	401	GHP	C1-CA	-4.72	1.47	1.52
2	B	402	OMY	CG-CB	-3.44	1.46	1.51
2	B	403	3FG	CB-CA	-2.28	1.49	1.52
2	B	403	3FG	OXT-C	-2.09	1.23	1.30

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	402	OMY	CG-CB-CA	-5.56	104.04	111.49
2	B	402	OMY	ODE-CB-CA	4.72	117.25	107.28
2	B	400	GHP	C5-C6-C1	3.29	124.50	121.20
2	B	403	3FG	OXT-C-O	-2.78	117.78	124.09
2	B	399	3FG	CB-CA-N	-2.64	106.07	112.40
2	B	402	OMY	CD2-CG-CD1	2.11	121.19	118.76
2	B	403	3FG	CB-CA-C	2.09	114.69	109.96
2	B	400	GHP	C6-C1-C2	-2.03	115.76	118.29

There are no chirality outliers.

All (8) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	402	OMY	O-C-CA-CB
2	B	403	3FG	C-CA-CB-CG1
2	B	403	3FG	C-CA-CB-CG2
2	B	400	GHP	C6-C1-CA-C
2	B	397	GHP	C6-C1-CA-N
2	B	397	GHP	C2-C1-CA-C
2	B	397	GHP	C6-C1-CA-C
2	B	397	GHP	C2-C1-CA-N

There are no ring outliers.

3 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	399	3FG	2	0
2	B	397	GHP	2	0
2	B	402	OMY	1	0

## 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

7 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	$\# Z  > 2$
6	GCS	B	502	2	11,11,12	0.33	0	12,15,17	1.16	1 (8%)
3	SO4	A	403	-	4,4,4	0.34	0	6,6,6	0.11	0
7	MAN	B	503	2	11,11,12	0.59	0	15,15,17	0.69	0
4	MFK	A	404	-	53,61,61	2.36	10 (18%)	64,87,87	1.93	8 (12%)
5	NAG	B	501	2	14,14,15	0.92	1 (7%)	17,19,21	1.54	2 (11%)
3	SO4	A	401	-	4,4,4	0.36	0	6,6,6	0.17	0
3	SO4	A	402	-	4,4,4	0.32	0	6,6,6	0.08	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
6	GCS	B	502	2	-	0/2/19/22	0/1/1/1
4	MFK	A	404	-	-	6/56/76/76	0/3/3/3
7	MAN	B	503	2	-	0/2/19/22	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	NAG	B	501	2	-	2/6/23/26	0/1/1/1

All (11) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	404	MFK	C2-N3	10.23	1.48	1.32
4	A	404	MFK	C2-N1	7.50	1.47	1.33
4	A	404	MFK	CAJ-SAI	7.31	1.93	1.76
4	A	404	MFK	O4'-C1'	4.27	1.47	1.41
4	A	404	MFK	PBV-OBW	2.64	1.59	1.50
4	A	404	MFK	CAK-CAJ	2.53	1.53	1.50
4	A	404	MFK	C5-C4	-2.51	1.34	1.40
4	A	404	MFK	PBV-O3'	2.51	1.64	1.59
4	A	404	MFK	OAL-CAJ	2.47	1.25	1.21
4	A	404	MFK	C6-C5	-2.25	1.34	1.43
5	B	501	NAG	O7-C7	-2.12	1.18	1.23

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	404	MFK	N3-C2-N1	-11.22	111.15	128.68
4	A	404	MFK	OAL-CAJ-CAK	-4.34	118.86	123.99
5	B	501	NAG	O5-C1-C2	-3.97	105.02	111.29
4	A	404	MFK	PAZ-OAY-PAV	-3.15	122.02	132.83
4	A	404	MFK	CBZ-CAK-CAJ	-3.15	105.35	112.33
4	A	404	MFK	CAD-CAC-NAB	-2.97	105.91	111.90
6	B	502	GCS	C1-O5-C5	2.80	115.99	112.19
4	A	404	MFK	CAH-CAG-NAF	-2.59	106.98	112.42
4	A	404	MFK	CAK-CAJ-SAI	2.11	115.91	113.46
5	B	501	NAG	C4-C3-C2	-2.07	107.98	111.02
4	A	404	MFK	OAL-CAJ-SAI	2.01	125.22	122.61

There are no chirality outliers.

All (8) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	B	501	NAG	O5-C5-C6-O6
5	B	501	NAG	C4-C5-C6-O6
4	A	404	MFK	CCB-CCC-CCD-CCE
4	A	404	MFK	CBZ-CCA-CCB-CCC
4	A	404	MFK	CAK-CBZ-CCA-CCB

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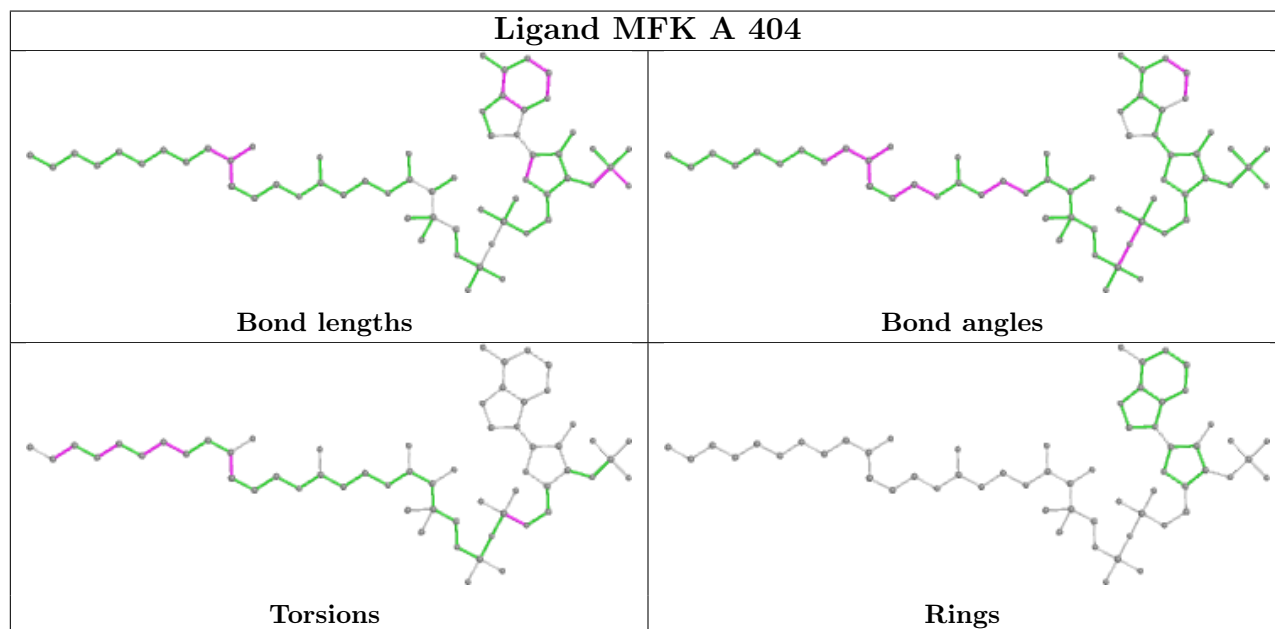
Mol	Chain	Res	Type	Atoms
4	A	404	MFK	CCD-CCE-CCF-CCG
4	A	404	MFK	OAL-CAJ-SAI-CAH
4	A	404	MFK	C5'-O5'-PAZ-OBB

There are no ring outliers.

2 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	B	502	GCS	6	0
4	A	404	MFK	2	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 Fit of model and data [i](#)

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

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	323/345 (93%)	0.01	13 (4%) 38 41	18, 29, 54, 74	0
2	B	0/7	-	-	-	-
All	All	323/352 (91%)	0.01	13 (4%) 38 41	18, 29, 54, 74	0

All (13) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	292	GLU	3.5
1	A	30	ALA	3.3
1	A	15	ARG	3.2
1	A	291	ASP	2.9
1	A	173[A]	LEU	2.8
1	A	289	PRO	2.8
1	A	8	ILE	2.7
1	A	296	ARG	2.5
1	A	114	VAL	2.5
1	A	32	PRO	2.4
1	A	106	ALA	2.3
1	A	14	GLU	2.2
1	A	164	TRP	2.0

### 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
2	GHP	B	397	11/12	0.61	0.70	91,106,114,115	0
2	3FG	B	399	12/13	0.62	0.41	78,91,98,102	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
2	GHP	B	401	11/12	0.71	0.33	65,76,83,83	0
2	3FG	B	403	13/13	0.71	0.43	78,92,99,101	0
2	3MY	B	398	13/14	0.76	0.20	72,76,86,88	0
2	OMY	B	402	14/15	0.77	0.22	58,65,72,74	0
2	GHP	B	400	11/12	0.92	0.22	56,64,68,73	0

### 6.3 Carbohydrates [i](#)

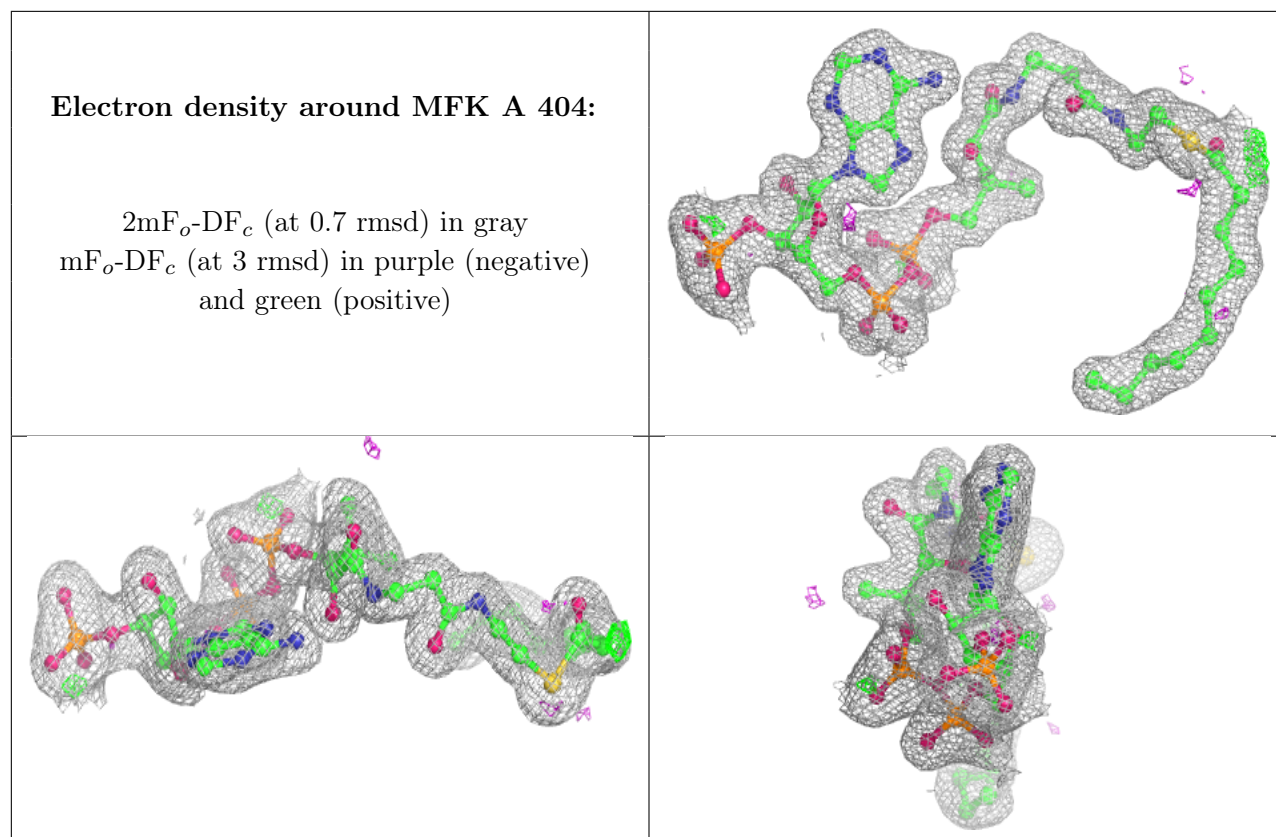
There are no monosaccharides in this entry.

### 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( $\text{\AA}^2$ )	Q<0.9
5	NAG	B	501	14/15	0.64	0.33	54,70,86,91	0
7	MAN	B	503	11/12	0.67	0.45	106,110,112,112	0
3	SO4	A	402	5/5	0.71	0.48	97,111,115,115	0
3	SO4	A	403	5/5	0.76	0.33	89,102,104,106	0
6	GCS	B	502	11/12	0.93	0.10	35,41,44,47	0
3	SO4	A	401	5/5	0.95	0.23	68,74,77,77	0
4	MFK	A	404	59/59	0.96	0.09	23,30,38,39	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.



## 6.5 Other polymers [i](#)

There are no such residues in this entry.