



# wwPDB X-ray Structure Validation Summary Report ⓘ

Nov 22, 2023 – 07:56 PM JST

PDB ID : 8H6S  
Title : Structure of acyltransferase VinK in complex with the loading acyl carrier protein of vicenistatin PKS  
Authors : Kawada, K.; Miyanaga, A.; Chisuga, T.; Kudo, F.; Eguchi, T.  
Deposited on : 2022-10-18  
Resolution : 3.00 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](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>.

---

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

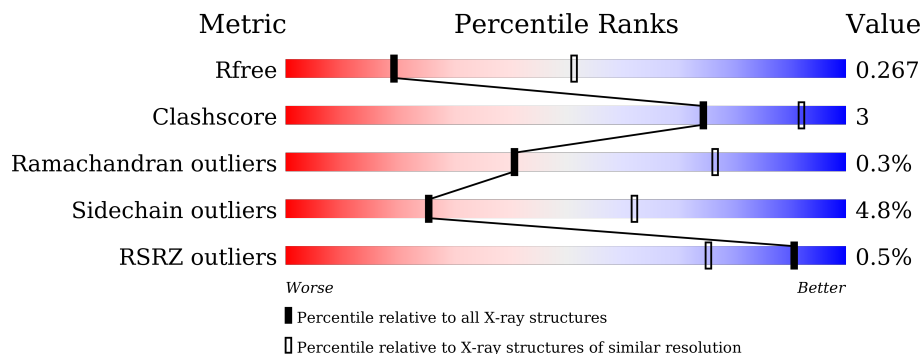
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.00 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	2092 (3.00-3.00)
Clashscore	141614	2416 (3.00-3.00)
Ramachandran outliers	138981	2333 (3.00-3.00)
Sidechain outliers	138945	2336 (3.00-3.00)
RSRZ outliers	127900	1990 (3.00-3.00)

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	343	
1	B	343	
2	C	136	
2	D	136	

## 2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 6113 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 Malonyl-CoA-[acyl-carrier-protein] transacylase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	306	2373	1495	420	441	17	0	0	0
1	B	282	2188	1381	382	408	17	0	0	0

There are 34 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-15	MET	-	initiating methionine	UNP Q76KY5
A	-14	ASN	-	expression tag	UNP Q76KY5
A	-13	HIS	-	expression tag	UNP Q76KY5
A	-12	LYS	-	expression tag	UNP Q76KY5
A	-11	VAL	-	expression tag	UNP Q76KY5
A	-10	HIS	-	expression tag	UNP Q76KY5
A	-9	HIS	-	expression tag	UNP Q76KY5
A	-8	HIS	-	expression tag	UNP Q76KY5
A	-7	HIS	-	expression tag	UNP Q76KY5
A	-6	HIS	-	expression tag	UNP Q76KY5
A	-5	HIS	-	expression tag	UNP Q76KY5
A	-4	ILE	-	expression tag	UNP Q76KY5
A	-3	GLU	-	expression tag	UNP Q76KY5
A	-2	GLY	-	expression tag	UNP Q76KY5
A	-1	ARG	-	expression tag	UNP Q76KY5
A	0	HIS	-	expression tag	UNP Q76KY5
A	106	CYS	SER	engineered mutation	UNP Q76KY5
B	-15	MET	-	initiating methionine	UNP Q76KY5
B	-14	ASN	-	expression tag	UNP Q76KY5
B	-13	HIS	-	expression tag	UNP Q76KY5
B	-12	LYS	-	expression tag	UNP Q76KY5
B	-11	VAL	-	expression tag	UNP Q76KY5
B	-10	HIS	-	expression tag	UNP Q76KY5
B	-9	HIS	-	expression tag	UNP Q76KY5
B	-8	HIS	-	expression tag	UNP Q76KY5

*Continued on next page...*

*Continued from previous page...*

Chain	Residue	Modelled	Actual	Comment	Reference
B	-7	HIS	-	expression tag	UNP Q76KY5
B	-6	HIS	-	expression tag	UNP Q76KY5
B	-5	HIS	-	expression tag	UNP Q76KY5
B	-4	ILE	-	expression tag	UNP Q76KY5
B	-3	GLU	-	expression tag	UNP Q76KY5
B	-2	GLY	-	expression tag	UNP Q76KY5
B	-1	ARG	-	expression tag	UNP Q76KY5
B	0	HIS	-	expression tag	UNP Q76KY5
B	106	CYS	SER	engineered mutation	UNP Q76KY5

- Molecule 2 is a protein called Polyketide synthase modules 1-3.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	C	95	734	469	130	134	1	0	0	0
2	D	98	756	481	136	138	1	0	0	0

There are 42 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	1	MET	-	initiating methionine	UNP Q76KY0
C	2	GLY	-	expression tag	UNP Q76KY0
C	3	SER	-	expression tag	UNP Q76KY0
C	4	SER	-	expression tag	UNP Q76KY0
C	5	HIS	-	expression tag	UNP Q76KY0
C	6	HIS	-	expression tag	UNP Q76KY0
C	7	HIS	-	expression tag	UNP Q76KY0
C	8	HIS	-	expression tag	UNP Q76KY0
C	9	HIS	-	expression tag	UNP Q76KY0
C	10	HIS	-	expression tag	UNP Q76KY0
C	11	SER	-	expression tag	UNP Q76KY0
C	12	SER	-	expression tag	UNP Q76KY0
C	13	GLY	-	expression tag	UNP Q76KY0
C	14	LEU	-	expression tag	UNP Q76KY0
C	15	VAL	-	expression tag	UNP Q76KY0
C	16	PRO	-	expression tag	UNP Q76KY0
C	17	ARG	-	expression tag	UNP Q76KY0
C	18	GLY	-	expression tag	UNP Q76KY0
C	19	SER	-	expression tag	UNP Q76KY0
C	20	HIS	-	expression tag	UNP Q76KY0
C	21	MET	-	expression tag	UNP Q76KY0

*Continued on next page...*

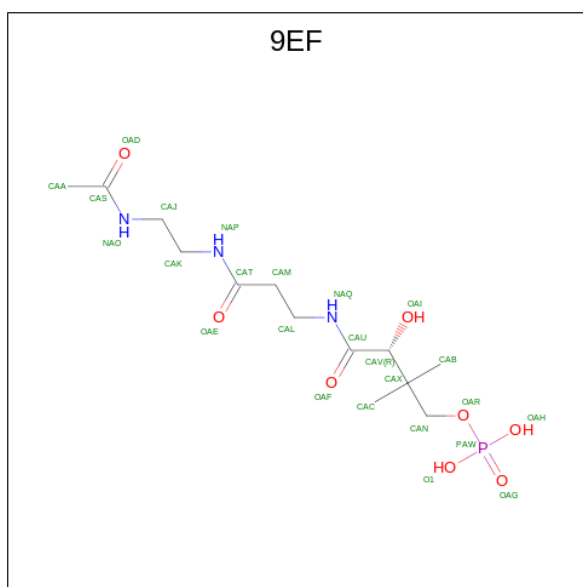
Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
D	1	MET	-	initiating methionine	UNP Q76KY0
D	2	GLY	-	expression tag	UNP Q76KY0
D	3	SER	-	expression tag	UNP Q76KY0
D	4	SER	-	expression tag	UNP Q76KY0
D	5	HIS	-	expression tag	UNP Q76KY0
D	6	HIS	-	expression tag	UNP Q76KY0
D	7	HIS	-	expression tag	UNP Q76KY0
D	8	HIS	-	expression tag	UNP Q76KY0
D	9	HIS	-	expression tag	UNP Q76KY0
D	10	HIS	-	expression tag	UNP Q76KY0
D	11	SER	-	expression tag	UNP Q76KY0
D	12	SER	-	expression tag	UNP Q76KY0
D	13	GLY	-	expression tag	UNP Q76KY0
D	14	LEU	-	expression tag	UNP Q76KY0
D	15	VAL	-	expression tag	UNP Q76KY0
D	16	PRO	-	expression tag	UNP Q76KY0
D	17	ARG	-	expression tag	UNP Q76KY0
D	18	GLY	-	expression tag	UNP Q76KY0
D	19	SER	-	expression tag	UNP Q76KY0
D	20	HIS	-	expression tag	UNP Q76KY0
D	21	MET	-	expression tag	UNP Q76KY0

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

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total Mg 1 1	0	0
3	B	1	Total Mg 1 1	0	0

- Molecule 4 is N-[2-(acetylamino)ethyl]-N 3 -[(2R)-2-hydroxy-3,3-dimethyl-4-(phosphonoxy)butanoyl]-beta-alaninamide (three-letter code: 9EF) (formula: C<sub>13</sub>H<sub>26</sub>N<sub>3</sub>O<sub>8</sub>P) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	C	1	Total	C	N	O	P	0	0
			24	13	3	7	1		
4	D	1	Total	C	N	O	P	0	0
			24	13	3	7	1		

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	7	Total	O	0	0
			7	7		
5	B	3	Total	O	0	0
			3	3		
5	C	2	Total	O	0	0
			2	2		



MET  
GLY  
SER  
SER  
HIS  
HIS  
HIS  
HIS  
HIS  
HIS  
HIS  
SER  
SER  
SER  
GLY  
LEU  
VAL  
PRO  
ARG  
GLY  
SER  
HIS  
MET  
THR  
ALA  
GLY  
ALA  
ASP  
GLU  
THR  
PRO  
ASP  
THR  
R32  
A36  
E48  
Q49  
R50  
L51  
R57  
H58  
T59  
V60  
L63  
Q64  
P71  
D72  
Q73  
V76  
Q77  
R78  
P79  
V107  
P114

V117  
R124  
A127  
F128  
G129  
ILE  
ARG  
PRO  
ALA  
PRO  
LEU  
ALA



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	78.36Å 90.63Å 113.51Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	46.01 – 3.00 45.97 – 3.00	Depositor EDS
% Data completeness (in resolution range)	99.9 (46.01-3.00) 99.9 (45.97-3.00)	Depositor EDS
$R_{merge}$	0.17	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.94 (at 3.01Å)	Xtrriage
Refinement program	REFMAC 5.8.0238	Depositor
R, $R_{free}$	0.210 , 0.268 0.217 , 0.267	Depositor DCC
$R_{free}$ test set	814 reflections (4.87%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	62.6	Xtrriage
Anisotropy	0.103	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 49.0	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	6113	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	68.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.61% 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: MG, 9EF

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	0.64	0/2426	0.78	0/3294
1	B	0.66	0/2235	0.77	0/3034
2	C	0.67	0/749	0.80	0/1023
2	D	0.64	0/771	0.79	0/1052
All	All	0.65	0/6181	0.78	0/8403

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts [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	2373	0	2315	12	0
1	B	2188	0	2135	9	0
2	C	734	0	743	8	0
2	D	756	0	766	8	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
4	C	24	0	0	0	0
4	D	24	0	0	1	0
5	A	7	0	0	0	0

*Continued on next page...*

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	B	3	0	0	0	0
5	C	2	0	0	0	0
All	All	6113	0	5959	38	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 3.

The worst 5 of 38 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:C:60:VAL:O	2:C:64:GLN:HG2	1.92	0.70
2:C:101:THR:HG21	2:C:123:ILE:HD13	1.77	0.67
2:D:60:VAL:O	2:D:64:GLN:HG2	1.96	0.65
1:A:177:CYS:HB2	1:A:185:MET:HG2	1.82	0.61
1:A:54:ASP:OD1	1:A:60:SER:HA	2.02	0.60

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	304/343 (89%)	274 (90%)	29 (10%)	1 (0%)	41	76
1	B	276/343 (80%)	249 (90%)	26 (9%)	1 (0%)	34	72
2	C	93/136 (68%)	86 (92%)	7 (8%)	0	100	100
2	D	96/136 (71%)	87 (91%)	9 (9%)	0	100	100
All	All	769/958 (80%)	696 (90%)	71 (9%)	2 (0%)	41	76

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	293	PRO
1	A	293	PRO

### 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	245/278 (88%)	233 (95%)	12 (5%)	25	61
1	B	228/278 (82%)	219 (96%)	9 (4%)	32	69
2	C	78/110 (71%)	74 (95%)	4 (5%)	24	60
2	D	80/110 (73%)	75 (94%)	5 (6%)	18	51
All	All	631/776 (81%)	601 (95%)	30 (5%)	25	62

5 of 30 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	183	PHE
2	D	57	ARG
1	B	206	MET
2	D	107	VAL
2	C	107	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	67	GLN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

## 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

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	9EF	D	201	1,2	17,23,24	0.47	0	23,30,33	1.45	4 (17%)
4	9EF	C	201	1,2	17,23,24	0.56	0	23,30,33	1.93	6 (26%)

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	9EF	D	201	1,2	-	7/27/29/30	-
4	9EF	C	201	1,2	-	4/27/29/30	-

There are no bond length outliers.

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

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	C	201	9EF	CAL-CAM-CAT	-5.27	103.59	112.36
4	D	201	9EF	CAL-NAQ-CAU	4.01	129.73	122.59
4	C	201	9EF	CAM-CAT-NAP	-3.43	110.65	116.42
4	D	201	9EF	CAM-CAL-NAQ	-3.18	105.48	111.90
4	C	201	9EF	CAL-NAQ-CAU	-2.95	117.33	122.59

There are no chirality outliers.

5 of 11 torsion outliers are listed below:

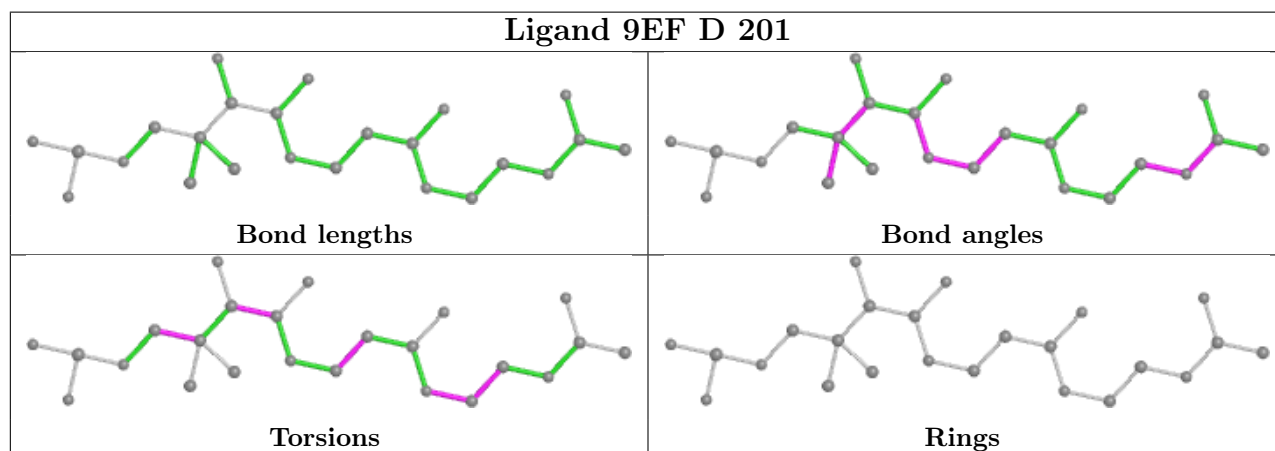
Mol	Chain	Res	Type	Atoms
4	C	201	9EF	NAQ-CAU-CAV-OAI
4	D	201	9EF	OAF-CAU-CAV-OAI
4	D	201	9EF	NAQ-CAU-CAV-OAI
4	D	201	9EF	NAO-CAJ-CAK-NAP
4	D	201	9EF	NAQ-CAL-CAM-CAT

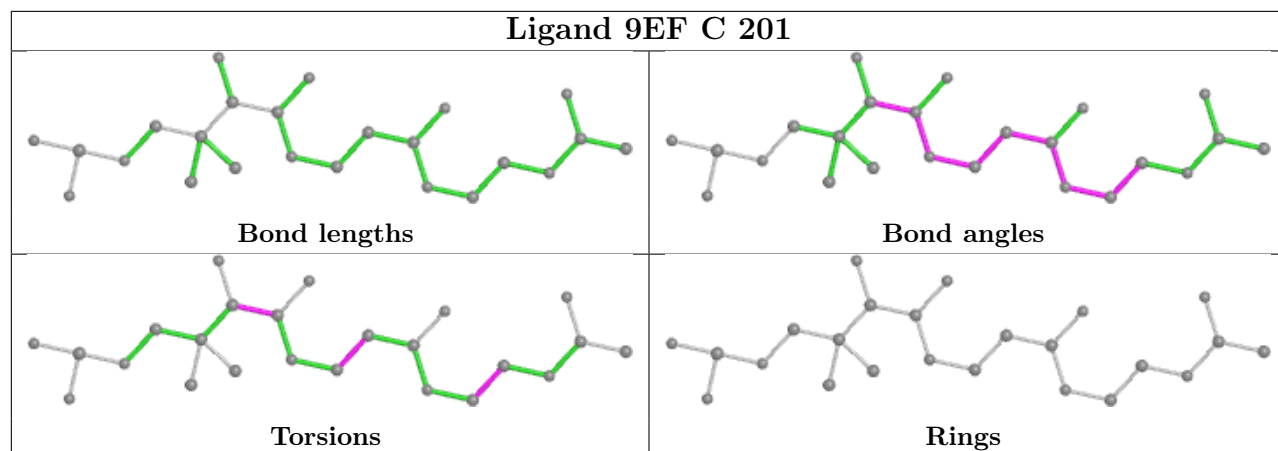
There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	D	201	9EF	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 [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	306/343 (89%)	-0.38	0 <b>100</b>   <b>100</b>	38, 55, 79, 100	0
1	B	282/343 (82%)	0.03	3 (1%) 80   56	40, 79, 117, 133	0
2	C	95/136 (69%)	0.12	1 (1%) 80   56	44, 71, 113, 128	0
2	D	98/136 (72%)	-0.24	0 <b>100</b>   <b>100</b>	42, 56, 89, 103	0
All	All	781/958 (81%)	-0.15	4 (0%) <b>91</b>   <b>75</b>	38, 64, 109, 133	0

All (4) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	21	THR	3.8
1	B	90	TRP	2.6
1	B	68	ALA	2.2
2	C	123	ILE	2.1

### 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.

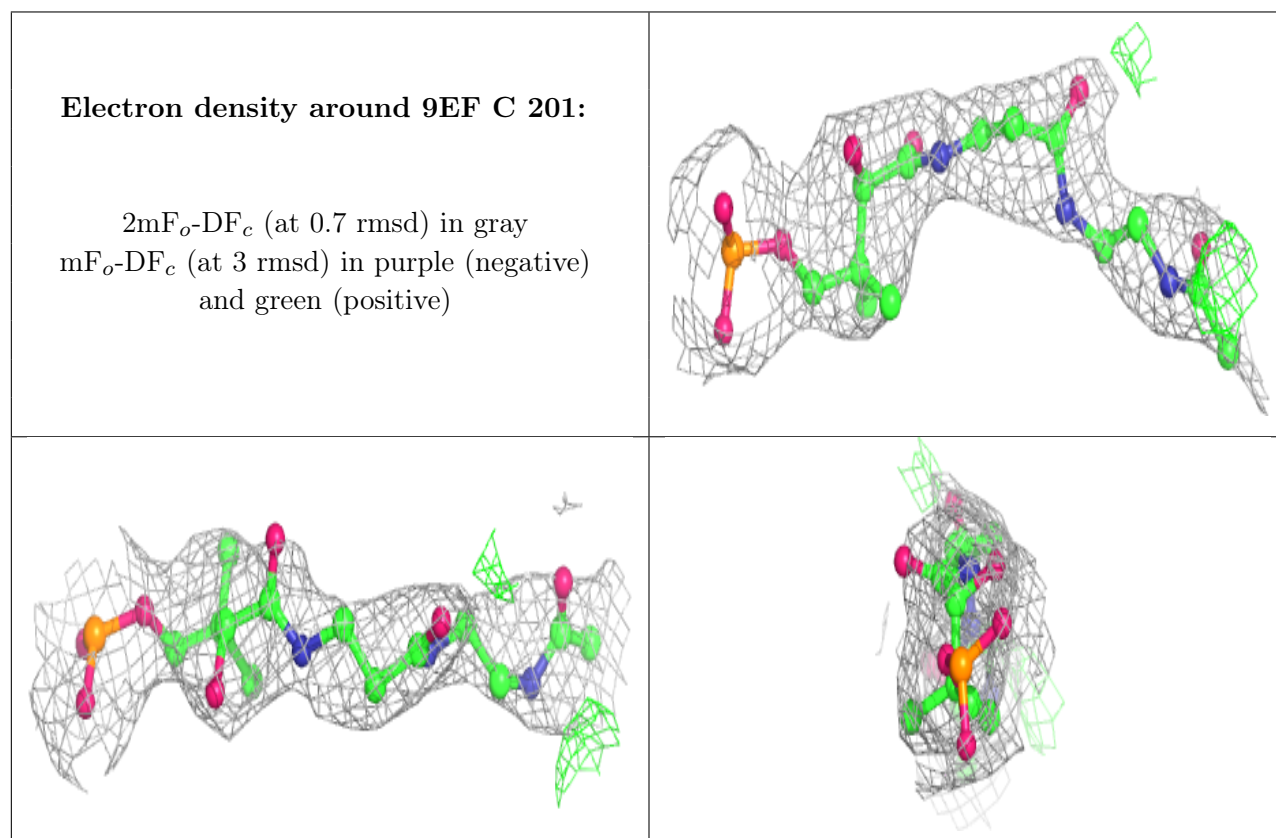
### 6.4 Ligands [i](#)

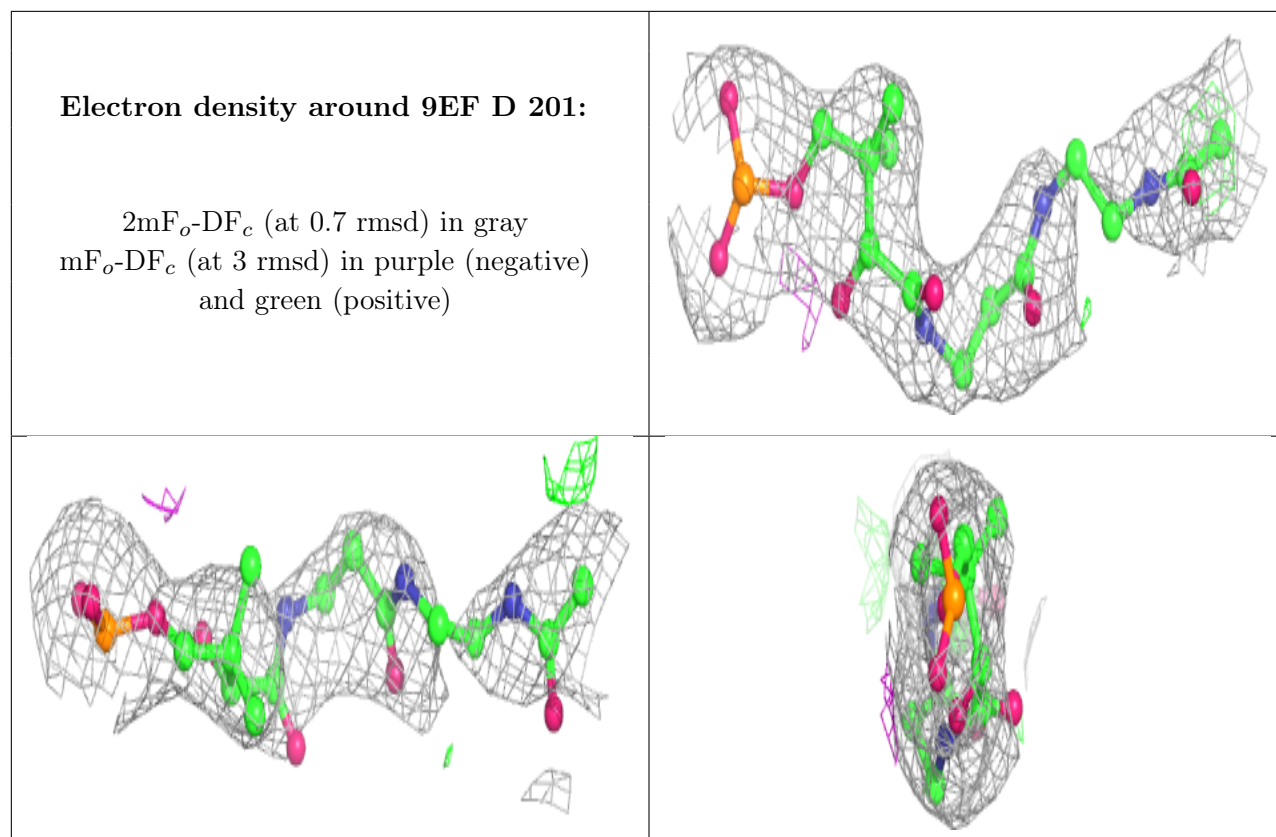
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q < 0.9’ lists the number of atoms with occupancy less than 0.9.



Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
4	9EF	C	201	24/25	0.92	0.22	57,71,76,80	0
4	9EF	D	201	24/25	0.92	0.21	51,79,91,95	0
3	MG	A	401	1/1	0.97	0.10	58,58,58,58	0
3	MG	B	401	1/1	0.98	0.14	37,37,37,37	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.