

# wwPDB X-ray Structure Validation Summary Report (i)

#### May 15, 2020 – 04:18 pm BST

PDB ID : 6CLV

Title : Staphylococcus aureus Dihydropteroate Synthase (saDHPS) F17L E208K dou-

ble mutant structure

Authors: Gajewski, S.; Griffith, E.C.; Wu, Y.; White, S.W.

Deposited on : 2018-03-02

Resolution : 2.30 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 (i) symbol.

The following versions of software and data (see references (1)) 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)

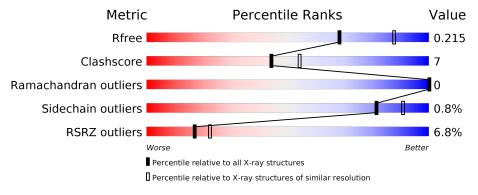
Validation Pipeline (wwPDB-VP) : 2.11

## 1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure: X-RAY DIFFRACTION

The reported resolution of this entry is 2.30 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	$\begin{array}{c} \text{Whole archive} \\ (\#\text{Entries}) \end{array}$	$\begin{array}{c} {\rm Similar \; resolution} \\ (\#{\rm Entries, \; resolution \; range(\AA)}) \end{array}$
$R_{free}$	130704	5042 (2.30-2.30)
Clashscore	141614	5643 (2.30-2.30)
Ramachandran outliers	138981	5575 (2.30-2.30)
Sidechain outliers	138945	5575 (2.30-2.30)
RSRZ outliers	127900	4938 (2.30-2.30)

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 >=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 <=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	291	77%	11%	12%
1	В	291	72%	14%	14%
1	С	291	79%	9%	12%
1	D	291	14%	19%	18%



# 2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 7542 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 Dihydropteroate synthase.

Mol	Chain	Residues		$\mathbf{At}$	oms			ZeroOcc	AltConf	Trace
1	Λ	256	Total	С	N	О	S	0	0	0
1	A	250	1903	1197	335	359	12	0	0	
1	В	249	Total	С	N	О	S	0	0	0
1	Б	249	1832	1158	323	340	11	0	0	
1	С	257	Total	С	N	О	S	0	0	0
1		201	1926	1212	336	366	12	0	0	
1	D	240	Total	С	N	О	S	0	0	0
1	D	240	1689	1066	293	319	11	U	U	

There are 104 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-23	MET	-	initiating methionine	UNP O05701
A	-22	GLY	-	expression tag	UNP O05701
A	-21	HIS	-	expression tag	UNP O05701
A	-20	HIS	_	expression tag	UNP O05701
A	-19	HIS	-	expression tag	UNP O05701
A	-18	HIS	_	expression tag	UNP O05701
A	-17	HIS	_	expression tag	UNP O05701
A	-16	HIS	_	expression tag	UNP O05701
A	-15	HIS	_	expression tag	UNP O05701
A	-14	HIS	_	expression tag	UNP O05701
A	-13	HIS	_	expression tag	UNP O05701
A	-12	HIS	_	expression tag	UNP O05701
A	-11	SER	_	expression tag	UNP O05701
A	-10	SER	_	expression tag	UNP O05701
A	-9	GLY	_	expression tag	UNP O05701
A	-8	HIS	_	expression tag	UNP O05701
A	-7	ILE	=	expression tag	UNP O05701
A	-6	GLU	-	expression tag	UNP O05701
A	-5	GLY	-	expression tag	UNP O05701
A	-4	ARG		expression tag	UNP O05701
A	-3	HIS	_	expression tag	UNP O05701

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A	Chain	Residue	Modelled	Actual	Comment	Reference
A	A	-2	MET	-	expression tag	UNP O05701
A	A	-1	LEU	-	expression tag	UNP O05701
A	A	0	GLU	_	expression tag	UNP O05701
B	A	17	LEU	PHE	engineered mutation	UNP 005701
B	A	208	LYS	GLU	engineered mutation	UNP O05701
B	В	-23	MET	_	initiating methionine	UNP O05701
B	В	-22	GLY	_	expression tag	UNP O05701
B	В	-21	HIS	-	expression tag	UNP O05701
B	В	-20	HIS	_	expression tag	UNP O05701
B	В	-19	HIS	-	expression tag	UNP O05701
B	В	-18	HIS	_	expression tag	UNP O05701
B	В	-17	HIS	-	expression tag	UNP O05701
B	В	-16	HIS	-	expression tag	UNP O05701
B	В	-15	HIS	-	expression tag	UNP O05701
B	В	-14	HIS	-	expression tag	UNP O05701
B	В	-13	HIS	-	expression tag	UNP 005701
B	В	-12	HIS	-	expression tag	UNP O05701
B	В	-11	SER	-	expression tag	UNP O05701
B	В	-10	SER	-	expression tag	UNP O05701
B	В	-9	GLY	-	expression tag	UNP O05701
B	В	-8	HIS	-	expression tag	UNP O05701
B	В	-7	ILE	-	expression tag	UNP O05701
B	В	-6	GLU	_	expression tag	UNP O05701
B	В	-5	GLY	-	expression tag	UNP O05701
B	В	-4	ARG	_	expression tag	UNP O05701
B         -1         LEU         -         expression tag         UNP 005701           B         0         GLU         -         expression tag         UNP 005701           B         17         LEU         PHE         engineered mutation         UNP 005701           B         208         LYS         GLU         engineered mutation         UNP 005701           C         -23         MET         -         initiating methionine         UNP 005701           C         -22         GLY         -         expression tag         UNP 005701           C         -21         HIS         -         expression tag         UNP 005701           C         -19         HIS         -         expression tag         UNP 005701           C         -18         HIS         -         expression tag         UNP 005701           C         -17         HIS         -         expression tag         UNP 005701           C         -16         HIS         -         expression tag         UNP 005701           C         -15         HIS         -         expression tag         UNP 005701           C         -14         HIS         -         expression tag <td>В</td> <td>-3</td> <td>HIS</td> <td>_</td> <td>expression tag</td> <td>UNP O05701</td>	В	-3	HIS	_	expression tag	UNP O05701
B         0         GLU         -         expression tag         UNP 005701           B         17         LEU         PHE         engineered mutation         UNP 005701           B         208         LYS         GLU         engineered mutation         UNP 005701           C         -23         MET         -         initiating methionine         UNP 005701           C         -22         GLY         -         expression tag         UNP 005701           C         -21         HIS         -         expression tag         UNP 005701           C         -20         HIS         -         expression tag         UNP 005701           C         -19         HIS         -         expression tag         UNP 005701           C         -18         HIS         -         expression tag         UNP 005701           C         -16         HIS         -         expression tag         UNP 005701           C         -15         HIS         -         expression tag         UNP 005701           C         -14         HIS         -         expression tag         UNP 005701	В	-2	MET	_	expression tag	UNP O05701
B         17         LEU         PHE         engineered mutation         UNP 005701           B         208         LYS         GLU         engineered mutation         UNP 005701           C         -23         MET         -         initiating methionine         UNP 005701           C         -22         GLY         -         expression tag         UNP 005701           C         -21         HIS         -         expression tag         UNP 005701           C         -19         HIS         -         expression tag         UNP 005701           C         -18         HIS         -         expression tag         UNP 005701           C         -16         HIS         -         expression tag         UNP 005701           C         -16         HIS         -         expression tag         UNP 005701           C         -15         HIS         -         expression tag         UNP 005701           C         -14         HIS         -         expression tag         UNP 005701	В	-1	LEU	_	expression tag	
B         208         LYS         GLU         engineered mutation         UNP 005701           C         -23         MET         - initiating methionine         UNP 005701           C         -22         GLY         - expression tag         UNP 005701           C         -21         HIS         - expression tag         UNP 005701           C         -20         HIS         - expression tag         UNP 005701           C         -19         HIS         - expression tag         UNP 005701           C         -18         HIS         - expression tag         UNP 005701           C         -16         HIS         - expression tag         UNP 005701           C         -15         HIS         - expression tag         UNP 005701           C         -14         HIS         - expression tag         UNP 005701	В	0	GLU	_	expression tag	UNP O05701
C         -23         MET         -         initiating methionine         UNP 005701           C         -22         GLY         -         expression tag         UNP 005701           C         -21         HIS         -         expression tag         UNP 005701           C         -20         HIS         -         expression tag         UNP 005701           C         -19         HIS         -         expression tag         UNP 005701           C         -18         HIS         -         expression tag         UNP 005701           C         -16         HIS         -         expression tag         UNP 005701           C         -15         HIS         -         expression tag         UNP 005701           C         -14         HIS         -         expression tag         UNP 005701	В	17	LEU	PHE	engineered mutation	UNP O05701
C         -22         GLY         -         expression tag         UNP 005701           C         -21         HIS         -         expression tag         UNP 005701           C         -20         HIS         -         expression tag         UNP 005701           C         -19         HIS         -         expression tag         UNP 005701           C         -18         HIS         -         expression tag         UNP 005701           C         -16         HIS         -         expression tag         UNP 005701           C         -15         HIS         -         expression tag         UNP 005701           C         -14         HIS         -         expression tag         UNP 005701		208	LYS	GLU	engineered mutation	
C         -21         HIS         -         expression tag         UNP 005701           C         -20         HIS         -         expression tag         UNP 005701           C         -19         HIS         -         expression tag         UNP 005701           C         -18         HIS         -         expression tag         UNP 005701           C         -17         HIS         -         expression tag         UNP 005701           C         -16         HIS         -         expression tag         UNP 005701           C         -15         HIS         -         expression tag         UNP 005701           C         -14         HIS         -         expression tag         UNP 005701		-23	MET	_	initiating methionine	UNP O05701
C         -20         HIS         -         expression tag         UNP 005701           C         -19         HIS         -         expression tag         UNP 005701           C         -18         HIS         -         expression tag         UNP 005701           C         -17         HIS         -         expression tag         UNP 005701           C         -16         HIS         -         expression tag         UNP 005701           C         -15         HIS         -         expression tag         UNP 005701           C         -14         HIS         -         expression tag         UNP 005701	С	-22	GLY	_	expression tag	UNP O05701
C         -19         HIS         -         expression tag         UNP 005701           C         -18         HIS         -         expression tag         UNP 005701           C         -17         HIS         -         expression tag         UNP 005701           C         -16         HIS         -         expression tag         UNP 005701           C         -15         HIS         -         expression tag         UNP 005701           C         -14         HIS         -         expression tag         UNP 005701		-21	HIS		expression tag	UNP 005701
C         -18         HIS         -         expression tag         UNP O05701           C         -17         HIS         -         expression tag         UNP O05701           C         -16         HIS         -         expression tag         UNP O05701           C         -15         HIS         -         expression tag         UNP O05701           C         -14         HIS         -         expression tag         UNP O05701	С	-20	HIS		expression tag	UNP O05701
C         -17         HIS         -         expression tag         UNP 005701           C         -16         HIS         -         expression tag         UNP 005701           C         -15         HIS         -         expression tag         UNP 005701           C         -14         HIS         -         expression tag         UNP 005701		-19	HIS	-	expression tag	UNP O05701
C         -16         HIS         -         expression tag         UNP O05701           C         -15         HIS         -         expression tag         UNP O05701           C         -14         HIS         -         expression tag         UNP O05701	С	-18	HIS	-	expression tag	UNP 005701
C         -15         HIS         -         expression tag         UNP O05701           C         -14         HIS         -         expression tag         UNP O05701		-17			expression tag	UNP 005701
C -14 HIS - expression tag UNP O05701	С	-16	HIS		expression tag	UNP 005701
1 0	С	-15	HIS	-	expression tag	UNP O05701
C -13 HIS - expression tag UNP O05701	С	-14	HIS	-	expression tag	UNP 005701
	С	-13	HIS	-	expression tag	UNP O05701

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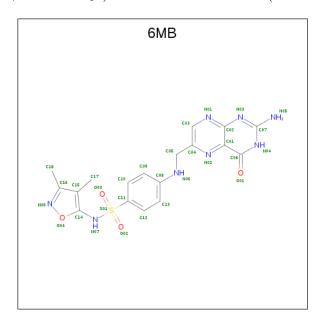
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Chain	Residue	Modelled  Modelled	Actual	Comment	Reference
С	-12	HIS	-	expression tag	UNP O05701
С	-11	SER	-	expression tag	UNP 005701
С	-10	SER	-	expression tag	UNP O05701
С	-9	GLY	_	expression tag	UNP O05701
С	-8	HIS	-	expression tag	UNP O05701
С	-7	ILE	_	expression tag	UNP 005701
С	-6	GLU	-	expression tag	UNP O05701
С	-5	GLY	-	expression tag	UNP O05701
С	-4	ARG	-	expression tag	UNP O05701
С	-3	HIS	-	expression tag	UNP O05701
С	-2	MET	_	expression tag	UNP 005701
С	-1	LEU	_	expression tag	UNP 005701
С	0	GLU	-	expression tag	UNP O05701
С	17	LEU	PHE	engineered mutation	UNP 005701
С	208	LYS	GLU	engineered mutation	UNP 005701
D	-23	MET	-	initiating methionine	UNP O05701
D	-22	GLY	-	expression tag	UNP O05701
D	-21	HIS	-	expression tag	UNP O05701
D	-20	HIS	-	expression tag	UNP O05701
D	-19	HIS	-	expression tag	UNP 005701
D	-18	HIS	-	expression tag	UNP O05701
D	-17	HIS	-	expression tag	UNP O05701
D	-16	HIS	-	expression tag	UNP O05701
D	-15	HIS	-	expression tag	UNP O05701
D	-14	HIS	-	expression tag	UNP O05701
D	-13	HIS	-	expression tag	UNP O05701
D	-12	HIS	-	expression tag	UNP O05701
D	-11	SER	-	expression tag	UNP 005701
D	-10	SER	_	expression tag	UNP O05701
D	-9	GLY	_	expression tag	UNP O05701
D	-8	HIS	_	expression tag	UNP O05701
D	-7	ILE	-	expression tag	UNP O05701
D	-6	GLU	-	expression tag	UNP O05701
D	-5	GLY	-	expression tag	UNP O05701
D	-4	ARG	-	expression tag	UNP O05701
D	-3	HIS		expression tag	UNP O05701
D	-2	MET	-	expression tag	UNP O05701
D	-1	LEU	-	expression tag	UNP O05701
D	0	GLU	-	expression tag	UNP O05701
D	17	LEU	PHE	engineered mutation	UNP O05701
D	208	LYS	GLU	engineered mutation	UNP O05701

 $\bullet \ \ Molecule \ 2 \ is \ 4-\{[(2-amino-4-oxo-3,4-dihydropteridin-6-yl)methyl] amino\}-N-(3,4-dimethyl-1,4-di$ 



,2-oxazol-5-yl) benzene-1-sulfonamide (three-letter code: 6MB) (formula:  $\mathrm{C_{18}H_{18}N_8O_4S}).$ 



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
9	Λ	1	Total	С	N	О	S	0	0
	Λ	1	31	18	8	4	1	0	0
2	D	1	Total	С	N	О	S	0	0
	Б	1	31	18	8	4	1	0	0
9	С	1	Total	С	Ν	О	S	0	0
		1	31	18	8	4	1	0	0

#### • Molecule 3 is water.

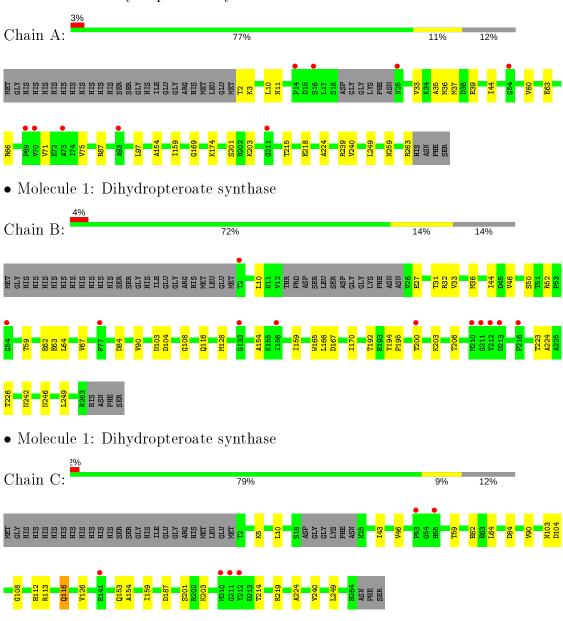
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	30	Total O 30 30	0	0
3	В	34	Total O 34 34	0	0
3	С	28	Total O 28 28	0	0
3	D	7	Total O 7 7	0	0



## 3 Residue-property plots (i)

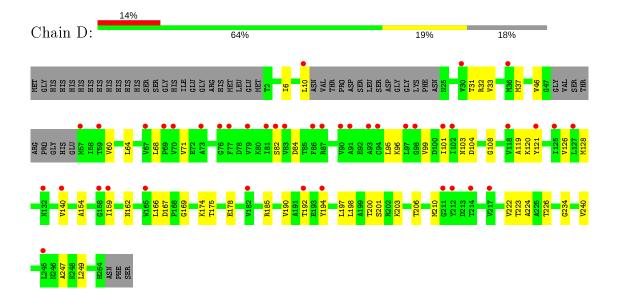
These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are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



• Molecule 1: Dihydropteroate synthase







# 4 Data and refinement statistics (i)

Property	Value	Source	
Space group	P 43	Depositor	
Cell constants	79.75Å 79.75Å 175.40Å	D i4	
a, b, c, $\alpha$ , $\beta$ , $\gamma$	$90.00^{\circ}$ $90.00^{\circ}$ $90.00^{\circ}$	Depositor	
Resolution (Å)	47.43 - 2.30	Depositor	
Resolution (A)	47.43 - 2.30	EDS	
% Data completeness	100.0 (47.43-2.30)	Depositor	
(in resolution range)	$100.0 \ (47.43-2.30)$	EDS	
$R_{merge}$	(Not available)	Depositor	
$R_{sum}$	(Not available)	Depositor	
$< I/\sigma(I) > 1$	56.03 (at 2.29Å)	Xtriage	
Refinement program	PHENIX (1.13_2998)	Depositor	
D D	0.191 , 0.210	Depositor	
$R, R_{free}$	0.193 , $0.215$	DCC	
$R_{free}$ test set	2546 reflections (5.25%)	wwPDB-VP	
Wilson B-factor (Å <sup>2</sup> )	47.3	Xtriage	
Anisotropy	0.318	Xtriage	
Bulk solvent $k_{sol}(e/Å^3)$ , $B_{sol}(Å^2)$	0.34 , 33.7	EDS	
L-test for twinning <sup>2</sup>	$< L >=0.39, < L^2>=0.22$	Xtriage	
Estimated twinning fraction	0.320 for h,-k,-l	Xtriage	
Reported twinning fraction	0.640 for h,-k,-l	Depositor	
Outliers	0 of 48470 reflections	Xtriage	
$F_o, F_c$ correlation	0.95	EDS	
Total number of atoms	7542	wwPDB-VP	
Average B, all atoms (Å <sup>2</sup> )	53.0	wwPDB-VP	

Xtriage's analysis on translational NCS is as follows: The largest off-origin peak in the Patterson function is 4.68% of the height of the origin peak. No significant pseudotranslation is detected.

<sup>&</sup>lt;sup>2</sup>Theoretical values of <|L|>,  $< L^2>$  for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.



<sup>&</sup>lt;sup>1</sup>Intensities estimated from amplitudes.

## 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: 6MB

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		
MIOI	Chain	RMSZ	# Z  > 5	RMSZ	# Z  > 5	
1	A	0.39	0/1927	0.48	0/2616	
1	В	0.24	0/1855	0.41	0/2517	
1	С	0.23	0/1952	0.40	0/2649	
1	D	0.35	0/1710	0.51	0/2332	
All	All	0.31	0/7444	0.45	0/10114	

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)	$\mathbf{H}(\mathbf{added})$	Clashes	Symm-Clashes
1	A	1903	0	1895	20	0
1	В	1832	0	1818	24	0
1	С	1926	0	1909	15	0
1	D	1689	0	1573	37	0
2	A	31	0	0	1	0
2	В	31	0	0	2	0
2	С	31	0	0	1	0
3	A	30	0	0	1	0
3	В	34	0	0	1	0

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Mol	Chain	Non-H	H(model)	$\mathbf{H}(\mathbf{added})$	Clashes	Symm-Clashes
3	С	28	0	0	0	0
3	D	7	0	0	0	0
All	All	7542	0	7195	96	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 7.

The worst 5 of 96 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	$egin{aligned}  ext{Interatomic} \  ext{distance} \ ( ext{Å}) \end{aligned}$	Clash overlap (Å)	
1:B:116:GLN:HG3	3:B:412:HOH:O	1.58	1.00	
1:D:192:THR:HG23	1:D:194:TYR:H	1.31	0.92	
1:B:192:THR:HG23	1:B:194:TYR:H	1.45	0.81	
1:D:223:THR:O	1:D:226:THR:HG22	1.82	0.79	
1:A:36:MET:HE3	1:A:44:ILE:HD12	1.73	0.70	

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	252/291~(87%)	251 (100%)	1 (0%)	0	100 10	00
1	В	$245/291 \; (84\%)$	244 (100%)	1 (0%)	0	100 10	00
1	С	253/291~(87%)	251 (99%)	2 (1%)	0	100 10	00
1	D	$234/291 \; (80\%)$	234 (100%)	0	0	100 10	00
All	All	984/1164 (84%)	980 (100%)	4 (0%)	0	100 10	00

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	195/244~(80%)	193 (99%)	2 (1%)	76 8	7	
1	В	183/244 (75%)	183 (100%)	0	100 1	00	
1	С	199/244 (82%)	198 (100%)	1 (0%)	88 9	5	
1	D	154/244 (63%)	151 (98%)	3 (2%)	57 7	3	
All	All	731/976 (75%)	725 (99%)	6 (1%)	81 9	1	

5 of 6 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	С	116	GLN
1	D	162	ASN
1	D	31	THR
1	A	66	ARG
1	D	32	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 6 such sidechains are listed below:

Mol	Chain	Res	Type
1	С	112	HIS
1	D	152	HIS
1	С	116	GLN
1	В	65	ASN
1	D	105	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 carbohydrates in this entry.

## 5.6 Ligand geometry (i)

3 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	Mol Type	Chain	Res	Link	Bond lengths			Bond angles		
Moi Type Chain	Chain	ites	Lilik	Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z >2	
2	6MB	С	300	-	32,34,34	2.17	9 (28%)	39,50,50	3.11	13 (33%)
2	6MB	В	300	-	32,34,34	2.17	9 (28%)	39,50,50	3.29	13 (33%)
2	6MB	A	300	-	32,34,34	2.17	9 (28%)	39,50,50	3.16	13 (33%)

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	6MB	С	300	-	-	8/14/16/16	0/4/4/4
2	6MB	В	300	-	-	8/14/16/16	0/4/4/4
2	6MB	A	300	-	-	8/14/16/16	0/4/4/4

The worst 5 of 27 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	$\mathbf{Z}$	$\operatorname{Observed}(\operatorname{\AA})$	$\operatorname{Ideal}( ext{\AA})$
2	В	300	6MB	C06-C01	5.77	1.51	1.41
2	A	300	6MB	C06-C01	5.75	1.51	1.41
2	С	300	6MB	C06-C01	5.73	1.51	1.41
2	A	300	6MB	C02-N03	5.04	1.46	1.36
2	В	300	6MB	C02-N03	5.01	1.46	1.36

The worst 5 of 39 bond angle outliers are listed below:



Mol	Chain	Res	Type	Atoms	Z	$Observed(^o)$	$Ideal(^{o})$
2	В	300	$6\mathrm{MB}$	O03-S01-O02	-15.67	100.28	119.55
2	A	300	6MB	O03-S01-O02	-14.91	101.23	119.55
2	С	300	6MB	O03-S01-O02	-14.71	101.46	119.55
2	A	300	6MB	N03-C07-N04	-5.43	119.98	127.22
2	С	300	6MB	N03-C07-N04	-5.34	120.09	127.22

There are no chirality outliers.

5 of 24 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	С	300	6MB	C14-N07-S01-C11
2	С	300	6MB	C14-N07-S01-O03
2	В	300	6MB	C14-N07-S01-C11
2	В	300	6MB	C14-N07-S01-O03
2	A	300	6MB	C04-C05-N06-C08

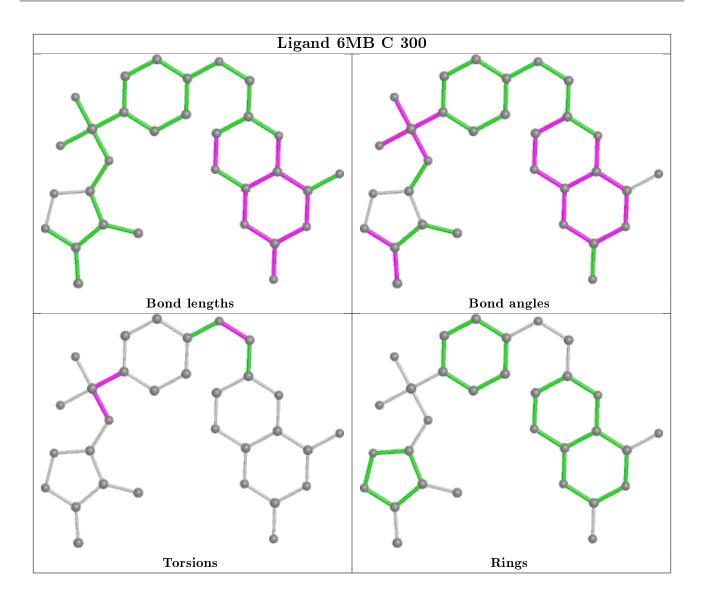
There are no ring outliers.

3 monomers are involved in 4 short contacts:

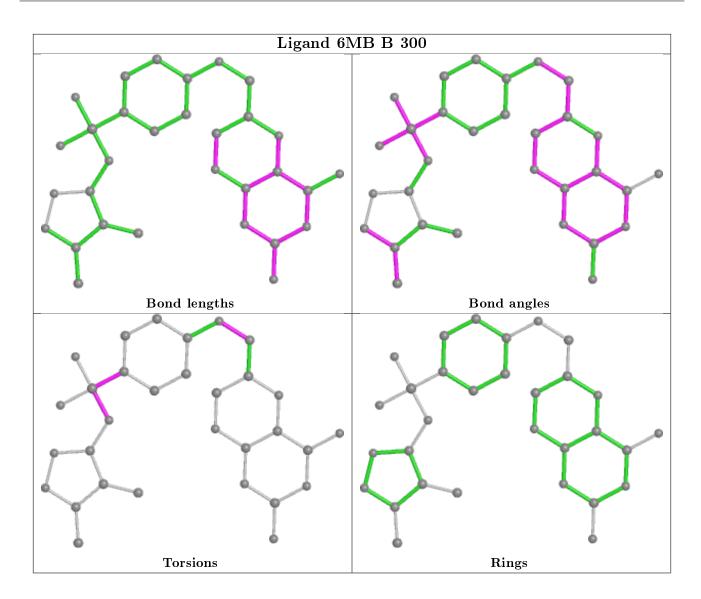
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	С	300	6MB	1	0
2	В	300	6MB	2	0
2	A	300	6MB	1	0

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 then 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.

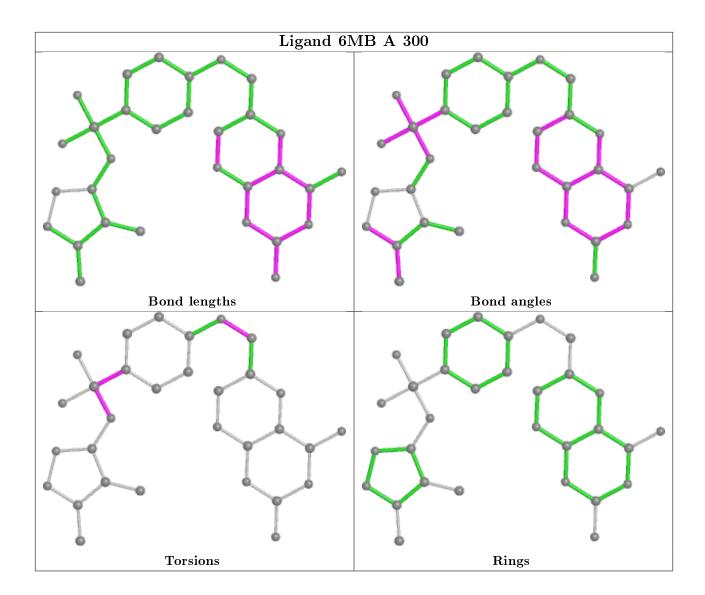












# 5.7 Other polymers (i)

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,  $95^{th}$  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	$\langle { m RSRZ} \rangle$	$\# \mathrm{RSRZ} {>} 2$	$\mathbf{OWAB}(\mathrm{\AA}^2)$	Q < 0.9
1	A	$256/291 \; (87\%)$	0.48	9 (3%) 44 51	32, 47, 73, 92	0
1	В	$249/291\ (85\%)$	0.54	11 (4%) 34 41	30, 46, 74, 115	0
1	С	257/291 (88%)	0.49	6 (2%) 60 67	31, 45, 69, 168	0
1	D	240/291 (82%)	1.14	42 (17%) 1 1	41, 66, 96, 124	0
All	All	1002/1164 (86%)	0.66	68 (6%) 17 22	30, 50, 83, 168	0

The worst 5 of 68 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	98	GLY	7.7
1	С	55	HIS	7.4
1	D	76	GLY	6.8
1	D	158	GLY	6.7
1	С	211	GLY	5.1

## 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 carbohydrates in this entry.

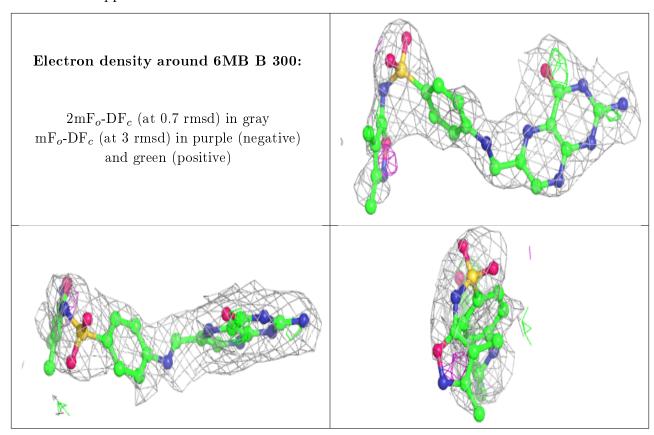
## 6.4 Ligands (i)

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,  $95^{th}$  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	${f B-factors}({f A}^2)$	Q<0.9
2	6MB	В	300	31/31	0.80	0.24	58,70,82,84	0
2	6MB	С	300	31/31	0.83	0.29	59,66,78,78	0
2	6MB	A	300	31/31	0.87	0.21	55,60,67,69	0

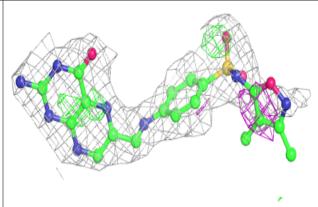
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

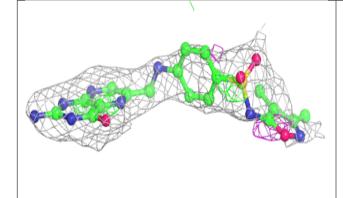


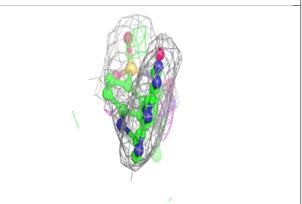


# Electron density around 6MB C 300:

 $2 {\rm mF}_o\text{-}{\rm DF}_c$  (at 0.7 rmsd) in gray  ${\rm mF}_o\text{-}{\rm DF}_c$  (at 3 rmsd) in purple (negative) and green (positive)

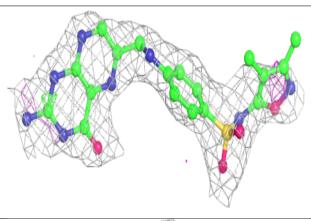


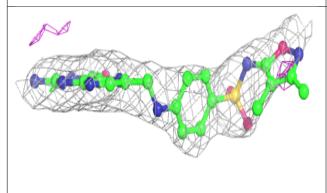


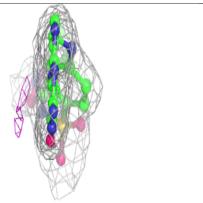


#### Electron density around 6MB A 300:

 $2 \mathrm{mF}_o\text{-}\mathrm{DF}_c$  (at 0.7 rmsd) in gray  $\mathrm{mF}_o\text{-}\mathrm{DF}_c$  (at 3 rmsd) in purple (negative) and green (positive)









# 6.5 Other polymers (i)

There are no such residues in this entry.

