



# wwPDB X-ray Structure Validation Summary Report ⓘ

May 27, 2020 – 02:21 am BST

PDB ID : 2AMJ  
Title : Crystal Structure of Modulator of Drug Activity B from Escherichia coli O157:H7  
Authors : Adams, M.A.; Jia, Z.; Montreal-Kingston Bacterial Structural Genomics Initiative (BSGI)  
Deposited on : 2005-08-09  
Resolution : 1.80 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](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

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The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.11
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.11

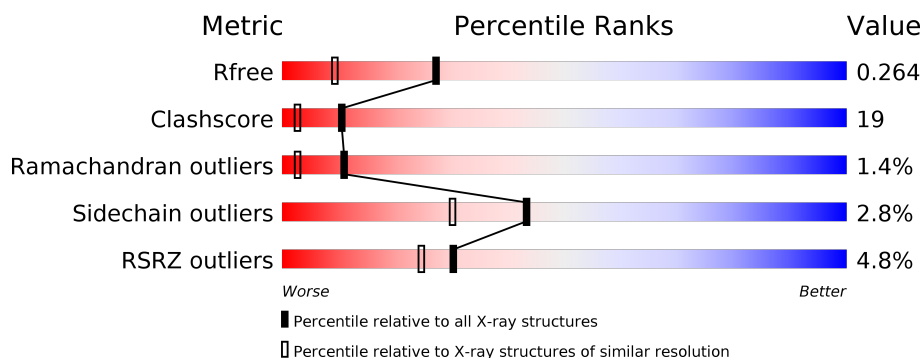
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 1.80 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))
$R_{free}$	130704	5950 (1.80-1.80)
Clashscore	141614	6793 (1.80-1.80)
Ramachandran outliers	138981	6697 (1.80-1.80)
Sidechain outliers	138945	6696 (1.80-1.80)
RSRZ outliers	127900	5850 (1.80-1.80)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	204	<div> <div>2%</div> <div> <div></div> <div>62%</div> <div>22%</div> <div>•</div> <div>12%</div> </div> </div>
1	B	204	<div> <div>4%</div> <div> <div></div> <div>64%</div> <div>24%</div> <div>•</div> <div>10%</div> </div> </div>
1	C	204	<div> <div>6%</div> <div> <div></div> <div>61%</div> <div>23%</div> <div>•</div> <div>13%</div> </div> </div>
1	D	204	<div> <div>3%</div> <div> <div></div> <div>59%</div> <div>27%</div> <div>•</div> <div>13%</div> </div> </div>

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 6352 atoms, of which 4 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 Modulator of drug activity B.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	180	Total	C	N	O	Se	0	0	0
			1439	929	238	266	6			
1	B	184	Total	C	H	N	O	Se	0	0
			1479	949	4	248	272	6		
1	C	177	Total	C	N	O	Se	0	0	0
			1423	922	233	262	6			
1	D	177	Total	C	N	O	Se	0	0	0
			1425	922	237	260	6			

There are 72 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MSE	-	SEE REMARK 999	UNP P0AEY7
A	2	GLY	-	CLONING ARTIFACT	UNP P0AEY7
A	3	SER	-	CLONING ARTIFACT	UNP P0AEY7
A	4	SER	-	CLONING ARTIFACT	UNP P0AEY7
A	5	HIS	-	EXPRESSION TAG	UNP P0AEY7
A	6	HIS	-	EXPRESSION TAG	UNP P0AEY7
A	7	HIS	-	EXPRESSION TAG	UNP P0AEY7
A	8	HIS	-	EXPRESSION TAG	UNP P0AEY7
A	9	HIS	-	EXPRESSION TAG	UNP P0AEY7
A	10	HIS	-	EXPRESSION TAG	UNP P0AEY7
A	11	GLY	-	CLONING ARTIFACT	UNP P0AEY7
A	12	SER	-	CLONING ARTIFACT	UNP P0AEY7
A	78	MSE	MET	MODIFIED RESIDUE	UNP P0AEY7
A	83	MSE	MET	MODIFIED RESIDUE	UNP P0AEY7
A	131	MSE	MET	MODIFIED RESIDUE	UNP P0AEY7
A	140	MSE	MET	MODIFIED RESIDUE	UNP P0AEY7
A	171	MSE	MET	MODIFIED RESIDUE	UNP P0AEY7
A	185	MSE	MET	MODIFIED RESIDUE	UNP P0AEY7
B	1	MSE	-	SEE REMARK 999	UNP P0AEY7
B	2	GLY	-	CLONING ARTIFACT	UNP P0AEY7
B	3	SER	-	CLONING ARTIFACT	UNP P0AEY7

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Chain	Residue	Modelled	Actual	Comment	Reference
B	4	SER	-	CLONING ARTIFACT	UNP P0AEY7
B	5	HIS	-	EXPRESSION TAG	UNP P0AEY7
B	6	HIS	-	EXPRESSION TAG	UNP P0AEY7
B	7	HIS	-	EXPRESSION TAG	UNP P0AEY7
B	8	HIS	-	EXPRESSION TAG	UNP P0AEY7
B	9	HIS	-	EXPRESSION TAG	UNP P0AEY7
B	10	HIS	-	EXPRESSION TAG	UNP P0AEY7
B	11	GLY	-	CLONING ARTIFACT	UNP P0AEY7
B	12	SER	-	CLONING ARTIFACT	UNP P0AEY7
B	78	MSE	MET	MODIFIED RESIDUE	UNP P0AEY7
B	83	MSE	MET	MODIFIED RESIDUE	UNP P0AEY7
B	131	MSE	MET	MODIFIED RESIDUE	UNP P0AEY7
B	140	MSE	MET	MODIFIED RESIDUE	UNP P0AEY7
B	171	MSE	MET	MODIFIED RESIDUE	UNP P0AEY7
B	185	MSE	MET	MODIFIED RESIDUE	UNP P0AEY7
C	1	MSE	-	SEE REMARK 999	UNP P0AEY7
C	2	GLY	-	CLONING ARTIFACT	UNP P0AEY7
C	3	SER	-	CLONING ARTIFACT	UNP P0AEY7
C	4	SER	-	CLONING ARTIFACT	UNP P0AEY7
C	5	HIS	-	EXPRESSION TAG	UNP P0AEY7
C	6	HIS	-	EXPRESSION TAG	UNP P0AEY7
C	7	HIS	-	EXPRESSION TAG	UNP P0AEY7
C	8	HIS	-	EXPRESSION TAG	UNP P0AEY7
C	9	HIS	-	EXPRESSION TAG	UNP P0AEY7
C	10	HIS	-	EXPRESSION TAG	UNP P0AEY7
C	11	GLY	-	CLONING ARTIFACT	UNP P0AEY7
C	12	SER	-	CLONING ARTIFACT	UNP P0AEY7
C	78	MSE	MET	MODIFIED RESIDUE	UNP P0AEY7
C	83	MSE	MET	MODIFIED RESIDUE	UNP P0AEY7
C	131	MSE	MET	MODIFIED RESIDUE	UNP P0AEY7
C	140	MSE	MET	MODIFIED RESIDUE	UNP P0AEY7
C	171	MSE	MET	MODIFIED RESIDUE	UNP P0AEY7
C	185	MSE	MET	MODIFIED RESIDUE	UNP P0AEY7
D	1	MSE	-	SEE REMARK 999	UNP P0AEY7
D	2	GLY	-	CLONING ARTIFACT	UNP P0AEY7
D	3	SER	-	CLONING ARTIFACT	UNP P0AEY7
D	4	SER	-	CLONING ARTIFACT	UNP P0AEY7
D	5	HIS	-	EXPRESSION TAG	UNP P0AEY7
D	6	HIS	-	EXPRESSION TAG	UNP P0AEY7
D	7	HIS	-	EXPRESSION TAG	UNP P0AEY7
D	8	HIS	-	EXPRESSION TAG	UNP P0AEY7
D	9	HIS	-	EXPRESSION TAG	UNP P0AEY7

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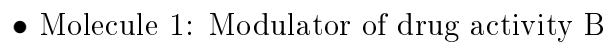
Chain	Residue	Modelled	Actual	Comment	Reference
D	10	HIS	-	EXPRESSION TAG	UNP P0AEY7
D	11	GLY	-	CLONING ARTIFACT	UNP P0AEY7
D	12	SER	-	CLONING ARTIFACT	UNP P0AEY7
D	78	MSE	MET	MODIFIED RESIDUE	UNP P0AEY7
D	83	MSE	MET	MODIFIED RESIDUE	UNP P0AEY7
D	131	MSE	MET	MODIFIED RESIDUE	UNP P0AEY7
D	140	MSE	MET	MODIFIED RESIDUE	UNP P0AEY7
D	171	MSE	MET	MODIFIED RESIDUE	UNP P0AEY7
D	185	MSE	MET	MODIFIED RESIDUE	UNP P0AEY7

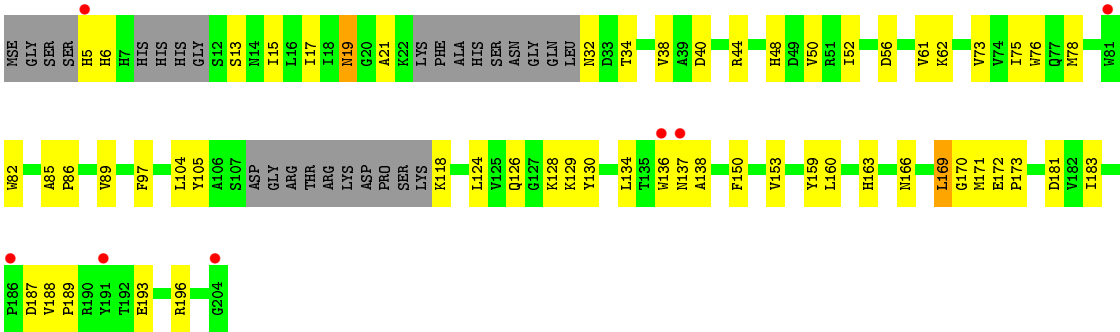
- Molecule 2 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	137	Total O 137 137	0	0
2	B	145	Total O 145 145	0	0
2	C	134	Total O 134 134	0	0
2	D	170	Total O 170 170	0	0



- Molecule 1: Modulator of drug activity B





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	53.06Å 86.51Å 82.67Å 90.00° 93.85° 90.00°	Depositor
Resolution (Å)	46.00 – 1.80 45.98 – 1.80	Depositor EDS
% Data completeness (in resolution range)	(Not available) (46.00-1.80) 99.7 (45.98-1.80)	Depositor EDS
$R_{merge}$	0.06	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.45 (at 1.79Å)	Xtriage
Refinement program	CNS 1.1	Depositor
R, $R_{free}$	0.233 , 0.263 0.262 , 0.264	Depositor DCC
$R_{free}$ test set	3490 reflections (5.06%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	17.5	Xtriage
Anisotropy	0.613	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 75.3	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	6352	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	20.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 79.68 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 5.2985e-07. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

<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](#)

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	0.34	0/1472	0.62	0/1985
1	B	0.34	0/1510	0.64	2/2037 (0.1%)
1	C	0.33	0/1456	0.61	0/1964
1	D	0.33	0/1460	0.58	0/1969
All	All	0.33	0/5898	0.61	2/7955 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	99	GLU	N-CA-C	-6.23	94.19	111.00
1	B	118	LYS	CB-CA-C	5.29	120.98	110.40

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	1439	0	1386	58	0
1	B	1475	4	1406	42	0
1	C	1423	0	1375	58	0
1	D	1425	0	1364	57	0
2	A	137	0	0	11	0
2	B	145	0	0	7	0
2	C	134	0	0	4	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	D	170	0	0	8	0
All	All	6348	4	5531	209	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 19.

The worst 5 of 209 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:128:LYS:HB3	1:A:171:MSE:HE3	1.28	1.13
1:D:128:LYS:HB3	1:D:171:MSE:HE3	1.38	0.99
1:A:17:ILE:HB	1:A:52:ILE:HD13	1.50	0.92
1:D:78:MSE:HE3	1:D:89:VAL:HG21	1.57	0.83
1:D:136:TRP:HD1	1:D:138:ALA:H	1.21	0.83

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	174/204 (85%)	166 (95%)	5 (3%)	3 (2%)	9	2
1	B	176/204 (86%)	170 (97%)	4 (2%)	2 (1%)	14	4
1	C	171/204 (84%)	157 (92%)	10 (6%)	4 (2%)	6	1
1	D	169/204 (83%)	163 (96%)	5 (3%)	1 (1%)	25	12
All	All	690/816 (85%)	656 (95%)	24 (4%)	10 (1%)	11	3

5 of 10 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	151	HIS

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Mol	Chain	Res	Type
1	A	190	ARG
1	C	31	LEU
1	C	190	ARG
1	D	187	ASP

### 5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	151/165 (92%)	146 (97%)	5 (3%)	38	23
1	B	155/165 (94%)	152 (98%)	3 (2%)	57	46
1	C	150/165 (91%)	144 (96%)	6 (4%)	31	16
1	D	150/165 (91%)	147 (98%)	3 (2%)	55	44
All	All	606/660 (92%)	589 (97%)	17 (3%)	43	30

5 of 17 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	28	ASN
1	C	16	LEU
1	C	181	ASP
1	B	19	ASN
1	D	19	ASN

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 26 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	166	ASN
1	C	32	ASN
1	D	166	ASN
1	C	19	ASN
1	C	30	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](#)

There are no ligands in this entry.

### 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	174/204 (85%)	0.22	5 (2%) 51 46	9, 16, 31, 38	0
1	B	178/204 (87%)	0.31	9 (5%) 28 22	9, 16, 31, 38	0
1	C	171/204 (83%)	0.44	12 (7%) 16 13	12, 19, 32, 39	0
1	D	171/204 (83%)	0.27	7 (4%) 37 31	12, 18, 30, 41	0
All	All	694/816 (85%)	0.31	33 (4%) 30 25	9, 17, 31, 41	0

The worst 5 of 33 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	188	VAL	8.3
1	A	188	VAL	5.7
1	B	111	THR	4.0
1	C	81	TRP	3.9
1	B	100	GLY	3.9

### 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](#)

There are no ligands in this entry.

## 6.5 Other polymers [i](#)

There are no such residues in this entry.