wwPDB X-ray Structure Validation Summary Report (i)

May 15, 2020 – 08:31 pm BST

PDB ID	:	1FM2
Title	:	THE 2 ANGSTROM CRYSTAL STRUCTURE OF CEPHALOSPORIN ACYLASE
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Deposited on	:	2000-08-15
Resolution	:	2.00 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*
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 (i)) were used in the production of this report:

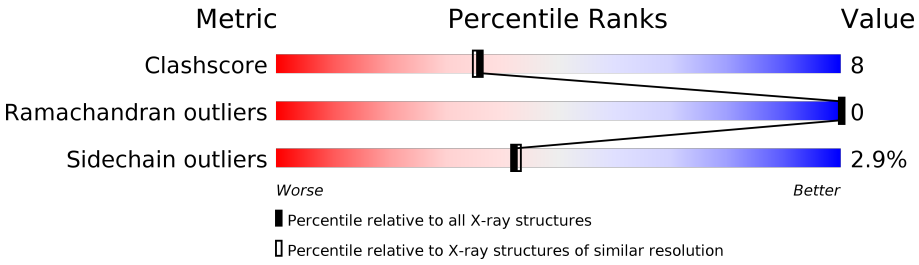
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.11

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 2.00 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))
Clashscore	141614	9178 (2.00-2.00)
Ramachandran outliers	138981	9054 (2.00-2.00)
Sidechain outliers	138945	9053 (2.00-2.00)

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 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%

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	169	80% 8% • 10%
2	B	520	83% 16% •

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 5720 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 GLUTARYL 7-AMINOCEPHALOSPORANIC ACID ACYLASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	Se			
1	A	152	1193	760	211	221	1	0	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	145	MSE	MET	MODIFIED RESIDUE	UNP Q9L5D6

- Molecule 2 is a protein called GLUTARYL 7-AMINOCEPHALOSPORANIC ACID ACYLASE.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	N	O	S	Se			
2	B	520	4105	2590	729	773	1	12	0	0	0

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	233	MSE	MET	MODIFIED RESIDUE	UNP Q9L5D6
B	242	MSE	MET	MODIFIED RESIDUE	UNP Q9L5D6
B	318	MSE	MET	MODIFIED RESIDUE	UNP Q9L5D6
B	325	MSE	MET	MODIFIED RESIDUE	UNP Q9L5D6
B	338	MSE	MET	MODIFIED RESIDUE	UNP Q9L5D6
B	341	MSE	MET	MODIFIED RESIDUE	UNP Q9L5D6
B	426	CYS	THR	SEE REMARK 999	UNP Q9L5D6
B	428	ALA	ARG	SEE REMARK 999	UNP Q9L5D6
B	429	ASN	ASP	SEE REMARK 999	UNP Q9L5D6
B	451	MSE	MET	MODIFIED RESIDUE	UNP Q9L5D6
B	463	MSE	MET	MODIFIED RESIDUE	UNP Q9L5D6
B	473	MSE	MET	MODIFIED RESIDUE	UNP Q9L5D6
B	506	ASP	GLU	SEE REMARK 999	UNP Q9L5D6

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Chain	Residue	Modelled	Actual	Comment	Reference
B	585	MSE	MET	MODIFIED RESIDUE	UNP Q9L5D6
B	629	MSE	MET	MODIFIED RESIDUE	UNP Q9L5D6
B	642	MSE	MET	MODIFIED RESIDUE	UNP Q9L5D6

- Molecule 3 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	110	Total O 110 110	0	0
3	B	312	Total O 312 312	0	0

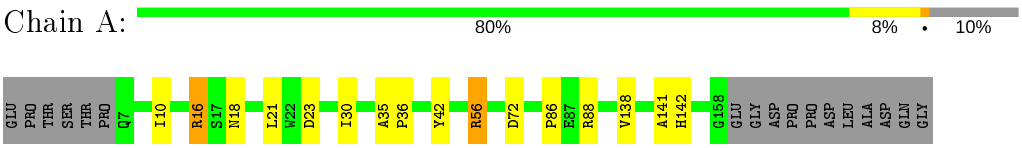
3 Residue-property plots (i)

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. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

Note EDS was not executed.

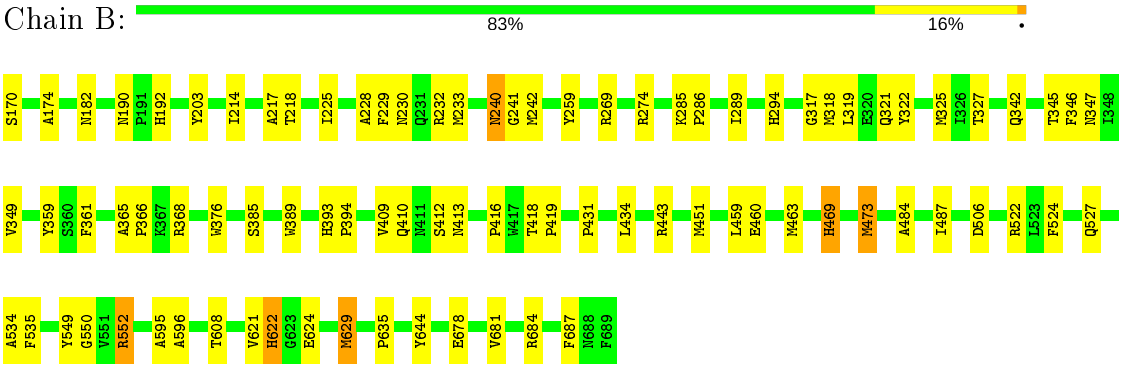
- Molecule 1: GLUTARYL 7-AMINOCEPHALOSPORANIC ACID ACYLASE

Chain A:



- Molecule 2: GLUTARYL 7-AMINOCEPHALOSPORANIC ACID ACYLASE

Chain B:



4 Data and refinement statistics (i)

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

Property	Value	Source
Space group	P 41 21 2	Depositor
Cell constants a, b, c, α, β, γ	73.60Å 73.60Å 380.90Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	40.00 – 2.00	Depositor
% Data completeness (in resolution range)	(Not available) (40.00-2.00)	Depositor
R_{merge}	0.04	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	CNS	Depositor
R, R_{free}	0.208 , 0.230	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	5720	wwPDB-VP
Average B, all atoms (Å^2)	27.0	wwPDB-VP

5 Model quality

5.1 Standard geometry

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	0.33	0/1231	0.54	0/1683
2	B	0.41	0/4209	0.60	0/5725
All	All	0.39	0/5440	0.59	0/7408

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

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	1193	0	1114	15	0
2	B	4105	0	3917	75	0
3	A	110	0	0	4	0
3	B	312	0	0	5	0
All	All	5720	0	5031	83	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 8.

The worst 5 of 83 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:B:463:MSE:HG2	2:B:629:MSE:HG3	1.27	1.11

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:413:ASN:HD22	2:B:443:ARG:HH22	1.09	1.00
2:B:459:LEU:HG	2:B:463:MSE:HE2	1.43	1.00
2:B:321:GLN:HE22	2:B:342:GLN:H	1.04	0.91
2:B:322:TYR:HA	2:B:325:MSE:HE3	1.56	0.86

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	150/169 (89%)	145 (97%)	5 (3%)	0	100	100
2	B	518/520 (100%)	507 (98%)	11 (2%)	0	100	100
All	All	668/689 (97%)	652 (98%)	16 (2%)	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	116/129 (90%)	113 (97%)	3 (3%)	46	48
2	B	428/416 (103%)	415 (97%)	13 (3%)	41	41
All	All	544/545 (100%)	528 (97%)	16 (3%)	42	43

5 of 16 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	B	410	GLN
2	B	469	HIS
2	B	621	VAL
2	B	274	ARG
2	B	622	HIS

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 16 such sidechains are listed below:

Mol	Chain	Res	Type
2	B	321	GLN
2	B	329	HIS
2	B	413	ASN
2	B	294	HIS
2	B	429	ASN

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

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

EDS was not executed - this section is therefore empty.

6.2 Non-standard residues in protein, DNA, RNA chains

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

6.4 Ligands

EDS was not executed - this section is therefore empty.

6.5 Other polymers

EDS was not executed - this section is therefore empty.