Full wwPDB X-ray Structure Validation Report (i)

Feb 13, 2025 – 06:06 PM EST

PDB ID	:	8FSR
Title	:	Complex Structure of YejA with fMccA
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Deposited on	:	2023-01-11
Resolution	:	1.78 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*
A user guide is available at
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the (i) 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 (1)) were used in the production of this report:

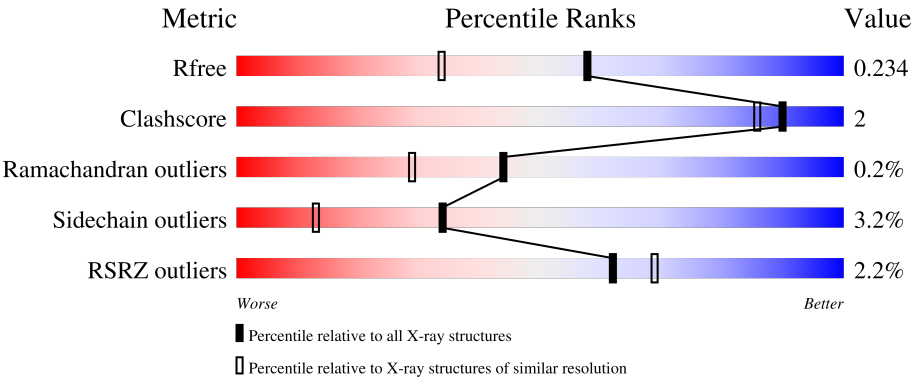
MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.21
EDS	:	3.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.004 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.40

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 1.78 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}	164625	1191 (1.78-1.78)
Clashscore	180529	1282 (1.78-1.78)
Ramachandran outliers	177936	1270 (1.78-1.78)
Sidechain outliers	177891	1270 (1.78-1.78)
RSRZ outliers	164620	1191 (1.78-1.78)

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 >=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	585	2% 90% 8%
2	B	7	43% 57%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 5271 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 YejA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	576	Total	C	N	O	S	0	5	0
			4731	3043	805	869	14			

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	560	VAL	ILE	conflict	UNP P33913

- Molecule 2 is a protein called Peptide Precursor of Microcin C7.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	7	Total	C	N	O	S	0	0	0
			54	29	12	12	1			

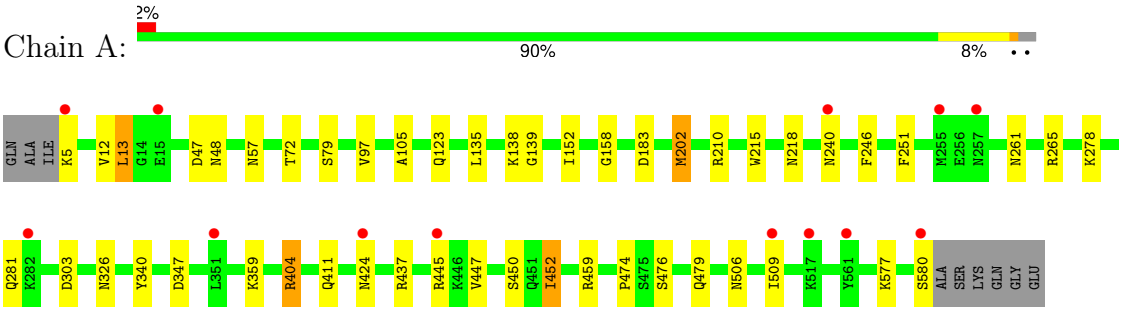
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	480	Total	O	0	0
			480	480		
3	B	6	Total	O	0	0
			6	6		

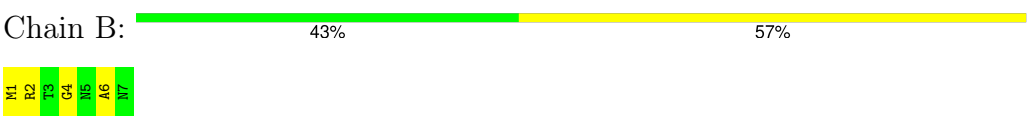
3 Residue-property plots (i)

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: YejA



• Molecule 2: Peptide Precursor of Microcin C7



4 Data and refinement statistics (i)

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants a, b, c, α, β, γ	89.52Å 103.12Å 144.01Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	83.84 – 1.78 83.84 – 1.78	Depositor EDS
% Data completeness (in resolution range)	98.3 (83.84-1.78) 98.4 (83.84-1.78)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.32 (at 1.77Å)	Xtriage
Refinement program		Depositor
R, R_{free}	0.182 , 0.225 0.193 , 0.234	Depositor DCC
R_{free} test set	3207 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å^2)	20.9	Xtriage
Anisotropy	1.046	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.37 , 36.0	EDS
L-test for twinning[2]	$< \|L\| > = 0.51$, $< L^2 > = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	5271	wwPDB-VP
Average B, all atoms (Å^2)	30.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.05% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] 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.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: FME

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	0.90	1/4888 (0.0%)	1.03	13/6653 (0.2%)
2	B	3.32	5/43 (11.6%)	2.24	3/55 (5.5%)
All	All	0.94	6/4931 (0.1%)	1.05	16/6708 (0.2%)

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	2	ARG	CZ-NH2	-7.67	1.23	1.33
1	A	139	GLY	N-CA	7.58	1.57	1.46
2	B	2	ARG	NE-CZ	7.39	1.42	1.33
2	B	4	GLY	C-O	-7.28	1.12	1.23
2	B	2	ARG	CZ-NH1	7.00	1.42	1.33
2	B	2	ARG	C-O	-5.68	1.12	1.23

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	459	ARG	NE-CZ-NH1	-22.26	109.17	120.30
1	A	459	ARG	NE-CZ-NH2	18.92	129.76	120.30
1	A	437	ARG	NE-CZ-NH1	-14.42	113.09	120.30
1	A	437	ARG	NE-CZ-NH2	11.23	125.92	120.30
1	A	445	ARG	NE-CZ-NH2	-8.67	115.97	120.30
1	A	138	LYS	C-N-CA	-8.37	104.72	122.30
1	A	202	MET	CG-SD-CE	-7.16	88.74	100.20
2	B	6	ALA	C-N-CA	7.13	139.53	121.70
1	A	459	ARG	CD-NE-CZ	6.79	133.11	123.60
1	A	303	ASP	CB-CG-OD1	6.45	124.11	118.30
1	A	183	ASP	CB-CG-OD2	-5.64	113.22	118.30
2	B	2	ARG	CG-CD-NE	-5.63	99.98	111.80
2	B	2	ARG	CB-CA-C	-5.52	99.36	110.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	404	ARG	NE-CZ-NH1	5.35	122.98	120.30
1	A	210	ARG	NE-CZ-NH1	5.09	122.84	120.30
1	A	347	ASP	CB-CG-OD1	5.03	122.83	118.30

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	4731	0	4590	16	0
2	B	54	0	50	0	0
3	A	480	0	0	2	0
3	B	6	0	0	0	0
All	All	5271	0	4640	16	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 2.

All (16) 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:5:LYS:N	3:A:604:HOH:O	2.35	0.58
1:A:447:VAL:HG23	1:A:452:ILE:HG12	1.85	0.57
1:A:47:ASP:HA	1:A:202:MET:CE	2.39	0.52
1:A:97:VAL:HG12	1:A:152:ILE:HB	1.93	0.51
1:A:47:ASP:HA	1:A:202:MET:HE3	1.92	0.51
1:A:72:THR:HA	1:A:79:SER:O	2.12	0.49
1:A:246:PHE:HB2	1:A:251:PHE:CZ	2.49	0.48
1:A:326:ASN:HB2	3:A:996:HOH:O	2.17	0.44
1:A:447:VAL:CG2	1:A:452:ILE:HG12	2.46	0.43
1:A:261:ASN:OD1	1:A:265:ARG:NH1	2.52	0.42
1:A:12:VAL:HG12	1:A:13:LEU:HD13	2.01	0.42
1:A:506:ASN:HA	1:A:509:ILE:HG12	2.02	0.42
1:A:105:ALA:HA	1:A:215:TRP:CE2	2.55	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:476:SER:O	1:A:479:GLN:HG2	2.21	0.41
1:A:340:TYR:CD1	1:A:474:PRO:HD3	2.56	0.40

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	579/585 (99%)	562 (97%)	16 (3%)	1 (0%)	44 29
2	B	5/7 (71%)	5 (100%)	0	0	100 100
All	All	584/592 (99%)	567 (97%)	16 (3%)	1 (0%)	44 29

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	158	GLY

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	503/504 (100%)	487 (97%)	16 (3%)	34 13
2	B	4/4 (100%)	4 (100%)	0	100 100
All	All	507/508 (100%)	491 (97%)	16 (3%)	34 13

All (16) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	13	LEU
1	A	48	ASN
1	A	57	ASN
1	A	123	GLN
1	A	135	LEU
1	A	218	ASN
1	A	240	ASN
1	A	278	LYS
1	A	281	GLN
1	A	359	LYS
1	A	404	ARG
1	A	411	GLN
1	A	450	SER
1	A	452	ILE
1	A	577	LYS
1	A	580	SER

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

Mol	Chain	Res	Type
2	B	5	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)

1 non-standard protein/DNA/RNA residue is 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	$\#\|Z\|>2$

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\|>2$	Counts	RMSZ	$\#\|Z\|>2$
2	FME	B	1	2	8,9,10	1.49	1 (12%)	8,9,11	3.43	4 (50%)

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	FME	B	1	2	-	5/7/9/11	-

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	1	FME	CN-N	3.79	1.45	1.33

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	1	FME	CA-N-CN	6.32	132.54	122.82
2	B	1	FME	CB-CA-N	5.67	120.84	110.52
2	B	1	FME	CE-SD-CG	2.14	111.37	100.32
2	B	1	FME	O1-CN-N	-2.05	120.02	125.32

There are no chirality outliers.

All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	1	FME	O1-CN-N-CA
2	B	1	FME	CB-CA-N-CN
2	B	1	FME	O-C-CA-CB
2	B	1	FME	CA-CB-CG-SD
2	B	1	FME	C-CA-CB-CG

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates (i)

There are no oligosaccharides 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

6.1 Protein, DNA and RNA chains

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	<RSRZ>	#RSRZ>2	OWAB(Å^2)	Q<0.9
1	A	576/585 (98%)	0.23	13 (2%) 61 68	15, 27, 47, 73	5 (0%)
2	B	6/7 (85%)	0.58	0 100 100	22, 27, 32, 50	0
All	All	582/592 (98%)	0.23	13 (2%) 62 69	15, 27, 47, 73	5 (0%)

All (13) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	580	SER	2.9
1	A	257	ASN	2.9
1	A	351	LEU	2.8
1	A	255	MET	2.5
1	A	282	LYS	2.5
1	A	424	ASN	2.4
1	A	509	ILE	2.3
1	A	5	LYS	2.2
1	A	15	GLU	2.2
1	A	517	LYS	2.2
1	A	240	ASN	2.1
1	A	445	ARG	2.1
1	A	561	TYR	2.1

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

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	B-factors(Å^2)	Q<0.9
2	FME	B	1	10/11	0.68	0.20	26,32,53,58	0

6.3 Carbohydrates (i)

There are no monosaccharides 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.