Full wwPDB X-ray Structure Validation Report (i)

Jun 22, 2024 – 04:18 PM EDT

PDB ID	:	5FGM
Title	:	Streptomyces coelicolor SigR region 4
Authors	:	Park, S.Y.
Deposited on	:	2015-12-21
Resolution	:	2.60 Å(reported)

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

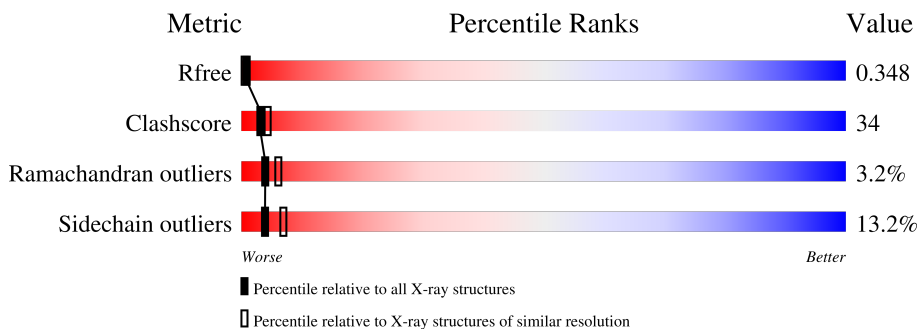|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.37.1
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.37.1

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 2.60 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	Percentile Ranks	Value
Rfree		0.348
Clashscore		34
Ramachandran outliers		3.2%
Sidechain outliers		13.2%

Worse   *Better*

▮ Percentile relative to all X-ray structures
❏ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	3163 (2.60-2.60)
Clashscore	141614	3518 (2.60-2.60)
Ramachandran outliers	138981	3455 (2.60-2.60)
Sidechain outliers	138945	3455 (2.60-2.60)

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%

Mol	Chain	Length	Quality of chain
1	A	69	54% 26% 13% · 6%

2 Entry composition ⓘ

There are 2 unique types of molecules in this entry. The entry contains 528 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 ECF RNA polymerase sigma factor SigR.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	65	Total	C	N	O	Se	0	0	0
			517	326	93	95	3			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	139	GLY	-	expression tag	UNP Q7AKG9
A	140	SER	-	expression tag	UNP Q7AKG9
A	141	HIS	-	expression tag	UNP Q7AKG9
A	142	MSE	-	expression tag	UNP Q7AKG9

- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	11	Total	O	0	0
			11	11		

3 Residue-property plots ⓘ

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. 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.

• Molecule 1: ECF RNA polymerase sigma factor SigR

Chain A:

4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α, β, γ	42.14Å 42.14Å 102.02Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	38.95 – 2.60 38.95 – 2.60	Depositor EDS
% Data completeness (in resolution range)	99.2 (38.95-2.60) 99.2 (38.95-2.60)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	11.37 (at 2.61Å)	Xtriage
Refinement program	REFMAC 5.5.0110	Depositor
R, R_{free}	0.239 , 0.318 0.282 , 0.348	Depositor DCC
R_{free} test set	138 reflections (4.36%)	wwPDB-VP
Wilson B-factor (Å^2)	51.8	Xtriage
Anisotropy	0.679	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.33 , 33.5	EDS
L-test for twinning[2]	$< |L| > = 0.49$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.88	EDS
Total number of atoms	528	wwPDB-VP
Average B, all atoms (Å^2)	43.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.45% of the height of the origin peak. No significant pseudotranslation is detected.*

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[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 ⓘ

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	1.19	1/522 (0.2%)	0.98	1/697 (0.1%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	144	PRO	N-CD	5.22	1.55	1.47

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	143	LEU	C-N-CD	5.59	140.15	128.40

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	146	SER	Peptide

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	517	0	521	35	0
2	A	11	0	0	0	0
All	All	528	0	521	35	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 34.

All (35) 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:207:ARG:H	1:A:207:ARG:HD2	1.24	0.99
1:A:145:ASP:OD1	1:A:146:SER:N	2.07	0.87
1:A:162:ALA:N	1:A:180:MSE:HE1	1.98	0.78
1:A:207:ARG:H	1:A:207:ARG:CD	1.93	0.75
1:A:145:ASP:C	1:A:147:ASP:H	2.06	0.59
1:A:161:ILE:HB	1:A:180:MSE:HE2	1.85	0.58
1:A:146:SER:HA	1:A:148:VAL:HG23	1.86	0.58
1:A:184:ILE:HD13	1:A:188:MSE:HE3	1.86	0.58
1:A:189:SER:O	1:A:193:ARG:HG2	2.05	0.57
1:A:143:LEU:HB2	1:A:144:PRO:HD2	1.85	0.56
1:A:156:PRO:HD2	1:A:197:GLN:HE22	1.71	0.55
1:A:207:ARG:HD2	1:A:207:ARG:N	2.07	0.54
1:A:143:LEU:CB	1:A:144:PRO:CD	2.85	0.54
1:A:186:THR:O	1:A:190:ARG:HG3	2.07	0.53
1:A:143:LEU:HB2	1:A:144:PRO:CD	2.38	0.53
1:A:161:ILE:HB	1:A:180:MSE:CE	2.39	0.52
1:A:162:ALA:N	1:A:180:MSE:CE	2.73	0.52
1:A:207:ARG:CD	1:A:207:ARG:N	2.69	0.50
1:A:191:LEU:O	1:A:195:ARG:HD2	2.14	0.48
1:A:148:VAL:O	1:A:150:GLN:N	2.49	0.46
1:A:148:VAL:C	1:A:150:GLN:N	2.65	0.46
1:A:162:ALA:H	1:A:180:MSE:HE1	1.80	0.44
1:A:158:GLU:H	1:A:158:GLU:HG2	1.63	0.43
1:A:155:ILE:HD11	1:A:198:LEU:HD23	2.00	0.43
1:A:148:VAL:O	1:A:149:LYS:C	2.57	0.42
1:A:173:TYR:HD2	1:A:188:MSE:HE2	1.83	0.42
1:A:145:ASP:CG	1:A:146:SER:N	2.73	0.42
1:A:145:ASP:O	1:A:148:VAL:HG23	2.21	0.41
1:A:148:VAL:C	1:A:150:GLN:H	2.22	0.41
1:A:173:TYR:N	1:A:173:TYR:CD1	2.88	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:184:ILE:HG21	1:A:184:ILE:HD12	1.68	0.41
1:A:145:ASP:C	1:A:147:ASP:N	2.73	0.41
1:A:202:LEU:H	1:A:202:LEU:HG	1.61	0.40
1:A:184:ILE:HD13	1:A:184:ILE:HG23	1.67	0.40
1:A:193:ARG:HG2	1:A:193:ARG:H	1.69	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	63/69 (91%)	55 (87%)	6 (10%)	2 (3%)	4 6

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	149	LYS
1	A	144	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	53/52 (102%)	46 (87%)	7 (13%)	4 7

All (7) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	158	GLU
1	A	184	ILE
1	A	189	SER
1	A	198	LEU
1	A	202	LEU
1	A	205	TYR
1	A	207	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	150	GLN
1	A	197	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

There are no ligands in this entry.

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

WORLDWIDE
wwPDB
PROTEIN DATA BANK

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.

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

Unable to reproduce the depositors R factor - this section is therefore empty.

6.3 Carbohydrates ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.

6.4 Ligands ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.

6.5 Other polymers ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.