



Full wwPDB X-ray Structure Validation Report

Feb 27, 2014 – 10:43 AM GMT

PDB ID : 2PSF
Title : Crystal Structures of the Luciferase and Green Fluorescent Protein from Renilla Reniformis
Authors : Loening, A.M.; Fenn, T.D.; Gambhir, S.S.
Deposited on : 2007-05-06
Resolution : 1.40 Å(reported)

This is a full wwPDB validation report for a publicly released PDB entry.
We welcome your comments at validation@mail.wwpdb.org
A user guide is available at <http://wwpdb.org/ValidationPDFNotes.html>

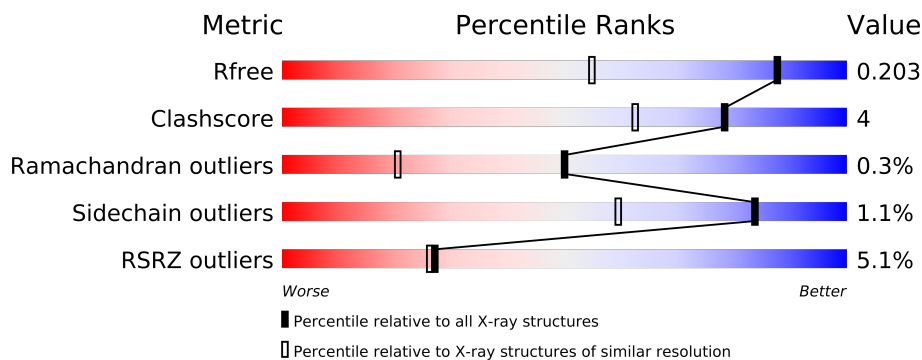
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.15 2013
Xtriage (Phenix) : dev-1323
EDS : stable22639
Percentile statistics : 21963
Refmac : 5.8.0049
CCP4 : 6.3.0 (Settle)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)
Validation Pipeline (wwPDB-VP) : stable22683

1 Overall quality at a glance

The reported resolution of this entry is 1.40 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}	66092	1097 (1.42-1.38)
Clashscore	79885	1246 (1.42-1.38)
Ramachandran outliers	78287	1206 (1.42-1.38)
Sidechain outliers	78261	1205 (1.42-1.38)
RSRZ outliers	66119	1097 (1.42-1.38)

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. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density.

Mol	Chain	Length	Quality of chain
1	A	310	
1	B	310	

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 5773 atoms, of which 0 are hydrogen and 0 are deuterium.

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 Renilla-luciferin 2-monooxygenase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	307	Total	C	N	O	S	0	0	0
			2516	1631	422	454	9			
1	B	301	Total	C	N	O	S	0	0	0
			2467	1599	415	444	9			

There are 18 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	2	GLY	-	EXPRESSION TAG	UNP P27652
A	55	THR	ALA	ENGINEERED	UNP P27652
A	124	ALA	CYS	ENGINEERED	UNP P27652
A	130	ALA	SER	ENGINEERED	UNP P27652
A	136	ARG	LYS	ENGINEERED	UNP P27652
A	143	MET	ALA	ENGINEERED	UNP P27652
A	185	VAL	MET	ENGINEERED	UNP P27652
A	253	LEU	MET	ENGINEERED	UNP P27652
A	287	LEU	SER	ENGINEERED	UNP P27652
B	2	GLY	-	EXPRESSION TAG	UNP P27652
B	55	THR	ALA	ENGINEERED	UNP P27652
B	124	ALA	CYS	ENGINEERED	UNP P27652
B	130	ALA	SER	ENGINEERED	UNP P27652
B	136	ARG	LYS	ENGINEERED	UNP P27652
B	143	MET	ALA	ENGINEERED	UNP P27652
B	185	VAL	MET	ENGINEERED	UNP P27652
B	253	LEU	MET	ENGINEERED	UNP P27652
B	287	LEU	SER	ENGINEERED	UNP P27652

- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	425	Total	O	0	0
			425	425		

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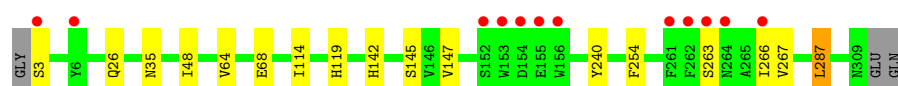
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	B	365	Total 365	O 365	0	0

3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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.

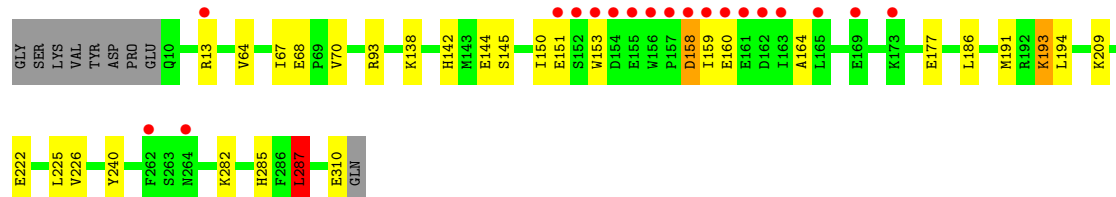
- Molecule 1: Renilla-luciferin 2-monooxygenase

Chain A: 



- Molecule 1: Renilla-luciferin 2-monooxygenase

Chain B: 



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	81.18Å 82.28Å 90.38Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	50.00 – 1.40 48.69 – 1.40	Depositor EDS
% Data completeness (in resolution range)	98.3 (50.00-1.40) 98.3 (48.69-1.40)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.36 (at 1.40Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.173 , 0.194 0.182 , 0.203	Depositor DCC
R_{free} test set	5880 reflections (5.27%)	DCC
Wilson B-factor (Å ²)	12.7	Xtriage
Anisotropy	0.167	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 49.6	EDS
Estimated twinning fraction	0.013 for k,h,-l	Xtriage
L-test for twinning	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Outliers	1 of 117453 reflections (0.001%)	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	5773	wwPDB-VP
Average B, all atoms (Å ²)	21.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.76% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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	0.36	0/2588	0.59	0/3504
1	B	0.36	0/2537	0.59	1/3434 (0.0%)
All	All	0.36	0/5125	0.59	1/6938 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	287	LEU	CA-CB-CG	5.13	127.11	115.30

There are no chirality outliers.

There are no planarity outliers.

5.2 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 hydrogens added by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, and the number in parentheses is this value normalized per 1000 atoms of the molecule in the chain. The Symm-Clashes column gives symmetry related clashes, in the same way as for the Clashes column.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2516	0	2481	16	0
1	B	2467	0	2434	20	0
2	A	425	0	0	2	0
2	B	365	0	0	4	0
All	All	5773	0	4915	36	0

Clashscore is defined as the number of clashes calculated for the entry per 1000 atoms (including hydrogens) of the entry. The overall clashscore for this entry is 4.

All (36) close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:263:SER:O	1:A:267:VAL:HG23	1.54	1.05
1:A:147:VAL:HG21	1:A:266:ILE:HG23	1.49	0.92
1:A:147:VAL:CG2	1:A:266:ILE:HG23	2.00	0.91
1:B:193:LYS:CE	2:B:667:HOH:O	2.34	0.75
1:B:67:ILE:O	1:B:70:VAL:HG22	1.92	0.70
1:B:193:LYS:NZ	2:B:667:HOH:O	1.99	0.61
1:B:151:GLU:HG2	1:B:226:VAL:HG21	1.83	0.61
1:A:26:GLN:HE21	1:A:35:ASN:ND2	2.00	0.60
1:A:147:VAL:HG22	1:A:266:ILE:HG23	1.80	0.59
1:B:64:VAL:O	1:B:68:GLU:HG3	2.03	0.59
1:A:26:GLN:HE21	1:A:35:ASN:HD22	1.51	0.57
1:B:153:TRP:CZ2	1:B:225:LEU:HD21	2.40	0.56
1:B:287:LEU:HD12	1:B:287:LEU:H	1.71	0.55
1:A:3:SER:N	2:A:667:HOH:O	2.41	0.53
1:A:142:HIS:HD2	1:A:145:SER:OG	1.93	0.52
1:B:93:ARG:NH1	1:B:222:GLU:OE2	2.44	0.51
1:A:147:VAL:HG21	1:A:266:ILE:CG2	2.33	0.50
1:A:147:VAL:CG2	1:A:266:ILE:CG2	2.82	0.50
1:A:48:ILE:HD12	1:A:114:ILE:HD12	1.93	0.49
1:A:287:LEU:H	1:A:287:LEU:HD12	1.78	0.49
1:B:150:ILE:HB	1:B:225:LEU:HD23	1.95	0.48
1:A:64:VAL:O	1:A:68:GLU:HG3	2.13	0.48
1:B:177:GLU:O	1:B:209:LYS:HD2	2.14	0.48
1:B:193:LYS:HD3	1:B:194:LEU:O	2.14	0.47
1:B:191:MET:HE1	1:B:282:LYS:HB3	1.96	0.47
1:B:144:GLU:OE1	1:B:285:HIS:HD2	1.97	0.47
1:B:142:HIS:HD2	1:B:145:SER:OG	1.97	0.47
1:B:193:LYS:HD3	2:B:389:HOH:O	2.17	0.45
1:B:158:ASP:O	1:B:160:GLU:N	2.49	0.44
1:A:266:ILE:HG22	1:A:266:ILE:O	2.16	0.44
1:B:186:LEU:HD23	1:B:186:LEU:C	2.38	0.43
1:A:119:HIS:HD2	2:A:334:HOH:O	2.01	0.43
1:B:138:LYS:NZ	1:B:310:GLU:OE2	2.35	0.42
1:A:254:PHE:HE2	1:A:267:VAL:HG22	1.84	0.42
1:B:64:VAL:HG22	1:B:68:GLU:HG2	2.01	0.42
1:B:164:ALA:HB2	2:B:571:HOH:O	2.20	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone ⓘ

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	305/310 (98%)	296 (97%)	9 (3%)	0	100	100
1	B	299/310 (96%)	285 (95%)	12 (4%)	2 (1%)	30	7
All	All	604/620 (97%)	581 (96%)	21 (4%)	2 (0%)	50	20

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	158	ASP
1	B	159	ILE

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	271/273 (99%)	269 (99%)	2 (1%)	91	73
1	B	265/273 (97%)	261 (98%)	4 (2%)	76	46
All	All	536/546 (98%)	530 (99%)	6 (1%)	84	59

All (6) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	240	TYR
1	A	287	LEU
1	B	13	ARG
1	B	193	LYS
1	B	240	TYR
1	B	287	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	35	ASN
1	A	119	HIS
1	A	133	HIS
1	A	142	HIS
1	A	264	ASN
1	B	10	GLN
1	B	42	HIS
1	B	142	HIS
1	B	178	ASN
1	B	285	HIS

5.3.3 RNA ⓘ

There are no RNA chains 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 carbohydrates 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.

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, 95th 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	307/310 (99%)	-0.06	12 (3%) 37 39	15, 18, 26, 36	0
1	B	301/310 (97%)	0.12	19 (6%) 19 19	15, 18, 29, 38	0
All	All	608/620 (98%)	0.03	31 (5%) 27 26	15, 18, 28, 38	0

All (31) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	153	TRP	10.7
1	B	153	TRP	8.9
1	A	262	PHE	7.8
1	B	158	ASP	7.7
1	B	156	TRP	7.6
1	A	156	TRP	7.4
1	B	157	PRO	6.6
1	B	155	GLU	6.2
1	B	161	GLU	5.7
1	B	160	GLU	5.2
1	A	264	ASN	5.2
1	A	266	ILE	4.8
1	A	261	PHE	4.8
1	B	162	ASP	4.7
1	A	154	ASP	4.4
1	B	262	PHE	4.3
1	B	151	GLU	3.7
1	B	154	ASP	3.7
1	B	165	LEU	3.7
1	B	159	ILE	3.6
1	B	163	ILE	3.4
1	A	263	SER	3.4
1	A	155	GLU	3.4
1	B	152	SER	3.4

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Mol	Chain	Res	Type	RSRZ
1	A	6	TYR	3.3
1	B	13	ARG	2.8
1	B	173	LYS	2.7
1	B	264	ASN	2.7
1	A	152	SER	2.5
1	A	3	SER	2.0
1	B	169	GLU	2.0

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

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

6.3 Carbohydrates ⓘ

There are no carbohydrates in this entry.

6.4 Ligands ⓘ

There are no ligands in this entry.

6.5 Other polymers ⓘ

There are no such residues in this entry.