



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 12:28 PM GMT

PDB ID : 3RCZ
Title : Rad60 SLD2 Ubc9 Complex
Authors : Perry, J.J.P.; Arvai, A.S.; Tainer, J.A.
Deposited on : 2011-03-31
Resolution : 1.90 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
<http://wwpdb.org/validation/2016/XrayValidationReportHelp>
with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467
Mogul : 1.7 (RC4), CSD as536be (2015)
Xtriage (Phenix) : 1.9-1692
EDS : rb-20026688
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)
Refmac : 5.8.0135
CCP4 : 6.5.0
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : trunk26865

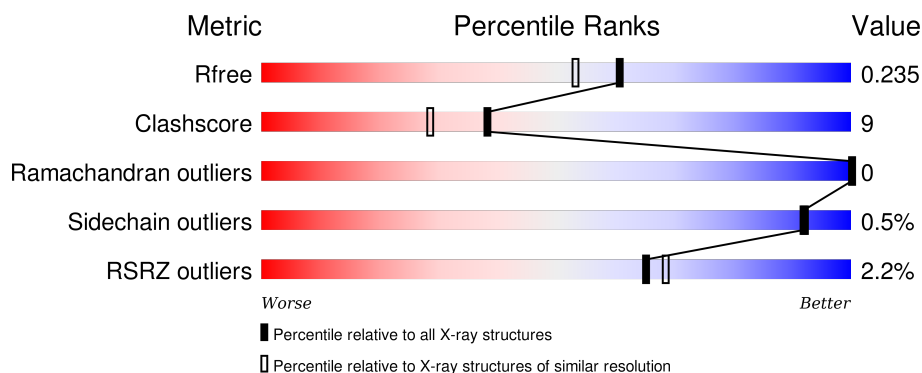
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.90 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}	91344	4755 (1.90-1.90)
Clashscore	102246	5398 (1.90-1.90)
Ramachandran outliers	100387	5338 (1.90-1.90)
Sidechain outliers	100360	5339 (1.90-1.90)
RSRZ outliers	91569	4766 (1.90-1.90)

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. 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	82	<div> <div style="width: 100%; height: 10px; background-color: red;"></div> <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="width: 77%; height: 10px; background-color: green;"></div> <div style="width: 13%; height: 10px; background-color: yellow;"></div> <div style="width: 10%; height: 10px; background-color: grey;"></div> </div> <div style="display: flex; justify-content: space-between; align-items: center;"> 77% 13% 10% </div> </div>
2	B	163	<div> <div style="width: 100%; height: 10px; background-color: red;"></div> <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="width: 76%; height: 10px; background-color: green;"></div> <div style="width: 19%; height: 10px; background-color: yellow;"></div> <div style="width: 5%; height: 10px; background-color: grey;"></div> </div> <div style="display: flex; justify-content: space-between; align-items: center;"> 76% 19% 5% </div> </div>

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 2058 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 DNA repair protein rad60.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	74	Total	C	N	O	S	0	0	0
			614	388	103	122	1			

There are 7 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	324	MET	-	EXPRESSION TAG	UNP Q9USX3
A	325	HIS	-	EXPRESSION TAG	UNP Q9USX3
A	326	HIS	-	EXPRESSION TAG	UNP Q9USX3
A	327	HIS	-	EXPRESSION TAG	UNP Q9USX3
A	328	HIS	-	EXPRESSION TAG	UNP Q9USX3
A	329	HIS	-	EXPRESSION TAG	UNP Q9USX3
A	330	HIS	-	EXPRESSION TAG	UNP Q9USX3

- Molecule 2 is a protein called SUMO-conjugating enzyme ubc9.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	155	Total	C	N	O	S	0	0	0
			1251	802	216	226	7			

There are 7 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	-5	MET	-	EXPRESSION TAG	UNP P40984
B	-4	HIS	-	EXPRESSION TAG	UNP P40984
B	-3	HIS	-	EXPRESSION TAG	UNP P40984
B	-2	HIS	-	EXPRESSION TAG	UNP P40984
B	-1	HIS	-	EXPRESSION TAG	UNP P40984
B	0	HIS	-	EXPRESSION TAG	UNP P40984
B	1	HIS	-	EXPRESSION TAG	UNP P40984

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	74	Total 74	O 74	0	0
3	B	119	Total 119	O 119	0	0

- Molecule 1: DNA repair protein rad60



-
- | Amino Acid Type | Value |
|-----------------|-------|
| Y134 | 1 |
| T135 | 1 |
| M136 | 1 |
| F137 | 1 |
| E143 | 1 |
| K146 | 1 |
| P157 | 1 |
| MET | 1 |
| H15 | 1 |
| H16 | 1 |
| H17 | 1 |
| H18 | 1 |
| H19 | 1 |
| H20 | 1 |
| S21 | 1 |
| R22 | 1 |
| R23 | 1 |
| P24 | 1 |
| F25 | 1 |
| R30 | 1 |
| S31 | 1 |
| S32 | 1 |
| D33 | 1 |
| G34 | 1 |
| V43 | 1 |
| P49 | 1 |
| E54 | 1 |
| K59 | 1 |
| L60 | 1 |
| L61 | 1 |
| D66 | 1 |
| D67 | 1 |
| I68 | 1 |
| P69 | 1 |
| P72 | 1 |
| F82 | 1 |
| H83 | 1 |
| F84 | 1 |
| N85 | 1 |
| P89 | 1 |
| E100 | 1 |
| W103 | 1 |
| K104 | 1 |
| P105 | 1 |
| A106 | 1 |
| I107 | 1 |
| A126 | 1 |
| S127 | 1 |
| P128 | 1 |
| E132 | 1 |

4 Data and refinement statistics

Property	Value	Source
Space group	P 6	Depositor
Cell constants a, b, c, α , β , γ	115.23 Å 115.23 Å 34.84 Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	33.27 – 1.90 33.26 – 1.90	Depositor EDS
% Data completeness (in resolution range)	94.4 (33.27-1.90) 94.5 (33.26-1.90)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.78 (at 1.91 Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.6 _289)	Depositor
R, R_{free}	0.198 , 0.239 0.196 , 0.235	Depositor DCC
R_{free} test set	1940 reflections (9.64%)	DCC
Wilson B-factor (Å ²)	25.9	Xtriage
Anisotropy	0.172	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 44.6	EDS
Estimated twinning fraction	0.036 for h,-h-k,-l	Xtriage
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Outliers	0 of 20990 reflections	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	2058	wwPDB-VP
Average B, all atoms (Å ²)	31.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.87% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.375 respectively for untwinned datasets, and 0.333, 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	0.36	0/623	0.57	0/841
2	B	0.36	0/1288	0.57	0/1745
All	All	0.36	0/1911	0.57	0/2586

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	614	0	614	9	0
2	B	1251	0	1248	25	0
3	A	74	0	0	0	0
3	B	119	0	0	2	0
All	All	2058	0	1862	34	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 9.

All (34) 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:372:HIS:CD2	1:A:374:ARG:HG2	1.95	1.02

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:83:HIS:HD2	2:B:85:ASN:H	1.15	0.93
1:A:372:HIS:HD2	1:A:374:ARG:HG2	1.33	0.92
2:B:83:HIS:CD2	2:B:85:ASN:H	1.98	0.82
2:B:136:MET:CE	2:B:143:GLU:HG3	2.12	0.80
2:B:128:PRO:HB3	2:B:134:TYR:CD1	2.31	0.66
2:B:136:MET:HE1	2:B:143:GLU:HG3	1.80	0.62
2:B:33:ASP:OD1	2:B:34:GLY:HA2	2.02	0.58
2:B:136:MET:HE3	2:B:143:GLU:HG3	1.85	0.57
2:B:31:SER:O	2:B:34:GLY:HA3	2.06	0.56
1:A:350:ILE:HD11	1:A:390:VAL:HG21	1.89	0.54
2:B:49:PRO:HA	2:B:54:GLU:HG3	1.91	0.52
2:B:8:ARG:NH2	2:B:105:PRO:O	2.32	0.51
2:B:21:PRO:HB2	2:B:24:PHE:CD2	2.46	0.51
2:B:136:MET:HE3	2:B:143:GLU:C	2.32	0.51
2:B:82:PHE:HE1	2:B:132:GLU:HG2	1.79	0.48
2:B:33:ASP:N	2:B:34:GLY:HA2	2.29	0.48
1:A:356:VAL:HB	1:A:386:PRO:HA	1.96	0.48
2:B:59:LYS:HE2	3:B:162:HOH:O	2.14	0.47
2:B:146:LYS:HD2	2:B:146:LYS:O	2.14	0.47
1:A:350:ILE:O	1:A:350:ILE:HG13	2.13	0.47
1:A:338:LEU:HD12	1:A:338:LEU:N	2.33	0.44
1:A:350:ILE:CD1	1:A:390:VAL:HG21	2.48	0.44
2:B:68:TYR:CD1	2:B:69:PRO:HA	2.52	0.43
2:B:30:LYS:NZ	3:B:246:HOH:O	2.52	0.42
2:B:83:HIS:HD2	2:B:85:ASN:N	1.99	0.42
2:B:66:GLU:HG2	2:B:66:GLU:O	2.19	0.42
1:A:377:LEU:HB3	1:A:401:VAL:CG1	2.50	0.42
2:B:72:PRO:CD	2:B:99:GLU:HG2	2.50	0.42
2:B:128:PRO:HB3	2:B:134:TYR:CG	2.55	0.42
2:B:43:VAL:HG22	2:B:60:LEU:HB2	2.02	0.41
2:B:72:PRO:HB3	2:B:103:TRP:CD2	2.57	0.40
1:A:397:ASP:O	1:A:398:GLU:HB2	2.22	0.40
2:B:104:LYS:H	2:B:107:ILE:HD12	1.87	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	72/82 (88%)	72 (100%)	0	0	100	100
2	B	153/163 (94%)	147 (96%)	6 (4%)	0	100	100
All	All	225/245 (92%)	219 (97%)	6 (3%)	0	100	100

There are no Ramachandran outliers to report.

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	73/81 (90%)	73 (100%)	0	100	100
2	B	136/144 (94%)	135 (99%)	1 (1%)	88	88
All	All	209/225 (93%)	208 (100%)	1 (0%)	92	92

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	B	13	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	372	HIS
1	A	391	GLN

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
2	B	83	HIS
2	B	117	GLN
2	B	130	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, 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	74/82 (90%)	-0.15	1 (1%) 78 80	20, 28, 44, 54	0
2	B	155/163 (95%)	0.18	4 (2%) 59 63	16, 29, 48, 56	0
All	All	229/245 (93%)	0.07	5 (2%) 65 68	16, 29, 47, 56	0

All (5) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	126	ALA	3.0
1	A	342	LYS	2.5
2	B	134	TYR	2.3
2	B	137	PHE	2.3
2	B	100	GLU	2.2

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.