



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 01:22 PM UTC

PDB ID : 9DT2 / pdb_00009dt2
Title : Crystal structure of the engineered sulfonyleurea repressor EsR (L7-D1), apo form
Authors : Schreiter, E.R.; Leija, C.; Kakani, N.K.; McBride, K.E.; Looger, L.L.
Deposited on : 2024-09-30
Resolution : 3.10 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 ⓘ 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 ⓘ](#)) were used in the production of this report:

MolProbity	:	4-5-2 with Phenix2.0
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

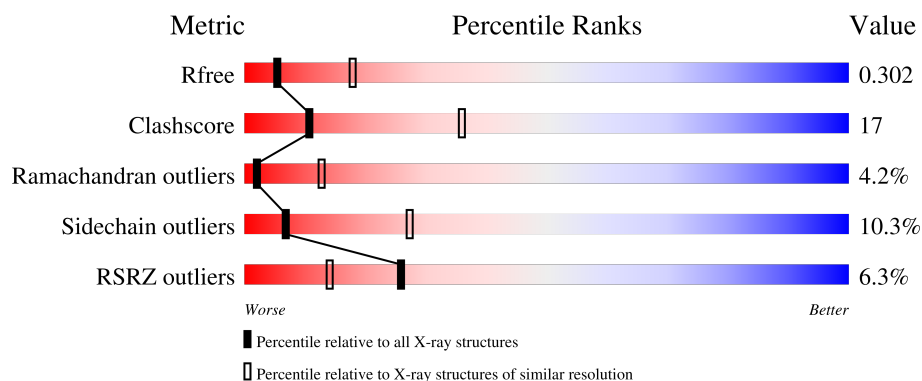
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.10 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}	180053	1456 (3.10-3.10)
Clashscore	190562	1539 (3.10-3.10)
Ramachandran outliers	187476	1467 (3.10-3.10)
Sidechain outliers	187428	1467 (3.10-3.10)
RSRZ outliers	180081	1456 (3.10-3.10)

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 $\leq 5\%$. 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	208	<div> <div>5%</div> <div>52%</div> <div>25%</div> <div>5%</div> <div>16%</div> </div>

2 Entry composition [i](#)

There is only 1 type of molecule in this entry. The entry contains 1365 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.

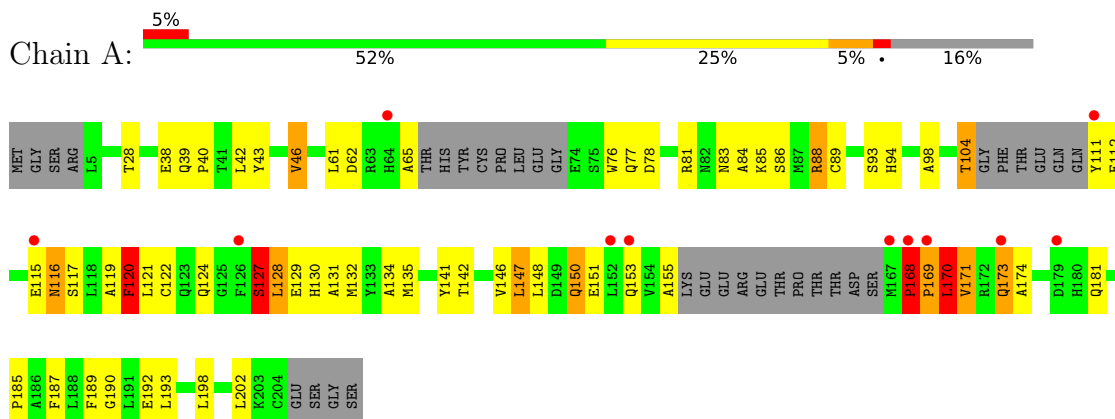
- Molecule 1 is a protein called Sulfonylurea repressor EsR (L7-D1).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	175	Total	C	N	O	S	0	0	0
			1365	866	236	251	12			

There are 23 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	2	GLY	MET	conflict	UNP B1VCF0
A	56	MET	LEU	conflict	UNP B1VCF0
A	65	ALA	HIS	conflict	UNP B1VCF0
A	68	TYR	PHE	conflict	UNP B1VCF0
A	87	MET	PHE	conflict	UNP B1VCF0
A	101	CYS	HIS	conflict	UNP B1VCF0
A	105	GLY	ARG	conflict	UNP B1VCF0
A	106	PHE	PRO	conflict	UNP B1VCF0
A	109	GLN	LYS	conflict	UNP B1VCF0
A	114	ALA	LEU	conflict	UNP B1VCF0
A	117	SER	GLN	conflict	UNP B1VCF0
A	130	HIS	ASN	conflict	UNP B1VCF0
A	132	MET	LEU	conflict	UNP B1VCF0
A	135	MET	LEU	conflict	UNP B1VCF0
A	136	GLN	SER	conflict	UNP B1VCF0
A	138	ALA	VAL	conflict	UNP B1VCF0
A	140	ILE	HIS	conflict	UNP B1VCF0
A	141	TYR	PHE	conflict	UNP B1VCF0
A	148	LEU	GLU	conflict	UNP B1VCF0
A	152	LEU	HIS	conflict	UNP B1VCF0
A	171	VAL	LEU	conflict	UNP B1VCF0
A	175	LEU	ILE	conflict	UNP B1VCF0
A	178	LYS	PHE	conflict	UNP B1VCF0

- Molecule 1: Sulfonylurea repressor EsR (L7-D1)



4 Data and refinement statistics

Property	Value	Source
Space group	P 41 21 2	Depositor
Cell constants a, b, c, α , β , γ	72.44Å 72.44Å 95.19Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	45.15 – 3.10 45.15 – 3.10	Depositor EDS
% Data completeness (in resolution range)	99.9 (45.15-3.10) 99.9 (45.15-3.10)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.12	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.24 (at 3.12Å)	Xtriage
Refinement program	REFMAC 5.8.0425	Depositor
R, R_{free}	0.234 , 0.298 0.242 , 0.302	Depositor DCC
R_{free} test set	261 reflections (5.26%)	wwPDB-VP
Wilson B-factor (Å ²)	63.9	Xtriage
Anisotropy	0.613	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 44.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.91	EDS
Total number of atoms	1365	wwPDB-VP
Average B, all atoms (Å ²)	64.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 8.28% 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, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

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	0.56	0/1383	1.30	5/1859 (0.3%)

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

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
1	A	104	THR	CA-CB-OG1	-8.01	97.58	109.60
1	A	168	PRO	N-CA-C	6.07	118.10	110.70
1	A	120	PHE	CA-CB-CG	5.84	119.64	113.80
1	A	170	LEU	N-CA-CB	-5.66	100.09	109.72
1	A	150	GLN	CB-CA-C	5.32	120.37	109.67

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	88	ARG	Sidechain

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	1365	0	1387	46	0
All	All	1365	0	1387	46	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 17.

All (46) 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:119:ALA:O	1:A:122:CYS:N	2.30	0.65
1:A:78:ASP:OD1	1:A:81:ARG:NH1	2.28	0.62
1:A:65:ALA:HA	1:A:86:SER:OG	1.99	0.62
1:A:168:PRO:O	1:A:171:VAL:HG23	1.99	0.61
1:A:171:VAL:O	1:A:174:ALA:HB3	1.99	0.61
1:A:150:GLN:O	1:A:153:GLN:HB3	2.00	0.60
1:A:61:LEU:O	1:A:65:ALA:HB3	2.02	0.60
1:A:127:SER:O	1:A:128:LEU:C	2.44	0.60
1:A:127:SER:O	1:A:127:SER:OG	2.20	0.57
1:A:141:TYR:O	1:A:142:THR:C	2.47	0.56
1:A:127:SER:O	1:A:129:GLU:N	2.39	0.56
1:A:119:ALA:O	1:A:121:LEU:N	2.42	0.52
1:A:169:PRO:HD2	1:A:170:LEU:CD2	2.40	0.52
1:A:151:GLU:O	1:A:155:ALA:N	2.40	0.51
1:A:119:ALA:C	1:A:121:LEU:N	2.68	0.51
1:A:127:SER:O	1:A:130:HIS:N	2.43	0.51
1:A:98:ALA:CB	1:A:147:LEU:HD13	2.41	0.50
1:A:115:GLU:O	1:A:116:ASN:C	2.55	0.50
1:A:112:GLU:O	1:A:115:GLU:HG2	2.12	0.50
1:A:129:GLU:O	1:A:132:MET:HB3	2.12	0.49
1:A:98:ALA:HB1	1:A:147:LEU:HD13	1.94	0.49
1:A:120:PHE:O	1:A:120:PHE:HD1	1.96	0.49
1:A:146:VAL:C	1:A:148:LEU:N	2.70	0.48
1:A:120:PHE:O	1:A:120:PHE:CD1	2.67	0.47
1:A:104:THR:O	1:A:104:THR:OG1	2.26	0.47
1:A:131:ALA:O	1:A:135:MET:HG2	2.15	0.47
1:A:141:TYR:OH	1:A:190:GLY:HA3	2.15	0.46
1:A:88:ARG:HD2	1:A:187:PHE:CE2	2.50	0.46
1:A:93:SER:C	1:A:94:HIS:ND1	2.74	0.46
1:A:76:TRP:O	1:A:77:GLN:C	2.58	0.45
1:A:181:GLN:HB3	1:A:185:PRO:HG2	1.99	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:43:TYR:HA	1:A:46:VAL:O	2.17	0.44
1:A:141:TYR:CZ	1:A:190:GLY:HA3	2.52	0.44
1:A:76:TRP:CH2	1:A:198:LEU:HB3	2.53	0.44
1:A:173:GLN:O	1:A:174:ALA:C	2.60	0.43
1:A:134:ALA:O	1:A:135:MET:C	2.62	0.43
1:A:146:VAL:C	1:A:148:LEU:H	2.25	0.43
1:A:189:PHE:O	1:A:193:LEU:HG	2.19	0.42
1:A:61:LEU:O	1:A:62:ASP:C	2.63	0.42
1:A:88:ARG:HB2	1:A:142:THR:HG23	2.02	0.42
1:A:119:ALA:C	1:A:121:LEU:H	2.28	0.42
1:A:84:ALA:O	1:A:85:LYS:C	2.63	0.42
1:A:116:ASN:O	1:A:117:SER:C	2.63	0.41
1:A:39:GLN:N	1:A:40:PRO:CD	2.83	0.40
1:A:148:LEU:HD12	1:A:148:LEU:HA	1.94	0.40
1:A:128:LEU:O	1:A:129:GLU:C	2.65	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	167/208 (80%)	146 (87%)	14 (8%)	7 (4%)	2 13

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	120	PHE
1	A	128	LEU
1	A	168	PRO
1	A	202	LEU
1	A	127	SER
1	A	116	ASN

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Mol	Chain	Res	Type
1	A	169	PRO

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	145/174 (83%)	130 (90%)	15 (10%)	7 27

All (15) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	28	THR
1	A	38	GLU
1	A	42	LEU
1	A	46	VAL
1	A	83	ASN
1	A	89	CYS
1	A	111	TYR
1	A	124	GLN
1	A	127	SER
1	A	147	LEU
1	A	168	PRO
1	A	170	LEU
1	A	171	VAL
1	A	173	GLN
1	A	192	GLU

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	173	GLN
1	A	181	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 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 [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	175/208 (84%)	0.23	11 (6%) 26 14	37, 61, 97, 128	0

All (11) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	152	LEU	3.2
1	A	111	TYR	2.8
1	A	64	HIS	2.5
1	A	169	PRO	2.5
1	A	179	ASP	2.3
1	A	126	PHE	2.2
1	A	168	PRO	2.2
1	A	167	MET	2.1
1	A	173	GLN	2.1
1	A	153	GLN	2.0
1	A	115	GLU	2.0

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 oligosaccharides 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.