



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 8, 2026 – 09:30 PM UTC

PDB ID : 1LYZ / pdb_00001lyz
Title : Real-space refinement of the structure of hen egg-white lysozyme
Authors : Diamond, R.; Phillips, D.C.; Blake, C.C.F.; North, A.C.T.
Deposited on : 1975-02-01
Resolution : 2.00 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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) : **NOT EXECUTED**
EDS : **NOT EXECUTED**
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

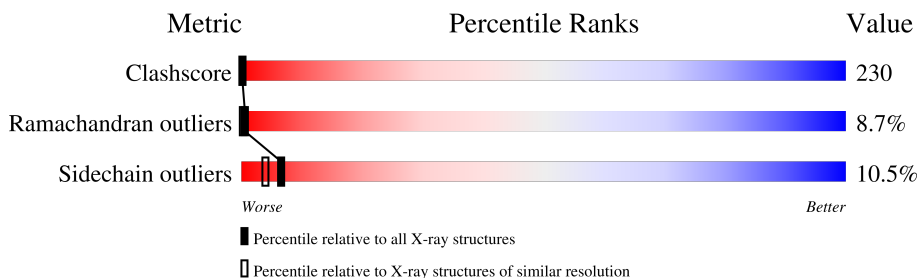
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.00 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))
Clashscore	190562	11152 (2.00-2.00)
Ramachandran outliers	187476	11031 (2.00-2.00)
Sidechain outliers	187428	11029 (2.00-2.00)

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 $\leq 5\%$

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	129	11% 44% 45%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 1102 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 HEN EGG WHITE LYSOZYME.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	129	Total	C	N	O	S	0	0	0
			1001	613	193	185	10			

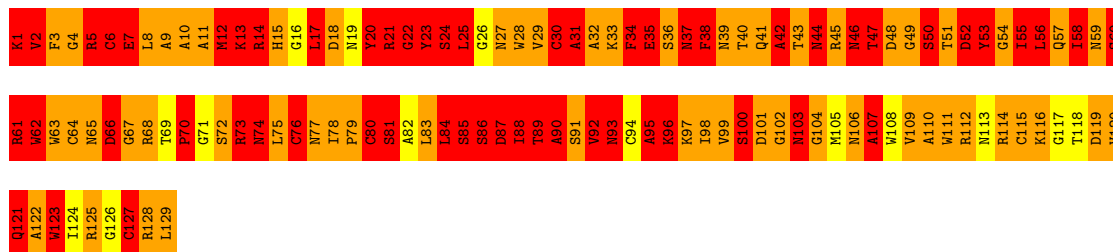
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	101	Total	O	0	0
			101	101		

i

Note EDS was not executed.

Chain A: 11% 44% 45%



4 Data and refinement statistics

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α , β , γ	79.10Å 79.10Å 37.90Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	(Not available) – 2.00	Depositor
% Data completeness (in resolution range)	(Not available) ((Not available)-2.00)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	unknown	Depositor
R, R_{free}	(Not available) , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	1102	wwPDB-VP
Average B, all atoms (Å ²)	6.0	wwPDB-VP

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	11.71	614/1021 (60.1%)	7.87	599/1379 (43.4%)

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	2	58

The worst 5 of 614 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	32	ALA	CA-C	56.08	2.31	1.52
1	A	50	SER	C-N	-55.43	0.55	1.33
1	A	5	ARG	NE-CZ	-46.33	0.82	1.33
1	A	5	ARG	CZ-NH2	45.30	1.92	1.33
1	A	44	ASN	C-O	-42.72	0.70	1.23

The worst 5 of 599 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	32	ALA	N-CA-C	-40.33	64.03	114.04
1	A	27	ASN	OD1-CG-ND2	-36.67	85.93	122.60
1	A	26	GLY	O-C-N	-35.96	87.31	122.19
1	A	25	LEU	CA-C-N	35.43	158.97	120.00
1	A	25	LEU	C-N-CA	35.43	158.97	120.00

All (2) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
1	A	14	ARG	CA

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atom
1	A	90	ALA	CA

5 of 58 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	1	LYS	Mainchain
1	A	12	MET	Mainchain
1	A	2	VAL	Mainchain
1	A	5	ARG	Mainchain,Sidechain
1	A	7	GLU	Mainchain,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	1001	0	939	444	5
2	A	101	0	0	19	6
All	All	1102	0	939	444	8

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 230.

The worst 5 of 444 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:30:CYS:CB	1:A:30:CYS:CA	1.75	1.65
1:A:51:THR:CB	1:A:51:THR:CA	1.76	1.64
1:A:68:ARG:CB	1:A:68:ARG:CA	1.75	1.63
1:A:45:ARG:CB	1:A:45:ARG:CA	1.77	1.62
1:A:13:LYS:CA	1:A:13:LYS:CB	1.77	1.61

The worst 5 of 8 symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:193:HOH:O	2:A:213:HOH:O[6_456]	0.06	2.14
2:A:141:HOH:O	2:A:185:HOH:O[8_555]	0.13	2.07
2:A:138(A):HOH:O	2:A:220:HOH:O[4_454]	0.16	2.04
1:A:128:ARG:CD	2:A:186:HOH:O[8_555]	0.89	1.31
1:A:128:ARG:NE	2:A:186:HOH:O[8_555]	1.69	0.51

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	127/129 (98%)	94 (74%)	22 (17%)	11 (9%)	0 0

5 of 11 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	50	SER
1	A	80	CYS
1	A	90	ALA
1	A	14	ARG
1	A	25	LEU

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	105/105 (100%)	94 (90%)	11 (10%)	6 4

5 of 11 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	74	ASN
1	A	81	SER
1	A	92	VAL
1	A	84	LEU
1	A	50	SER

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	74	ASN
1	A	103	ASN

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 oligosaccharides 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 ⓘ

The following chains have linkage breaks:

Mol	Chain	Number of breaks
1	A	37

The worst 5 of 37 chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	A	9:ALA	C	10:ALA	N	1.83
1	A	67:GLY	C	68:ARG	N	1.76
1	A	8:LEU	C	9:ALA	N	1.70
1	A	58:ILE	C	59:ASN	N	1.65
1	A	1:LYS	C	2:VAL	N	1.64

6 Fit of model and data

6.1 Protein, DNA and RNA chains

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

6.4 Ligands

EDS was not executed - this section is therefore empty.

6.5 Other polymers

EDS was not executed - this section is therefore empty.