



wwPDB X-ray Structure Validation Summary Report ⓘ

Apr 25, 2026 – 09:48 AM EDT

PDB ID : 2QB0 / pdb_00002qb0
Title : Structure of the 2TEL crystallization module fused to T4 lysozyme with an Ala-Gly-Pro linker.
Authors : Nauli, S.; Bowie, J.U.
Deposited on : 2007-06-15
Resolution : 2.56 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)	:	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

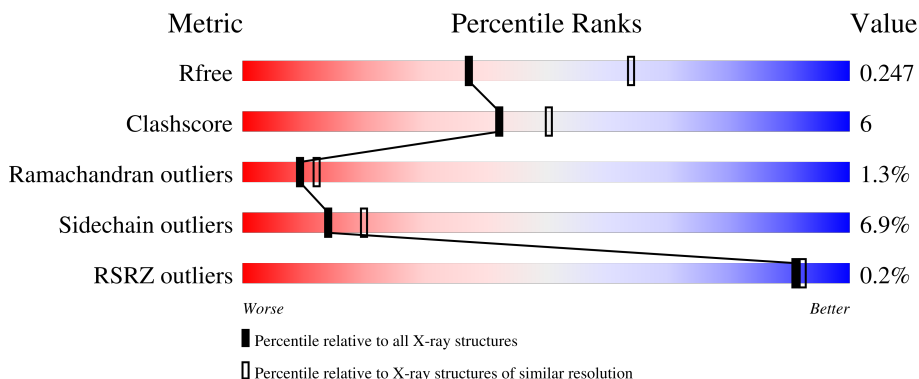
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.56 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	1853 (2.58-2.54)
Clashscore	190562	1897 (2.58-2.54)
Ramachandran outliers	187476	1875 (2.58-2.54)
Sidechain outliers	187428	1875 (2.58-2.54)
RSRZ outliers	180081	1853 (2.58-2.54)

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	77	 83% 16% .
1	C	77	 74% 22% . .
2	B	241	 87% 10% .
2	D	241	 83% 12% .

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 5372 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 Transcription factor ETV6.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	77	Total	C	N	O	S	0	1	0
			664	426	116	121	1			
1	C	77	Total	C	N	O	S	0	1	0
			669	432	117	119	1			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	80	GLU	VAL	engineered mutation	UNP P41212
C	80	GLU	VAL	engineered mutation	UNP P41212

- Molecule 2 is a protein called Transcription factor ETV6,Endolysin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	241	Total	C	N	O	S	0	0	0
			1951	1239	351	354	7			
2	D	241	Total	C	N	O	S	0	0	0
			1936	1227	349	353	7			

There are 18 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	92	ALA	-	linker	UNP P41212
B	93	GLY	-	linker	UNP P41212
B	94	PRO	-	linker	UNP P41212
B	105	GLY	ARG	conflict	UNP P00720
B	147	THR	CYS	conflict	UNP P00720
B	161	CYS	ASN	conflict	UNP P00720
B	186	CYS	ALA	conflict	UNP P00720
B	190	ALA	CYS	conflict	UNP P00720
B	230	ARG	ILE	conflict	UNP P00720
D	92	ALA	-	linker	UNP P41212

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Chain	Residue	Modelled	Actual	Comment	Reference
D	93	GLY	-	linker	UNP P41212
D	94	PRO	-	linker	UNP P41212
D	105	GLY	ARG	conflict	UNP P00720
D	147	THR	CYS	conflict	UNP P00720
D	161	CYS	ASN	conflict	UNP P00720
D	186	CYS	ALA	conflict	UNP P00720
D	190	ALA	CYS	conflict	UNP P00720
D	230	ARG	ILE	conflict	UNP P00720

- Molecule 3 is MANGANESE (II) ION (CCD ID: MN) (formula: Mn).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	B	2	Total Mn 2 2	0	0
3	C	1	Total Mn 1 1	0	0
3	D	2	Total Mn 2 2	0	0

- Molecule 4 is water.

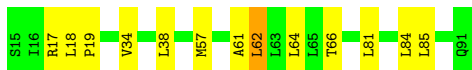
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	27	Total O 27 27	0	0
4	B	49	Total O 49 49	0	0
4	C	27	Total O 27 27	0	0
4	D	44	Total O 44 44	0	0

3 Residue-property plots [i](#)

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 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.

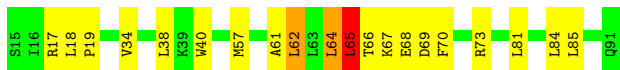
- Molecule 1: Transcription factor ETV6

Chain A:  83% 16% .



- Molecule 1: Transcription factor ETV6

Chain C:  74% 22% ..



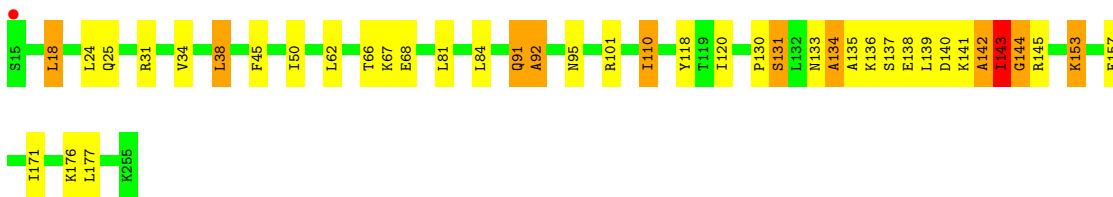
- Molecule 2: Transcription factor ETV6,Endolysin

Chain B:  87% 10% .



- Molecule 2: Transcription factor ETV6,Endolysin

Chain D:  83% 12% .



4 Data and refinement statistics

Property	Value	Source
Space group	P 32	Depositor
Cell constants a, b, c, α , β , γ	122.62Å 122.62Å 53.59Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	20.00 – 2.56 20.00 – 2.56	Depositor EDS
% Data completeness (in resolution range)	99.8 (20.00-2.56) 100.0 (20.00-2.56)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.74 (at 2.55Å)	Xtriage
Refinement program	REFMAC refmac_5.2.0019	Depositor
R, R_{free}	0.211 , 0.252 0.208 , 0.247	Depositor DCC
R_{free} test set	1476 reflections (5.05%)	wwPDB-VP
Wilson B-factor (Å ²)	51.4	Xtriage
Anisotropy	0.326	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 51.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.487 for -h,-k,l 0.039 for h,-h-k,-l 0.038 for -k,-h,-l	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	5372	wwPDB-VP
Average B, all atoms (Å ²)	57.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 31.43 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 1.1080e-03. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

¹ Intensities estimated from amplitudes.

² Theoretical 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](#)

Bond lengths and bond angles in the following residue types are not validated in this section: MN

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	0.39	0/682	0.94	2/922 (0.2%)
1	C	0.39	0/689	1.29	8/933 (0.9%)
2	B	0.40	0/1991	1.07	10/2690 (0.4%)
2	D	0.42	0/1975	1.01	9/2670 (0.3%)
All	All	0.40	0/5337	1.06	29/7215 (0.4%)

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
2	B	1	0

There are no bond length outliers.

The worst 5 of 29 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	64	LEU	CA-C-N	15.54	149.68	121.70
1	C	64	LEU	C-N-CA	15.54	149.68	121.70
1	C	64	LEU	N-CA-C	12.46	127.01	111.69
2	B	153	LYS	CA-C-N	12.04	143.37	121.70
2	B	153	LYS	C-N-CA	12.04	143.37	121.70

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
2	B	96	ILE	CA

There are no planarity outliers.

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	664	0	648	7	0
1	C	669	0	652	14	0
2	B	1951	0	1968	19	0
2	D	1936	0	1924	28	0
3	B	2	0	0	0	0
3	C	1	0	0	0	0
3	D	2	0	0	0	0
4	A	27	0	0	1	0
4	B	49	0	0	8	0
4	C	27	0	0	7	0
4	D	44	0	0	3	0
All	All	5372	0	5192	66	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 6.

The worst 5 of 66 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:66:THR:HB	4:A:99:HOH:O	1.45	1.16
1:C:66:THR:HB	4:C:217:HOH:O	1.48	1.14
2:D:91:GLN:C	2:D:92:ALA:N	2.14	1.05
2:D:144:GLY:HA2	2:D:145:ARG:HG3	1.40	1.02
2:D:138:GLU:HB3	2:D:139:LEU:HD23	1.42	0.97

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	76/77 (99%)	75 (99%)	1 (1%)	0	100	100
1	C	76/77 (99%)	74 (97%)	1 (1%)	1 (1%)	9	12
2	B	239/241 (99%)	231 (97%)	6 (2%)	2 (1%)	16	22
2	D	237/241 (98%)	220 (93%)	12 (5%)	5 (2%)	5	6
All	All	628/636 (99%)	600 (96%)	20 (3%)	8 (1%)	9	12

5 of 8 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	96	ILE
2	B	154	ASP
1	C	65	LEU
2	D	131	SER
2	D	142	ALA

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	72/71 (101%)	67 (93%)	5 (7%)	14	20
1	C	72/71 (101%)	64 (89%)	8 (11%)	6	6
2	B	207/207 (100%)	194 (94%)	13 (6%)	16	23
2	D	202/207 (98%)	189 (94%)	13 (6%)	16	23
All	All	553/556 (100%)	514 (93%)	39 (7%)	14	19

5 of 39 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	D	25	GLN
2	D	91	GLN
2	D	31	ARG

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Mol	Chain	Res	Type
2	D	62	LEU
2	D	110	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 12 such sidechains are listed below:

Mol	Chain	Res	Type
2	D	86	GLN
2	D	91	GLN
2	D	233	ASN
2	D	133	ASN
2	B	148	ASN

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](#)

Of 5 ligands modelled in this entry, 5 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
2	D	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	D	91:GLN	C	92:ALA	N	2.14

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	77/77 (100%)	-1.24	0 100 100	23, 46, 83, 152	1 (1%)
1	C	77/77 (100%)	-1.24	0 100 100	21, 47, 83, 152	1 (1%)
2	B	241/241 (100%)	-1.08	0 100 100	34, 56, 79, 146	0
2	D	241/241 (100%)	-1.06	1 (0%) 88 90	34, 56, 90, 146	0
All	All	636/636 (100%)	-1.11	1 (0%) 91 92	21, 55, 87, 152	2 (0%)

All (1) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	D	15	SER	2.6

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](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q< 0.9’ lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	MN	B	256	1/1	0.98	0.05	104,104,104,104	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	MN	C	207	1/1	0.98	0.09	92,92,92,92	0
3	MN	D	256	1/1	0.98	0.06	108,108,108,108	0
3	MN	D	257	1/1	0.99	0.02	103,103,103,103	0
3	MN	B	257	1/1	1.00	0.01	48,48,48,48	0

6.5 Other polymers [i](#)

There are no such residues in this entry.