



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 3, 2025 – 06:03 PM JST

PDB ID : 8YKT
Title : Fab and SEB complex
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Deposited on : 2024-03-05
Resolution : 2.04 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	:	4.02b-467
Xtriage (Phenix)	:	1.21
EDS	:	3.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.004 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.41.2

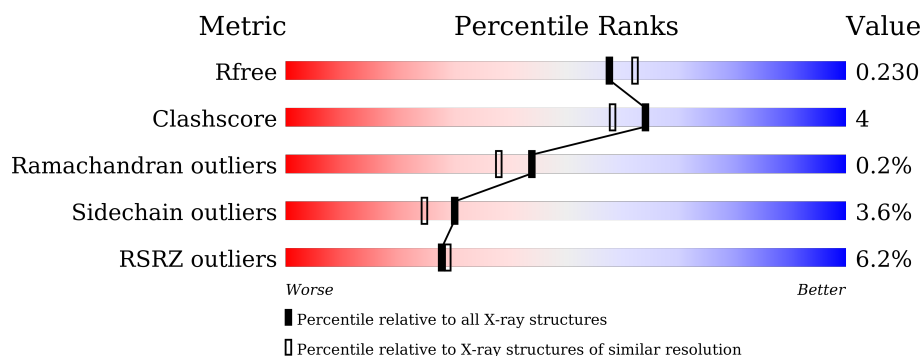
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.04 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}	164625	2096 (2.04-2.04)
Clashscore	180529	2229 (2.04-2.04)
Ramachandran outliers	177936	2217 (2.04-2.04)
Sidechain outliers	177891	2217 (2.04-2.04)
RSRZ outliers	164620	2096 (2.04-2.04)

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	239	<div> <div>10%</div> <div> <div></div> <div>77%</div> <div>15%</div> <div>• 7%</div> </div> </div>
2	H	232	<div> <div>5%</div> <div> <div></div> <div>89%</div> <div>8%</div> <div>•</div> </div> </div>
3	L	217	<div> <div>2%</div> <div> <div></div> <div>89%</div> <div>9%</div> <div>•</div> </div> </div>

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 5578 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 Enterotoxin type B.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	222	Total	C	N	O	S	0	0	0
			1848	1181	302	355	10			

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	46	ARG	LEU	conflict	UNP P01552
A	90	ALA	TYR	conflict	UNP P01552
A	95	ALA	TYR	conflict	UNP P01552

- Molecule 2 is a protein called Fab Heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	H	226	Total	C	N	O	S	0	3	0
			1722	1088	293	335	6			

- Molecule 3 is a protein called Fab Light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	L	213	Total	C	N	O	S	0	1	0
			1589	994	270	321	4			

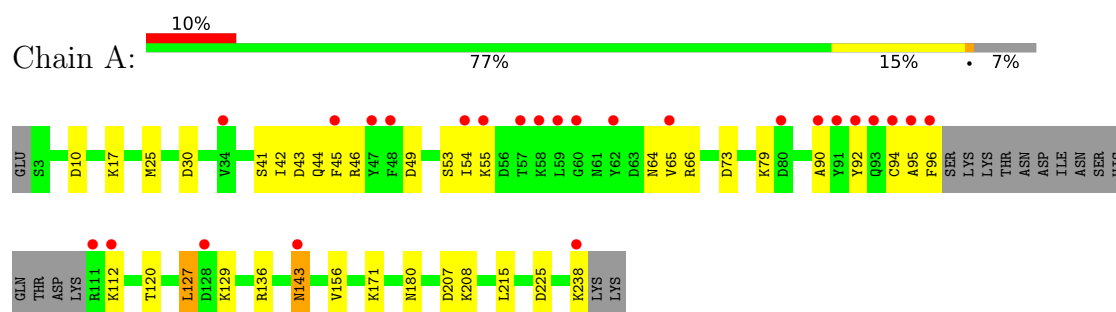
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	82	Total	O	0	0
			82	82		
4	H	151	Total	O	0	0
			151	151		
4	L	186	Total	O	0	0
			186	186		

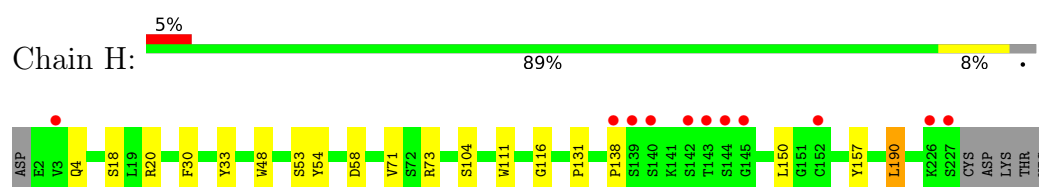
3 Residue-property plots [i](#)

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.

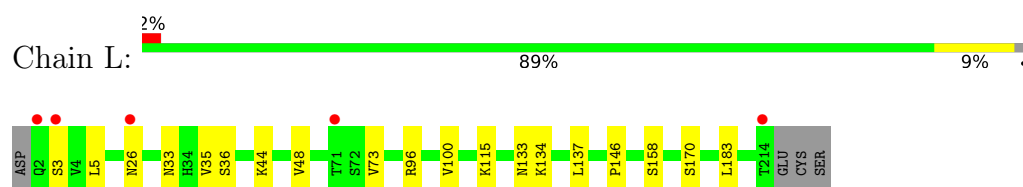
- Molecule 1: Enterotoxin type B



- Molecule 2: Fab Heavy chain



- Molecule 3: Fab Light chain



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	106.25Å 73.32Å 114.22Å 90.00° 91.66° 90.00°	Depositor
Resolution (Å)	38.06 – 2.04 38.06 – 2.04	Depositor EDS
% Data completeness (in resolution range)	99.9 (38.06-2.04) 99.9 (38.06-2.04)	Depositor EDS
R_{merge}	0.15	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.84 (at 2.05Å)	Xtriage
Refinement program	PHENIX (1.20.1_4487: ???)	Depositor
R, R_{free}	0.195 , 0.230 0.196 , 0.230	Depositor DCC
R_{free} test set	2879 reflections (5.15%)	wwPDB-VP
Wilson B-factor (Å ²)	36.1	Xtriage
Anisotropy	0.202	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 41.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.012 for -h,-k,l	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	5578	wwPDB-VP
Average B, all atoms (Å ²)	48.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.58% 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	0.25	0/1889	0.47	0/2540
2	H	0.26	0/1767	0.52	1/2410 (0.0%)
3	L	0.25	0/1627	0.50	0/2223
All	All	0.25	0/5283	0.50	1/7173 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
2	H	190	LEU	CA-CB-CG	5.10	127.04	115.30

There are no chirality outliers.

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	1848	0	1793	17	0
2	H	1722	0	1685	10	0
3	L	1589	0	1557	15	0
4	A	82	0	0	6	0
4	H	151	0	0	4	0
4	L	186	0	0	4	1
All	All	5578	0	5035	39	1

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 4.

All (39) 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:143:ASN:OD1	3:L:33:ASN:ND2	2.12	0.82
1:A:225:ASP:OD1	4:A:301:HOH:O	2.00	0.81
3:L:26:ASN:ND2	4:L:301:HOH:O	2.16	0.76
4:H:307:HOH:O	3:L:44:LYS:HE3	1.93	0.67
1:A:43:ASP:OD1	1:A:44:GLN:N	2.28	0.66
2:H:30:PHE:O	2:H:73:ARG:NH2	2.30	0.64
3:L:35[A]:VAL:HG21	3:L:73:VAL:HG21	1.80	0.64
1:A:66:ARG:HH21	1:A:96:PHE:H	1.46	0.64
1:A:136:ARG:NE	4:A:308:HOH:O	2.33	0.61
2:H:138:PRO:HG3	2:H:150:LEU:HB3	1.83	0.61
2:H:4:GLN:NE2	4:H:304:HOH:O	2.31	0.59
1:A:54:ILE:HD12	1:A:65:VAL:HG11	1.85	0.59
1:A:127:LEU:O	4:A:302:HOH:O	2.17	0.59
3:L:26:ASN:OD1	4:L:302:HOH:O	2.17	0.58
4:H:311:HOH:O	3:L:48:VAL:HG23	2.03	0.58
3:L:137:LEU:HD12	3:L:183:LEU:HD23	1.87	0.56
3:L:26:ASN:ND2	4:L:309:HOH:O	2.38	0.56
1:A:207:ASP:OD1	1:A:208:LYS:HE3	2.07	0.55
1:A:120:THR:HG22	4:A:345:HOH:O	2.07	0.53
2:H:131:PRO:HB3	2:H:157:TYR:HB3	1.90	0.53
1:A:41:SER:OG	1:A:79:LYS:O	2.27	0.52
3:L:3:SER:OG	3:L:5:LEU:O	2.22	0.51
2:H:33:TYR:O	2:H:73:ARG:NH2	2.42	0.49
3:L:44:LYS:HA	3:L:44:LYS:HD2	1.61	0.48
3:L:115:LYS:HG2	3:L:146:PRO:HD3	1.95	0.48
1:A:17:LYS:HE2	4:A:363:HOH:O	2.12	0.47
1:A:90:ALA:HB2	1:A:215:LEU:HD12	1.98	0.46
2:H:111:TRP:HB3	3:L:36:SER:HB3	1.98	0.46
1:A:42:ILE:HD13	1:A:53:SER:HB2	1.98	0.46
3:L:170:SER:OG	4:L:303:HOH:O	2.21	0.46
2:H:48:TRP:HB2	3:L:100:VAL:HG22	1.99	0.44
1:A:66:ARG:NH2	1:A:96:PHE:H	2.15	0.44
1:A:45:PHE:HD2	1:A:46:ARG:HG2	1.82	0.43
2:H:53:SER:HB3	2:H:58:ASP:HB2	2.02	0.42
2:H:54:TYR:CD1	2:H:104:SER:HA	2.55	0.41
2:H:116:GLY:N	4:H:301:HOH:O	2.11	0.41
1:A:64:ASN:HB3	1:A:96:PHE:HZ	1.85	0.41
1:A:180:ASN:HB3	4:A:337:HOH:O	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:L:133:ASN:O	3:L:134:LYS:HE2	2.21	0.40

All (1) 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)
4:L:405:HOH:O	4:L:443:HOH:O[2_656]	2.04	0.16

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	218/239 (91%)	211 (97%)	6 (3%)	1 (0%)	25	17
2	H	227/232 (98%)	224 (99%)	3 (1%)	0	100	100
3	L	212/217 (98%)	208 (98%)	4 (2%)	0	100	100
All	All	657/688 (96%)	643 (98%)	13 (2%)	1 (0%)	44	38

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	95	ALA

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	206/223 (92%)	191 (93%)	15 (7%)	11	5
2	H	195/198 (98%)	189 (97%)	6 (3%)	35	30
3	L	180/183 (98%)	178 (99%)	2 (1%)	70	71
All	All	581/604 (96%)	558 (96%)	23 (4%)	30	21

All (23) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	10	ASP
1	A	25	MET
1	A	30	ASP
1	A	49	ASP
1	A	55	LYS
1	A	73	ASP
1	A	92	TYR
1	A	94	CYS
1	A	112	LYS
1	A	127	LEU
1	A	129	LYS
1	A	143	ASN
1	A	156	VAL
1	A	171	LYS
1	A	238	LYS
2	H	18[A]	SER
2	H	18[B]	SER
2	H	20[A]	ARG
2	H	20[B]	ARG
2	H	71	VAL
2	H	190	LEU
3	L	96	ARG
3	L	158	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
2	H	176	HIS

5.3.3 RNA ⓘ

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 ⓘ

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	222/239 (92%)	0.68	25 (11%)	11 11	33, 52, 120, 158	0
2	H	226/232 (97%)	0.25	11 (4%)	36 38	17, 41, 72, 117	3 (1%)
3	L	213/217 (98%)	0.08	5 (2%)	61 63	16, 37, 59, 87	1 (0%)
All	All	661/688 (96%)	0.34	41 (6%)	28 29	16, 43, 87, 158	4 (0%)

All (41) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	92	TYR	6.8
1	A	62	TYR	5.6
1	A	90	ALA	5.4
1	A	96	PHE	4.6
1	A	47	TYR	4.2
2	H	145	GLY	4.0
1	A	59	LEU	3.9
2	H	143	THR	3.5
1	A	91	TYR	3.5
1	A	45	PHE	3.5
2	H	142	SER	3.4
1	A	95	ALA	3.4
2	H	140	SER	3.4
2	H	144	SER	3.4
1	A	80	ASP	3.3
1	A	54	ILE	3.2
2	H	226	LYS	3.2
1	A	143	ASN	2.9
1	A	57	THR	2.7
3	L	71	THR	2.7
1	A	60	GLY	2.7
3	L	214	THR	2.6
3	L	3	SER	2.6

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Mol	Chain	Res	Type	RSRZ
1	A	111	ARG	2.5
1	A	94	CYS	2.5
1	A	238	LYS	2.4
2	H	139	SER	2.4
1	A	112	LYS	2.4
2	H	3	VAL	2.3
2	H	227	SER	2.3
2	H	152	CYS	2.2
1	A	55	LYS	2.2
1	A	34	VAL	2.2
1	A	48	PHE	2.1
1	A	58	LYS	2.1
2	H	138	PRO	2.1
3	L	2	GLN	2.1
1	A	128	ASP	2.1
1	A	93	GLN	2.1
1	A	65	VAL	2.0
3	L	26	ASN	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 monosaccharides 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.