



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 20, 2026 – 07:18 PM UTC

PDB ID : 6VI2 / pdb\_00006vi2  
Title : Structure of the unaligned Fab4  
Authors : Cingolani, G.; Lokareddy, R.; Ko, Y.  
Deposited on : 2020-01-11  
Resolution : 1.15 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](mailto: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>.

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

MolProbity : 4-5-2 with Phenix2.0  
Xtrriage (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

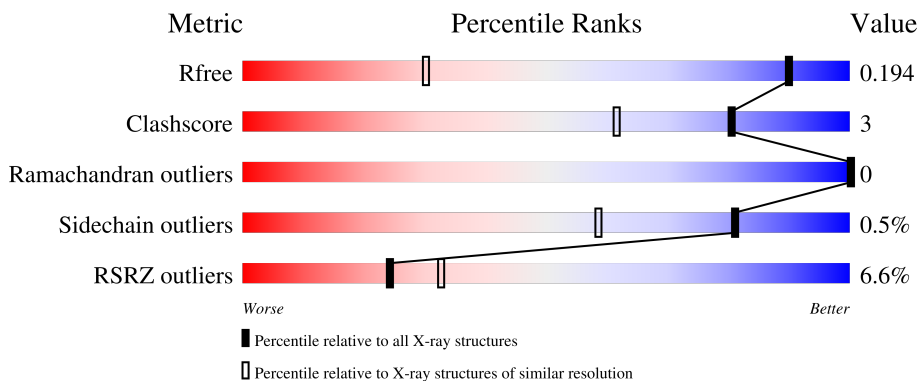
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.15 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	1380 (1.16-1.12)
Clashscore	190562	1393 (1.16-1.12)
Ramachandran outliers	187476	1369 (1.16-1.12)
Sidechain outliers	187428	1369 (1.16-1.12)
RSRZ outliers	180081	1379 (1.16-1.12)

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  $\geq 3$ , 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	215	 2% 94% 6%
1	C	215	 3% 93% 7%
2	B	243	 7% 87% 8% 5%
2	D	243	 13% 91% 6% 5%

## 2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 14565 atoms, of which 6591 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 FAB4 light chain.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
1	A	215	3237	1021	1601	275	334	6	0	0	0
1	C	215	3237	1021	1601	275	334	6	0	0	0

- Molecule 2 is a protein called FAB4 heavy chain.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
2	B	231	3419	1108	1681	286	338	6	0	0	0
2	D	236	3483	1129	1708	291	348	7	0	0	0

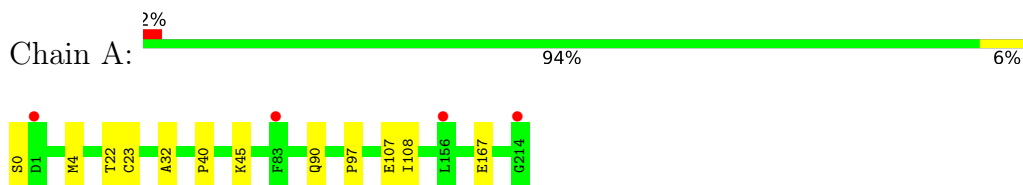
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	322	Total 322	O 322	0	0
3	B	270	Total 270	O 270	0	0
3	C	323	Total 323	O 323	0	0
3	D	274	Total 274	O 274	0	0

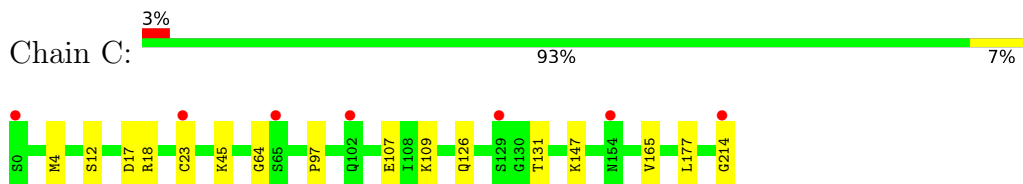
### 3 Residue-property plots [i](#)

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.

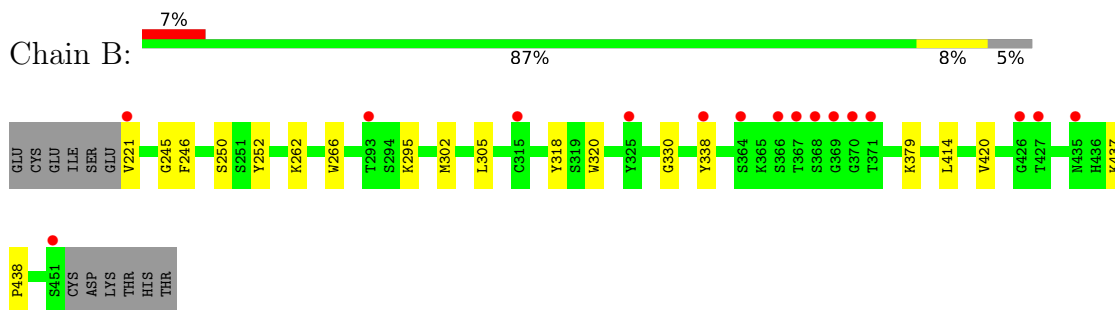
- Molecule 1: FAB4 light chain



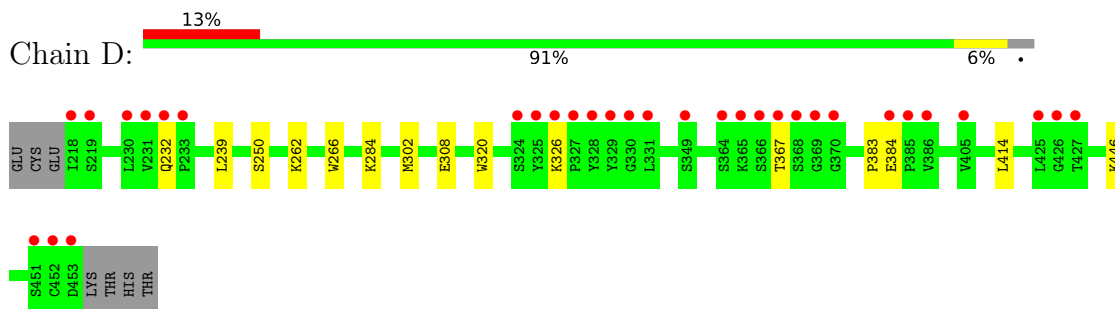
- Molecule 1: FAB4 light chain



- Molecule 2: FAB4 heavy chain



- Molecule 2: FAB4 heavy chain



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	64.77Å 65.84Å 107.42Å 90.00° 99.83° 90.00°	Depositor
Resolution (Å)	14.99 – 1.15 14.99 – 1.15	Depositor EDS
% Data completeness (in resolution range)	93.5 (14.99-1.15) 93.4 (14.99-1.15)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.05	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.11 (at 1.15Å)	Xtrriage
Refinement program	PHENIX 1.17.1_3660	Depositor
R, $R_{free}$	0.158 , 0.171 (Not available) , 0.194	Depositor DCC
$R_{free}$ test set	1996 reflections (0.64%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	16.7	Xtrriage
Anisotropy	0.367	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.43 , 43.3	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	14565	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	26.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.60% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>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

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	0.37	0/1670	0.62	0/2265
1	C	0.41	1/1670 (0.1%)	0.84	5/2265 (0.2%)
2	B	0.37	1/1789 (0.1%)	0.66	2/2443 (0.1%)
2	D	0.61	2/1826 (0.1%)	0.79	3/2493 (0.1%)
All	All	0.45	4/6955 (0.1%)	0.74	10/9466 (0.1%)

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	232	GLN	C-N	14.62	1.52	1.33
2	D	384	GLU	C-N	8.49	1.50	1.34
1	C	17	ASP	C-N	-6.38	1.24	1.33
2	B	420	VAL	C-O	-5.98	1.19	1.24

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	17	ASP	CA-C-N	12.27	139.05	121.50
1	C	17	ASP	C-N-CA	12.27	139.05	121.50
1	C	18	ARG	O-C-N	10.75	135.62	123.04
1	C	17	ASP	O-C-N	-9.62	111.51	122.86
2	D	232	GLN	CA-C-N	7.99	128.04	119.90
2	D	232	GLN	C-N-CA	7.99	128.04	119.90
2	D	326	LYS	CB-CA-C	6.87	117.68	109.85
2	B	330	GLY	N-CA-C	6.76	120.90	112.79
1	C	64	GLY	O-C-N	-5.26	118.74	123.37
2	B	295	LYS	CB-CA-C	-5.05	102.19	110.72

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	1636	1601	1601	8	0
1	C	1636	1601	1601	8	0
2	B	1738	1681	1681	12	0
2	D	1775	1708	1712	9	0
3	A	322	0	0	2	0
3	B	270	0	0	1	0
3	C	323	0	0	3	0
3	D	274	0	0	3	0
All	All	7974	6591	6595	35	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 3.

All (35) 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)
2:B:221:VAL:HG11	2:B:338:TYR:CD2	2.15	0.81
1:C:4:MET:HE3	1:C:23:CYS:SG	2.28	0.74
1:C:109:LYS:HE2	3:C:378:HOH:O	1.96	0.65
1:A:4:MET:HE3	1:A:23:CYS:SG	2.40	0.62
1:A:22:THR:HG23	3:A:431:HOH:O	2.00	0.60
2:B:221:VAL:HG13	2:B:246:PHE:CD1	2.39	0.56
2:B:379:LYS:HE3	3:B:545:HOH:O	2.05	0.56
2:D:367:THR:HG22	2:D:367:THR:O	2.06	0.56
2:B:221:VAL:HG11	2:B:338:TYR:CE2	2.41	0.55
2:B:221:VAL:HG13	2:B:246:PHE:HD1	1.73	0.54
1:C:165:VAL:HG22	1:C:177:LEU:HD12	1.90	0.54
2:B:414:LEU:C	2:B:414:LEU:HD12	2.33	0.53
2:D:414:LEU:C	2:D:414:LEU:HD12	2.35	0.51
2:D:414:LEU:HA	3:D:597:HOH:O	2.10	0.50
1:A:0:SER:O	1:A:0:SER:OG	2.29	0.48
1:C:12:SER:CB	1:C:107:GLU:OE2	2.63	0.47
2:D:446:LYS:HD3	3:D:755:HOH:O	2.14	0.47
1:C:214:GLY:OXT	3:C:301:HOH:O	2.20	0.47
2:B:252:TYR:HB2	2:B:318:TYR:HB2	1.97	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:262:LYS:NZ	3:D:505:HOH:O	2.40	0.45
1:A:45:LYS:NZ	3:A:303:HOH:O	2.32	0.45
2:B:302:MET:HE2	2:B:305:LEU:HD21	1.99	0.44
1:C:97:PRO:HA	2:D:266:TRP:CZ3	2.52	0.44
1:C:45:LYS:HD3	3:C:332:HOH:O	2.17	0.44
1:A:97:PRO:HA	2:B:266:TRP:CZ3	2.53	0.43
2:D:239:LEU:HG	2:D:302:MET:HE2	1.99	0.43
2:D:250:SER:O	2:D:320:TRP:HB2	2.19	0.43
2:B:250:SER:O	2:B:320:TRP:HB2	2.20	0.41
1:A:107:GLU:HG2	1:A:108:ILE:N	2.35	0.41
2:B:437:LYS:N	2:B:438:PRO:CD	2.84	0.41
1:A:32:ALA:O	1:A:90:GLN:HA	2.21	0.41
2:B:221:VAL:HG22	2:B:245:GLY:O	2.20	0.41
2:D:308:GLU:H	2:D:308:GLU:CD	2.29	0.41
1:A:40:PRO:HG2	1:A:167:GLU:HG3	2.03	0.40
1:C:126:GLN:HG2	1:C:131:THR:O	2.21	0.40

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	213/215 (99%)	208 (98%)	5 (2%)	0	100	100
1	C	213/215 (99%)	208 (98%)	5 (2%)	0	100	100
2	B	229/243 (94%)	225 (98%)	4 (2%)	0	100	100
2	D	234/243 (96%)	226 (97%)	8 (3%)	0	100	100
All	All	889/916 (97%)	867 (98%)	22 (2%)	0	100	100

There are no Ramachandran outliers to report.

### 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	189/189 (100%)	189 (100%)	0	100	100
1	C	189/189 (100%)	188 (100%)	1 (0%)	81	58
2	B	193/205 (94%)	192 (100%)	1 (0%)	81	58
2	D	198/205 (97%)	196 (99%)	2 (1%)	68	34
All	All	769/788 (98%)	765 (100%)	4 (0%)	81	58

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	B	262	LYS
1	C	147	LYS
2	D	284	LYS
2	D	383	PRO

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	38	GLN
1	A	154	ASN
2	B	258	GLN
1	C	154	ASN
1	C	162	GLN
2	D	428	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

### 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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	215/215 (100%)	-0.00	4 (1%) 66 75	13, 20, 37, 55	0
1	C	215/215 (100%)	0.05	7 (3%) 49 57	14, 22, 37, 60	0
2	B	231/243 (95%)	0.49	16 (6%) 23 31	15, 26, 47, 71	0
2	D	236/243 (97%)	0.60	32 (13%) 7 11	15, 25, 53, 70	0
All	All	897/916 (97%)	0.30	59 (6%) 24 33	13, 22, 45, 71	0

All (59) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	D	452	CYS	7.6
2	D	367	THR	6.5
2	D	327	PRO	6.5
2	D	331	LEU	6.3
2	D	329	TYR	6.3
2	B	366	SER	6.3
2	B	369	GLY	5.8
2	B	367	THR	5.0
2	B	221	VAL	4.8
2	D	328	TYR	4.7
2	B	368	SER	4.5
2	D	368	SER	4.5
2	D	453	ASP	3.9
2	D	230	LEU	3.7
2	D	426	GLY	3.7
2	D	366	SER	3.7
2	D	365	LYS	3.6
2	B	426	GLY	3.5
2	D	231	VAL	3.4
2	D	330	GLY	3.3
2	D	218	ILE	3.3

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Mol	Chain	Res	Type	RSRZ
2	D	369	GLY	3.2
2	D	364	SER	3.2
2	D	326	LYS	3.2
2	B	293	THR	3.0
2	D	385	PRO	3.0
2	B	338	TYR	2.9
1	C	23	CYS	2.8
2	B	427	THR	2.8
2	B	364	SER	2.8
2	B	451	SER	2.8
2	B	325	TYR	2.8
1	A	83	PHE	2.7
2	B	435	ASN	2.7
2	D	325	TYR	2.6
2	D	219	SER	2.6
1	A	1	ASP	2.6
1	C	214	GLY	2.6
2	B	370	GLY	2.6
2	D	233	PRO	2.5
1	C	102	GLN	2.4
1	C	154	ASN	2.4
2	D	349	SER	2.3
2	D	386	VAL	2.3
2	D	405	VAL	2.3
2	D	451	SER	2.3
1	C	65	SER	2.3
1	C	129	SER	2.3
2	D	384	GLU	2.3
2	D	427	THR	2.3
2	B	315	CYS	2.2
1	A	214	GLY	2.2
2	D	370	GLY	2.2
2	D	425	LEU	2.2
1	C	0	SER	2.2
2	D	324	SER	2.1
1	A	156	LEU	2.1
2	D	232	GLN	2.1
2	B	371	THR	2.1

## 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.