



# wwPDB X-ray Structure Validation Summary Report ⓘ

May 21, 2020 – 02:31 am BST

PDB ID : 2W67  
Title : BtGH84 in complex with FMA34  
Authors : He, Y.; Davies, G.J.  
Deposited on : 2008-12-17  
Resolution : 2.25 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](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 following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.11  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.11

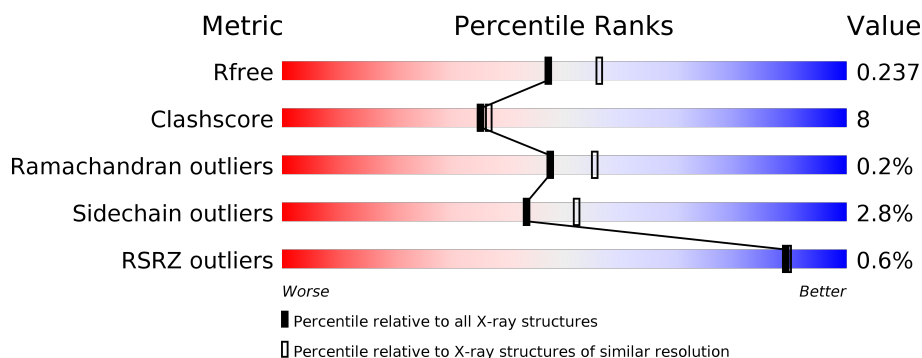
# 1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.25 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))
$R_{free}$	130704	1377 (2.26-2.26)
Clashscore	141614	1487 (2.26-2.26)
Ramachandran outliers	138981	1449 (2.26-2.26)
Sidechain outliers	138945	1450 (2.26-2.26)
RSRZ outliers	127900	1356 (2.26-2.26)

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 on 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	716	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 1%, orange 1%, yellow 16%, green 73%, grey 10%);"></div> <div style="display: flex; justify-content: space-between; font-size: small;"> <span>%</span> <span>73%</span> <span>16%</span> <span>10%</span> </div> </div>
1	B	716	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, green 65%, yellow 15%, grey 20%);"></div> <div style="display: flex; justify-content: space-between; font-size: small;"> <span>65%</span> <span>15%</span> <span>20%</span> </div> </div>

## 2 Entry composition [i](#)

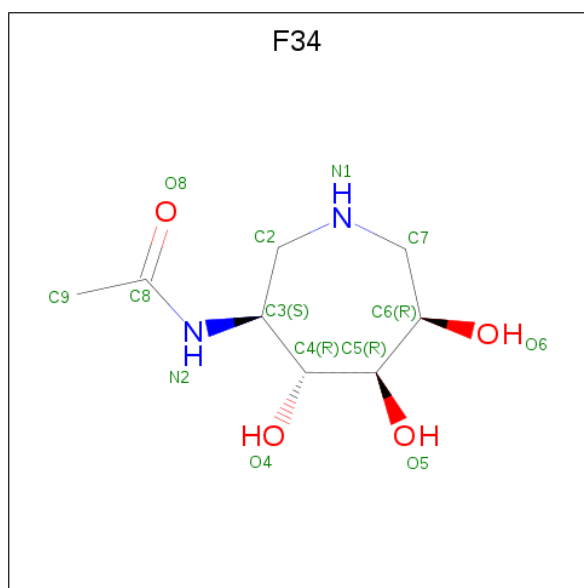
There are 5 unique types of molecules in this entry. The entry contains 10488 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 O-GLCNACASE BT\_4395.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	642	Total	C	N	O	S	0	2	0
			5230	3357	881	974	18			
1	B	576	Total	C	N	O	S	0	2	0
			4697	3009	791	881	16			

- Molecule 2 is N-[(3S,4R,5R,6R)-4,5,6-trihydroxyazepan-3-yl]acetamide (three-letter code: F34) (formula: C<sub>8</sub>H<sub>16</sub>N<sub>2</sub>O<sub>4</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			14	8	2	4		
2	B	1	Total	C	N	O	0	0
			14	8	2	4		

- Molecule 3 is GLYCEROL (three-letter code: GOL) (formula: C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			6	3	3		

- Molecule 4 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	B	1	Total	Ca	0	0
			1	1		
4	A	1	Total	Ca	0	0
			1	1		

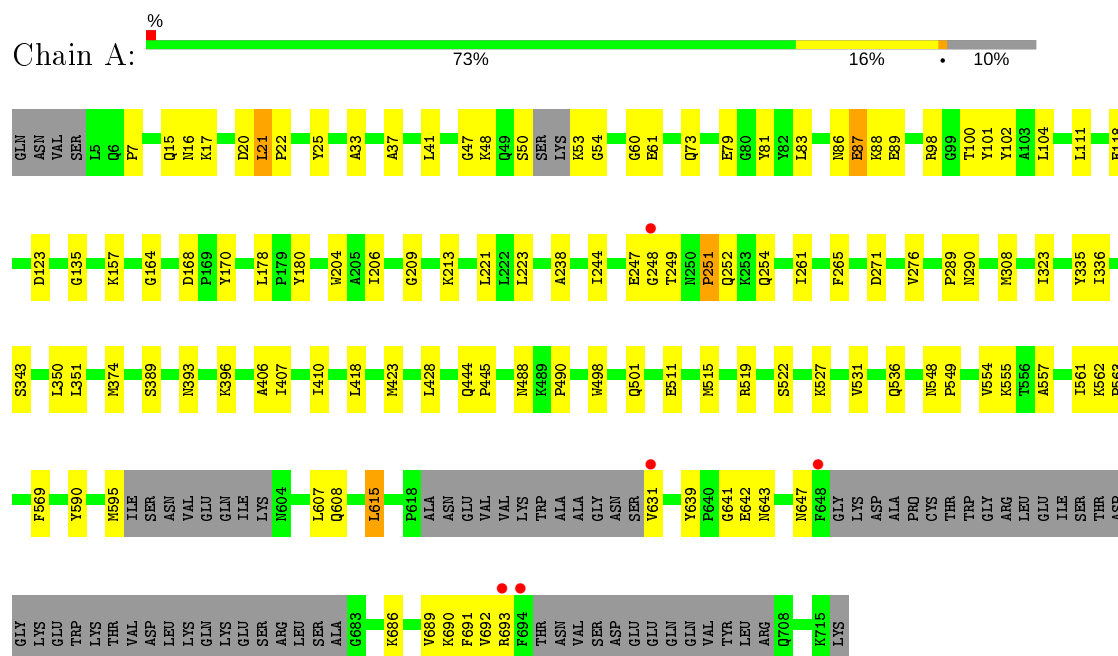
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	285	Total	O	0	0
			285	285		
5	B	240	Total	O	0	0
			240	240		

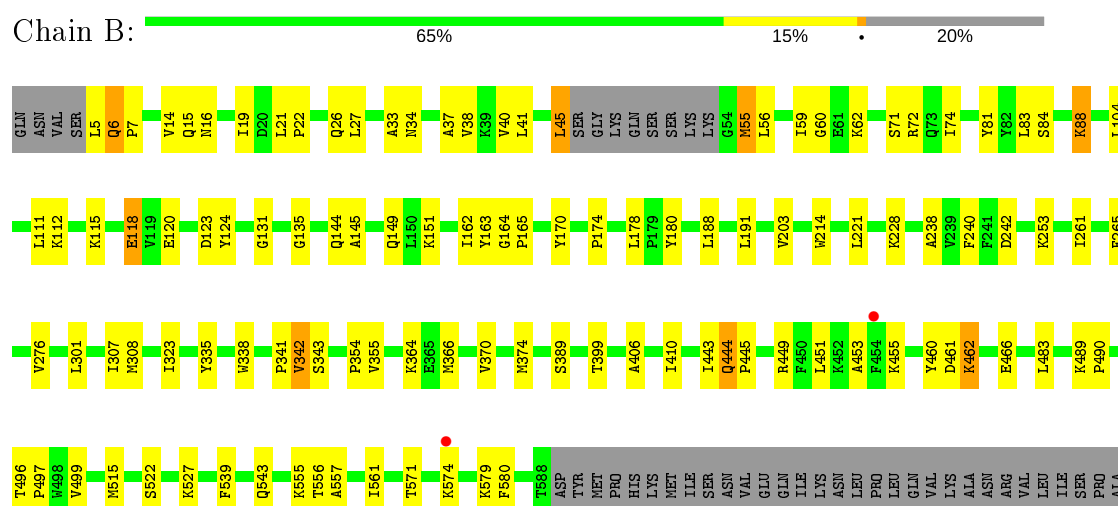
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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: O-GLCNACASE BT\_4395



#### • Molecule 1: O-GLCNACASE BT\_4395



ASN	GLU	VAL	LYS	ALA	ALA	GLY	ASN	SER	VAL	GLU	ILE	GLU	LEU	THR	ASN	ASP	ILE	TYR	PRO	GLY	GLU	ASN	ILE	GLN	ILE	ASN	PHE	GLY	LYS	ASP	ALA	PRO	CYS	THR	TRP	GLY	ARG	LEU	GLU	ILE	SER	THR	ASP	GLY	LYS	GLU	TRP	LYS	THR	VAL	ASP	LEU	LYS	GLN	LYS	GLU	SER	ARG
LEU	SER	ALA	GLY	LEU	GLN	LYS	ALA	PRO	VAL	LYS	PHE	VAL	ARG	PHE	THR	ASN	VAL	SER	ASP	GLU	GLU	GLN	GLN	VAL	TYR	LEU	ARG	GLN	PHE	VAL	LEU	THR	ILE	GLU	LYS	LYS																						

## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	51.25Å 92.10Å 98.29Å 103.42° 95.11° 100.60°	Depositor
Resolution (Å)	87.71 – 2.25 87.57 – 2.25	Depositor EDS
% Data completeness (in resolution range)	93.3 (87.71-2.25) 92.4 (87.57-2.25)	Depositor EDS
$R_{merge}$	0.06	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.47 (at 2.25Å)	Xtriage
Refinement program	REFMAC 5.4.0077	Depositor
R, $R_{free}$	0.181 , 0.229 0.192 , 0.237	Depositor DCC
$R_{free}$ test set	3711 reflections (4.97%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	27.6	Xtriage
Anisotropy	0.144	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.38 , 45.7	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	10488	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	20.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.28% 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

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: GOL, CA, F34

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	0.72	0/5367	0.71	0/7271
1	B	0.70	0/4826	0.71	0/6547
All	All	0.71	0/10193	0.71	0/13818

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts

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	5230	0	5149	81	0
1	B	4697	0	4594	80	0
2	A	14	0	16	0	0
2	B	14	0	16	0	0
3	A	6	0	8	0	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
5	A	285	0	0	0	0
5	B	240	0	0	5	0
All	All	10488	0	9783	161	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 8.

The worst 5 of 161 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:53:LYS:HG3	1:A:54:GLY:N	1.54	1.12
1:A:53:LYS:CG	1:A:54:GLY:H	1.64	1.08
1:A:53:LYS:HG3	1:A:54:GLY:H	0.95	1.08
1:A:21:LEU:HD23	1:A:22:PRO:HD2	1.35	1.06
1:A:47:GLY:O	1:A:48:LYS:HG2	1.64	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	632/716 (88%)	605 (96%)	26 (4%)	1 (0%)	47	55
1	B	574/716 (80%)	547 (95%)	26 (4%)	1 (0%)	47	55
All	All	1206/1432 (84%)	1152 (96%)	52 (4%)	2 (0%)	47	55

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	342	VAL
1	A	251	PRO

### 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	567/630 (90%)	553 (98%)	14 (2%)	47	56
1	B	507/630 (80%)	491 (97%)	16 (3%)	39	47
All	All	1074/1260 (85%)	1044 (97%)	30 (3%)	43	52

5 of 30 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	647	ASN
1	B	45	LEU
1	B	466	GLU
1	B	27	LEU
1	B	55	MET

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 23 such sidechains are listed below:

Mol	Chain	Res	Type
1	A	647	ASN
1	B	6	GLN
1	B	536	GLN
1	A	708	GLN
1	B	10	GLN

### 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 carbohydrates in this entry.

## 5.6 Ligand geometry ⓘ

Of 5 ligands modelled in this entry, 2 are monoatomic - leaving 3 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z  > 2$	Counts	RMSZ	$\# Z  > 2$
2	F34	B	1589	-	11,14,14	0.55	0	10,19,19	2.46	3 (30%)
3	GOL	A	1717	-	5,5,5	0.30	0	5,5,5	0.49	0
2	F34	A	1716	-	11,14,14	0.94	0	10,19,19	2.25	3 (30%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	F34	B	1589	-	-	1/4/22/22	0/1/1/1
3	GOL	A	1717	-	-	0/4/4/4	-
2	F34	A	1716	-	-	1/4/22/22	0/1/1/1

There are no bond length outliers.

The worst 5 of 6 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	1716	F34	C2-C3-N2	5.98	120.87	109.61
2	B	1589	F34	C2-C3-N2	5.70	120.34	109.61
2	B	1589	F34	C3-N2-C8	3.21	127.47	122.90
2	B	1589	F34	C6-C5-C4	2.63	119.43	115.20
2	A	1716	F34	O5-C5-C4	-2.35	103.70	108.93

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	1589	F34	C4-C3-N2-C8
2	A	1716	F34	C4-C3-N2-C8

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](#)

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, 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	642/716 (89%)	-0.25	5 (0%) 86 87	4, 16, 41, 55	0
1	B	576/716 (80%)	-0.23	2 (0%) 94 94	6, 17, 42, 51	0
All	All	1218/1432 (85%)	-0.24	7 (0%) 89 89	4, 17, 41, 55	0

The worst 5 of 7 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	454	PHE	3.8
1	A	694	PHE	3.2
1	A	648	PHE	2.4
1	A	631	VAL	2.3
1	A	693	ARG	2.3

### 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 carbohydrates 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, 95<sup>th</sup> 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( $\text{\AA}^2$ )	Q<0.9
4	CA	B	1590	1/1	0.93	0.11	32,32,32,32	0
2	F34	A	1716	14/14	0.96	0.12	7,13,17,20	0
4	CA	A	1718	1/1	0.96	0.15	25,25,25,25	0
3	GOL	A	1717	6/6	0.97	0.10	20,23,25,26	0
2	F34	B	1589	14/14	0.97	0.12	12,15,17,20	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.