



# wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 10, 2025 – 06:32 PM EDT

PDB ID : 8UIO  
Title : anti-Phosphohistidine Fab hSC44.ck  
Authors : Kalagiri, R.; Stanfield, R.L.; Hunter, T.; Wilson, I.A.  
Deposited on : 2023-10-10  
Resolution : 1.75 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 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  
Mogul : 2022.3.0, CSD as543be (2022)  
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) : 2.41.4

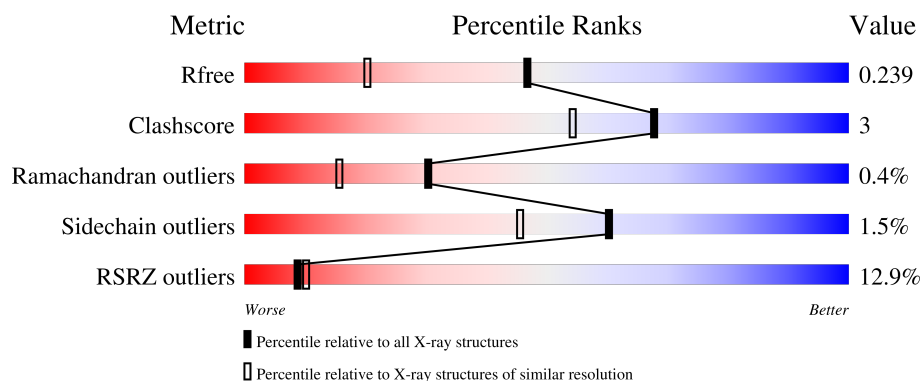
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.75 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	2888 (1.76-1.76)
Clashscore	180529	3097 (1.76-1.76)
Ramachandran outliers	177936	3072 (1.76-1.76)
Sidechain outliers	177891	3072 (1.76-1.76)
RSRZ outliers	164620	2887 (1.76-1.76)

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	225	<div> <div>8%</div> <div>89%</div> <div>5%</div> <div>5%</div> </div>
1	H	225	<div> <div>7%</div> <div>90%</div> <div>7%</div> <div>.</div> </div>
2	B	218	<div> <div>28%</div> <div>90%</div> <div>9%</div> <div>.</div> </div>
2	L	218	<div> <div>8%</div> <div>90%</div> <div>9%</div> <div>.</div> </div>

## 2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 13399 atoms, of which 6401 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.

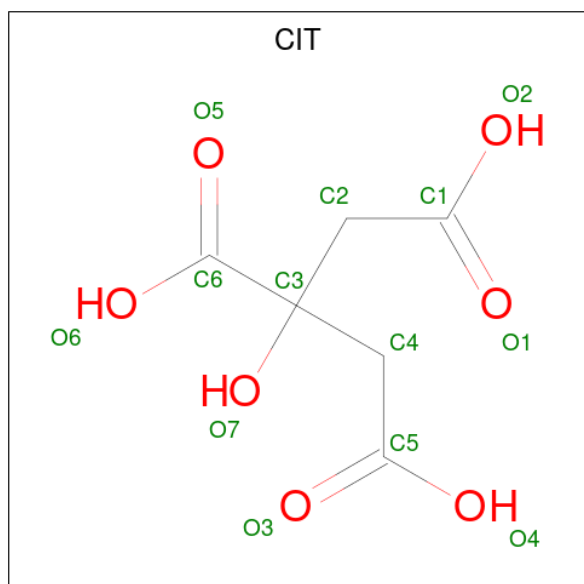
- Molecule 1 is a protein called hSC44.ck Fab heavy chain.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	H	217	Total	C	H	N	O	S	0	1	0
			3174	1002	1582	272	312	6			
1	A	213	Total	C	H	N	O	S	0	1	0
			3123	988	1556	267	306	6			

- Molecule 2 is a protein called hSC44.ck Fab light chain.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
2	L	218	Total	C	H	N	O	S	0	2	0
			3309	1054	1624	282	342	7			
2	B	218	Total	C	H	N	O	S	0	3	0
			3317	1056	1629	282	343	7			

- Molecule 3 is CITRIC ACID (three-letter code: CIT) (formula:  $C_6H_8O_7$ ).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	H	1	Total	C	H	O	0	0
			18	6	5	7		
3	A	1	Total	C	H	O	0	0
			18	6	5	7		

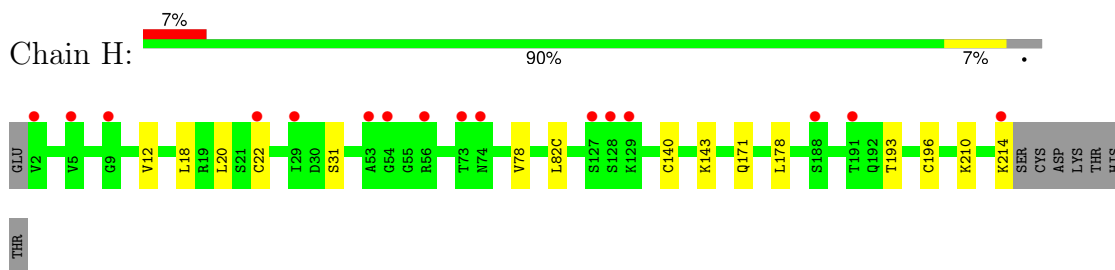
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	H	108	Total	O	0	0
			108	108		
4	L	165	Total	O	0	0
			165	165		
4	A	105	Total	O	0	0
			105	105		
4	B	62	Total	O	0	0
			62	62		

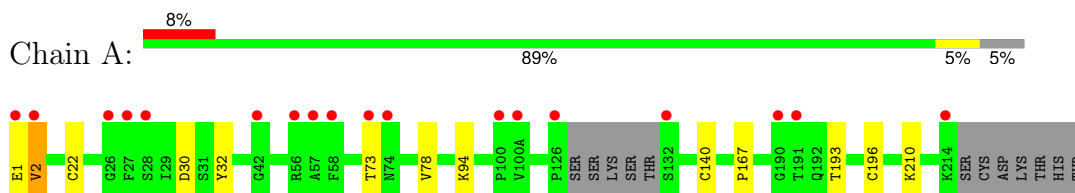
### 3 Residue-property plots [i](#)

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.

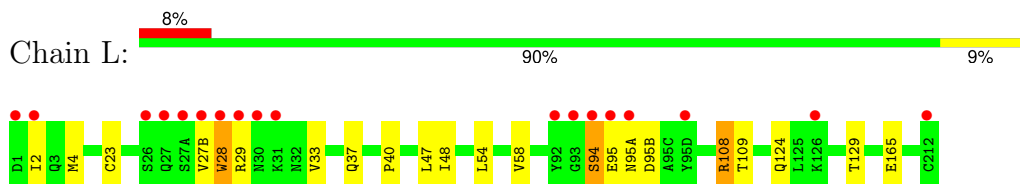
- Molecule 1: hSC44.ck Fab heavy chain



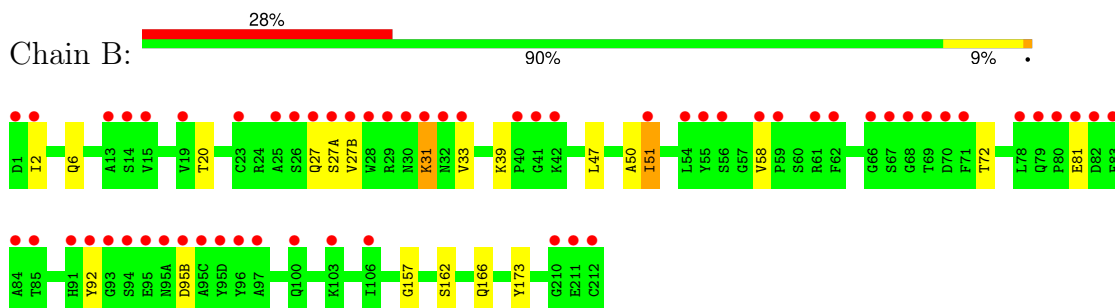
- Molecule 1: hSC44.ck Fab heavy chain



- Molecule 2: hSC44.ck Fab light chain



- Molecule 2: hSC44.ck Fab light chain



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	93.82Å 138.85Å 73.21Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	46.91 – 1.75 46.91 – 1.75	Depositor EDS
% Data completeness (in resolution range)	98.0 (46.91-1.75) 98.1 (46.91-1.75)	Depositor EDS
$R_{merge}$	0.12	Depositor
$R_{sym}$	0.12	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.50 (at 1.75Å)	Xtriage
Refinement program	PHENIX 1.19.2_4158	Depositor
R, $R_{free}$	0.210 , 0.239 0.210 , 0.239	Depositor DCC
$R_{free}$ test set	4901 reflections (5.05%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	22.4	Xtriage
Anisotropy	0.148	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.36 , 29.1	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	13399	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	37.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 11.11% 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](#)

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

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	0.35	0/1605	0.60	0/2186
1	H	0.37	0/1631	0.59	0/2222
2	B	0.33	0/1734	0.55	0/2354
2	L	0.41	0/1728	0.60	0/2346
All	All	0.37	0/6698	0.58	0/9108

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 [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	1567	1556	1555	9	0
1	H	1592	1582	1582	13	0
2	B	1688	1629	1629	12	0
2	L	1685	1624	1624	14	0
3	A	13	5	5	0	0
3	H	13	5	5	0	0
4	A	105	0	0	0	0
4	B	62	0	0	0	0
4	H	108	0	0	0	0

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	L	165	0	0	0	0
All	All	6998	6401	6400	45	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.

The worst 5 of 45 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:L:27(B):VAL:HG11	2:L:33:VAL:HG23	1.47	0.92
1:H:18:LEU:HD13	1:H:20:LEU:HG	1.81	0.61
1:A:193:THR:HG23	1:A:210:LYS:HE2	1.84	0.60
2:L:2:ILE:H	2:L:2:ILE:HD12	1.67	0.58
2:L:27(B):VAL:HG11	2:L:33:VAL:CG2	2.29	0.55

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	210/225 (93%)	207 (99%)	2 (1%)	1 (0%)	25	11
1	H	216/225 (96%)	210 (97%)	6 (3%)	0	100	100
2	B	219/218 (100%)	207 (94%)	11 (5%)	1 (0%)	25	11
2	L	218/218 (100%)	211 (97%)	6 (3%)	1 (0%)	25	11
All	All	863/886 (97%)	835 (97%)	25 (3%)	3 (0%)	30	22

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	L	28	TRP

*Continued on next page...*



*Continued from previous page...*

Mol	Chain	Res	Type
1	A	2	VAL
2	B	51	ILE

### 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	174/185 (94%)	174 (100%)	0	100	100
1	H	178/185 (96%)	177 (99%)	1 (1%)	84	78
2	B	191/188 (102%)	185 (97%)	6 (3%)	35	15
2	L	190/188 (101%)	186 (98%)	4 (2%)	48	29
All	All	733/746 (98%)	722 (98%)	11 (2%)	60	45

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

Mol	Chain	Res	Type
2	B	27(A)	SER
2	B	31	LYS
2	B	95(B)	ASP
2	B	92	TYR
2	L	108	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 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 [i](#)

There are no oligosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

2 ligands are modelled in this entry.

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	$\# Z  > 2$
3	CIT	H	301	-	12,12,12	1.08	0	17,17,17	1.61	2 (11%)
3	CIT	A	301	-	12,12,12	1.04	0	17,17,17	1.55	2 (11%)

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
3	CIT	H	301	-	-	9/16/16/16	-
3	CIT	A	301	-	-	12/16/16/16	-

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	H	301	CIT	O6-C6-C3	4.41	121.61	113.14
3	A	301	CIT	O6-C6-C3	4.36	121.50	113.14
3	A	301	CIT	O4-C5-C4	2.04	120.80	114.35
3	H	301	CIT	O4-C5-C4	2.01	120.70	114.35

There are no chirality outliers.

5 of 21 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	H	301	CIT	C1-C2-C3-O7
3	H	301	CIT	C1-C2-C3-C4
3	H	301	CIT	C1-C2-C3-C6
3	A	301	CIT	O7-C3-C6-O5
3	A	301	CIT	O7-C3-C6-O6

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	213/225 (94%)	0.45	18 (8%)	18 20	9, 32, 61, 99	1 (0%)
1	H	217/225 (96%)	0.35	16 (7%)	22 25	10, 28, 59, 72	1 (0%)
2	B	218/218 (100%)	1.21	60 (27%)	2 2	13, 44, 98, 124	3 (1%)
2	L	218/218 (100%)	0.20	18 (8%)	19 21	9, 26, 80, 104	2 (0%)
All	All	866/886 (97%)	0.55	112 (12%)	9 10	9, 32, 75, 124	7 (0%)

The worst 5 of 112 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	L	28	TRP	9.9
2	L	27(B)	VAL	6.8
2	B	28	TRP	6.8
2	B	83	PHE	6.7
2	B	92	TYR	5.2

### 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](#)

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
3	CIT	A	301	13/13	0.74	0.17	46,72,88,88	0
3	CIT	H	301	13/13	0.76	0.16	31,49,62,63	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.