



wwPDB X-ray Structure Validation Summary Report

Jun 16, 2024 – 03:40 AM EDT

PDB ID : 2QR0
Title : Structure of VEGF complexed to a Fab containing TYR and SER in the CDRs
Authors : Wiesmann, C.
Deposited on : 2007-07-27
Resolution : 3.50 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 : 4.02b-467
Xtriage (Phenix) : 1.20.1
EDS : 2.37.1
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) : 2.37.1

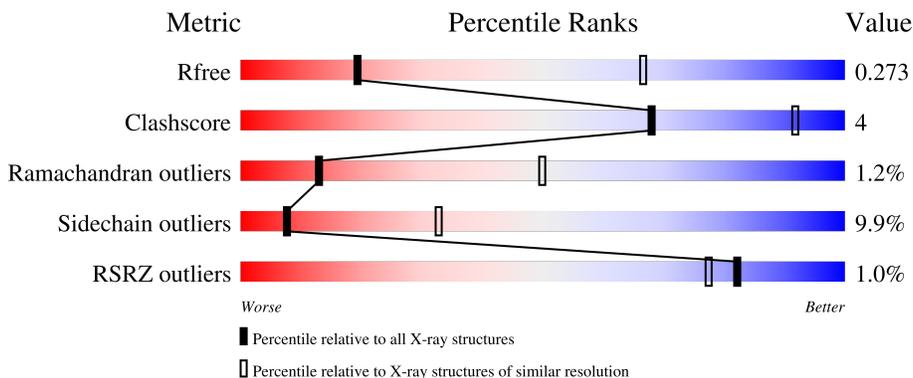
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.50 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	1659 (3.60-3.40)
Clashscore	141614	1036 (3.58-3.42)
Ramachandran outliers	138981	1005 (3.58-3.42)
Sidechain outliers	138945	1006 (3.58-3.42)
RSRZ outliers	127900	1559 (3.60-3.40)

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	213	 81% 15% •
1	E	213	 3% 84% 12% •
1	G	213	 82% 14% •
1	K	213	 84% 13% •
1	M	213	 85% 12% •

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Mol	Chain	Length	Quality of chain
1	Q	213	 85% 12% .
1	S	213	 85% 12% .
1	W	213	 87% 9% .
2	B	221	 82% 14% ..
2	F	221	 5% 84% 14% .
2	H	221	 81% 16% .
2	L	221	 2% 82% 14% ..
2	N	221	 83% 14% .
2	R	221	 1% 82% 15% .
2	T	221	 1% 83% 14% ..
2	X	221	 82% 16% .
3	C	97	 2% 85% 11% ..
3	D	97	 2% 88% 12%
3	I	97	 1% 79% 19% .
3	J	97	 2% 85% 14% .
3	O	97	 85% 11% ..
3	P	97	 3% 86% 12% .
3	U	97	 84% 14% .
3	V	97	 2% 85% 13% .

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 32356 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 Fab-Fragment Light Chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	213	Total 1654	C 1042	N 273	O 334	S 5	0	0	0
1	E	213	Total 1654	C 1042	N 273	O 334	S 5	0	0	0
1	G	213	Total 1654	C 1042	N 273	O 334	S 5	0	0	0
1	K	213	Total 1654	C 1042	N 273	O 334	S 5	0	0	0
1	M	213	Total 1654	C 1042	N 273	O 334	S 5	0	0	0
1	Q	213	Total 1654	C 1042	N 273	O 334	S 5	0	0	0
1	S	213	Total 1654	C 1042	N 273	O 334	S 5	0	0	0
1	W	213	Total 1654	C 1042	N 273	O 334	S 5	0	0	0

- Molecule 2 is a protein called Fab-Fragment Heavy Chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	216	Total 1612	C 1020	N 265	O 320	S 7	0	0	0
2	F	216	Total 1612	C 1020	N 265	O 320	S 7	0	0	0
2	H	216	Total 1612	C 1020	N 265	O 320	S 7	0	0	0
2	L	216	Total 1612	C 1020	N 265	O 320	S 7	0	0	0
2	N	216	Total 1612	C 1020	N 265	O 320	S 7	0	0	0
2	R	216	Total 1612	C 1020	N 265	O 320	S 7	0	0	0

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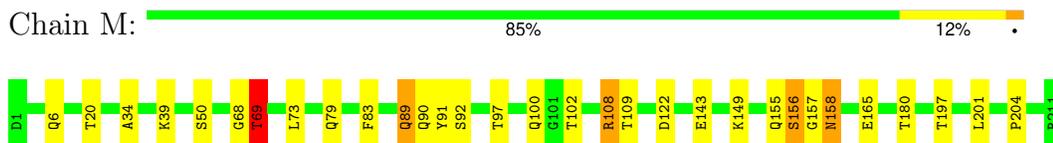
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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	T	216	Total	C	N	O	S	0	0	0
			1612	1020	265	320	7			
2	X	216	Total	C	N	O	S	0	0	0
			1612	1020	265	320	7			

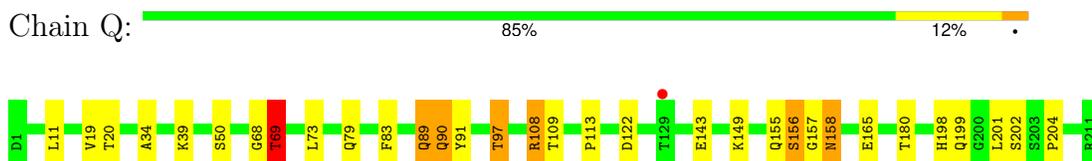
- Molecule 3 is a protein called Vascular endothelial growth factor A.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	C	95	Total	C	N	O	S	0	0	0
			770	483	129	145	13			
3	D	97	Total	C	N	O	S	0	0	0
			787	493	132	149	13			
3	I	95	Total	C	N	O	S	0	0	0
			770	483	129	145	13			
3	J	97	Total	C	N	O	S	0	0	0
			787	493	132	149	13			
3	O	95	Total	C	N	O	S	0	0	0
			770	483	129	145	13			
3	P	97	Total	C	N	O	S	0	0	0
			787	493	132	149	13			
3	U	95	Total	C	N	O	S	0	0	0
			770	483	129	145	13			
3	V	97	Total	C	N	O	S	0	0	0
			787	493	132	149	13			

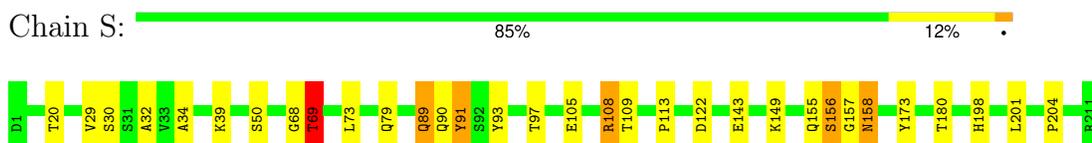
- Molecule 1: Fab-Fragment Light Chain



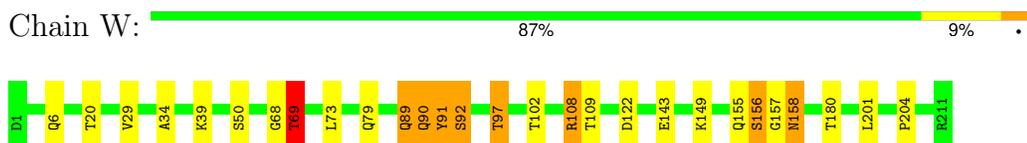
- Molecule 1: Fab-Fragment Light Chain



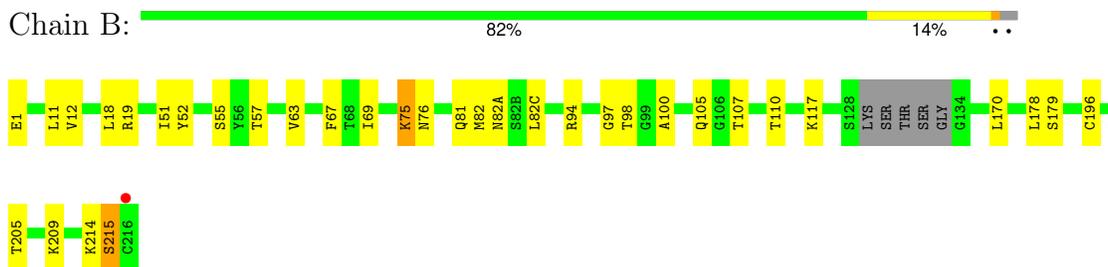
- Molecule 1: Fab-Fragment Light Chain



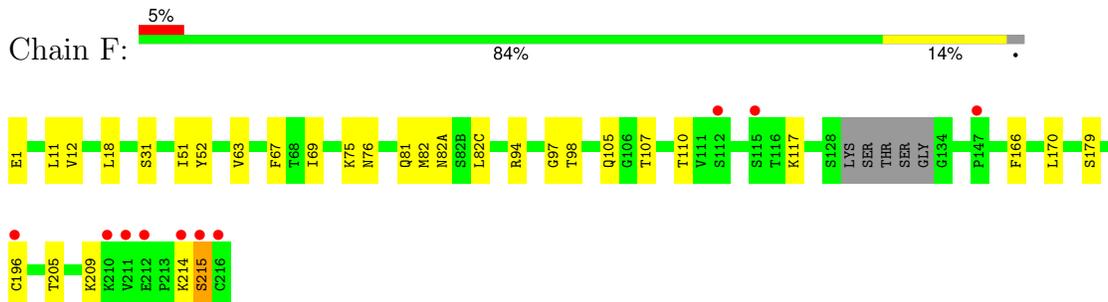
- Molecule 1: Fab-Fragment Light Chain



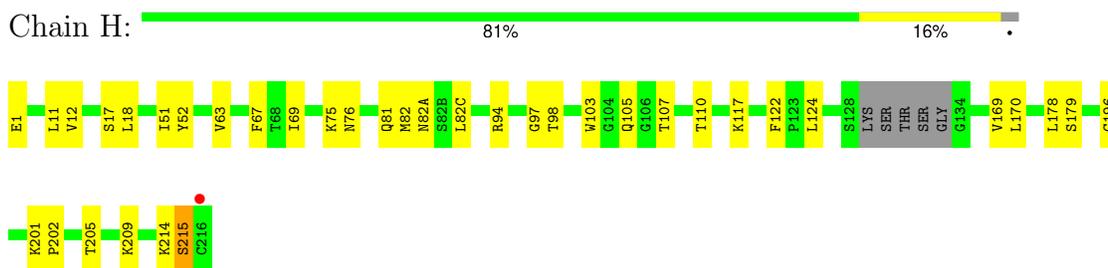
- Molecule 2: Fab-Fragment Heavy Chain



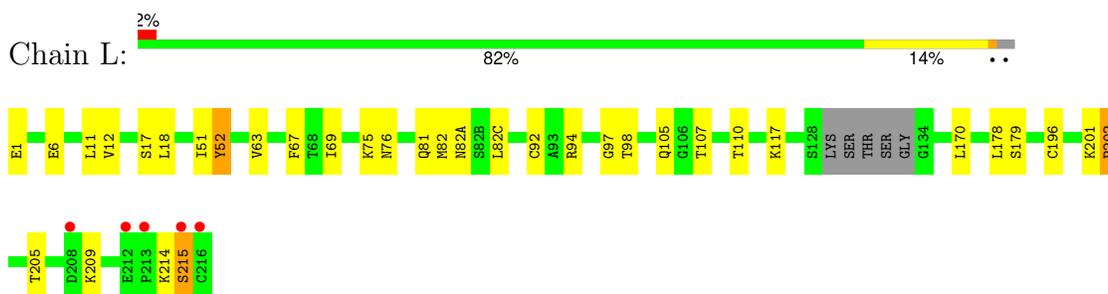
- Molecule 2: Fab-Fragment Heavy Chain



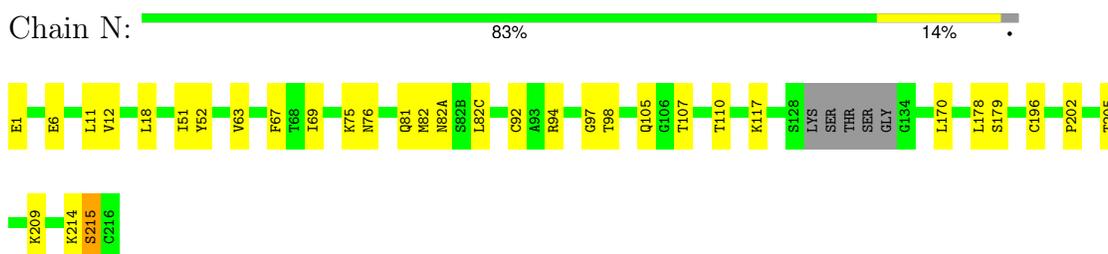
- Molecule 2: Fab-Fragment Heavy Chain



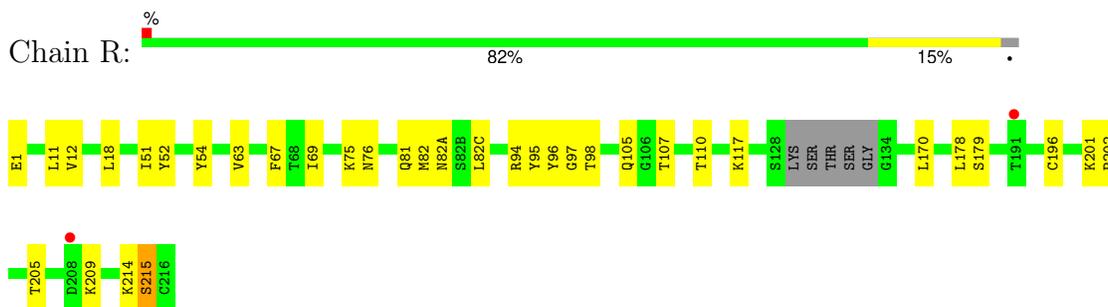
- Molecule 2: Fab-Fragment Heavy Chain



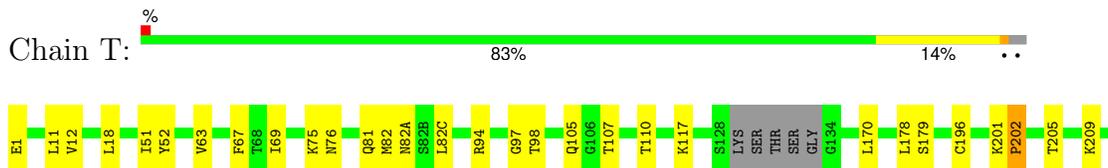
- Molecule 2: Fab-Fragment Heavy Chain



- Molecule 2: Fab-Fragment Heavy Chain



- Molecule 2: Fab-Fragment Heavy Chain





- Molecule 2: Fab-Fragment Heavy Chain

Chain X: 82% 16%



- Molecule 3: Vascular endothelial growth factor A

Chain C: 2% 85% 11%



- Molecule 3: Vascular endothelial growth factor A

Chain D: 2% 88% 12%



- Molecule 3: Vascular endothelial growth factor A

Chain I: % 79% 19%



- Molecule 3: Vascular endothelial growth factor A

Chain J: 2% 85% 14%

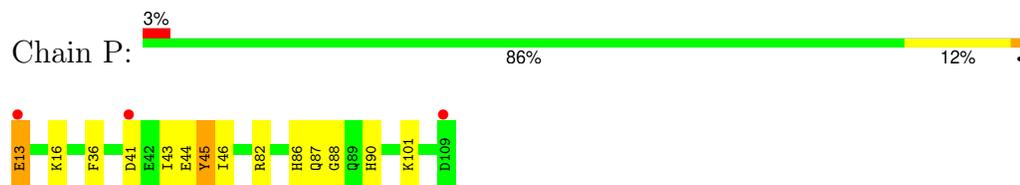


- Molecule 3: Vascular endothelial growth factor A

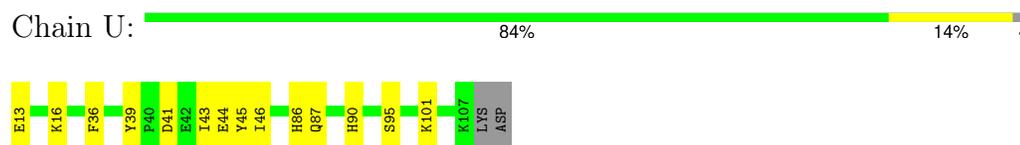
Chain O: 85% 11%



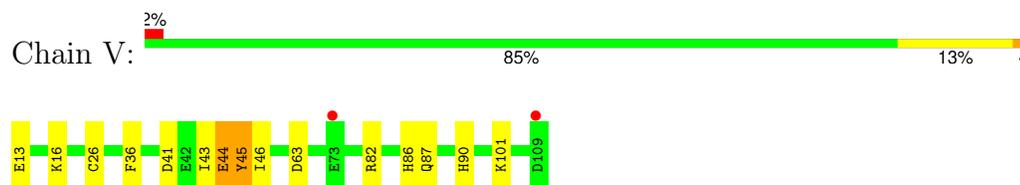
- Molecule 3: Vascular endothelial growth factor A



- Molecule 3: Vascular endothelial growth factor A



- Molecule 3: Vascular endothelial growth factor A



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	154.45Å 90.22Å 205.56Å 90.00° 90.85° 90.00°	Depositor
Resolution (Å)	20.00 – 3.50 48.97 – 3.50	Depositor EDS
% Data completeness (in resolution range)	96.1 (20.00-3.50) 96.1 (48.97-3.50)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.65 (at 3.48Å)	Xtrriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.291 , 0.312 0.258 , 0.273	Depositor DCC
R_{free} test set	3514 reflections (5.08%)	wwPDB-VP
Wilson B-factor (Å ²)	80.2	Xtrriage
Anisotropy	0.301	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.27 , 41.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	0.024 for h,-k,-l	Xtrriage
F_o, F_c correlation	0.88	EDS
Total number of atoms	32356	wwPDB-VP
Average B, all atoms (Å ²)	68.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 10.90% 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	0.40	0/1693	0.55	0/2300
1	E	0.36	0/1693	0.53	0/2300
1	G	0.40	0/1693	0.55	0/2300
1	K	0.39	0/1693	0.56	0/2300
1	M	0.39	0/1693	0.55	0/2300
1	Q	0.41	0/1693	0.55	0/2300
1	S	0.41	0/1693	0.55	0/2300
1	W	0.42	0/1693	0.54	0/2300
2	B	0.37	0/1653	0.54	0/2253
2	F	0.36	0/1653	0.53	0/2253
2	H	0.38	0/1653	0.54	0/2253
2	L	0.37	0/1653	0.53	0/2253
2	N	0.36	0/1653	0.53	0/2253
2	R	0.40	0/1653	0.54	0/2253
2	T	0.38	0/1653	0.54	0/2253
2	X	0.36	0/1653	0.53	0/2253
3	C	0.37	0/788	0.53	0/1062
3	D	0.36	0/805	0.53	0/1084
3	I	0.38	0/788	0.54	0/1062
3	J	0.37	0/805	0.53	0/1084
3	O	0.39	0/788	0.54	0/1062
3	P	0.36	0/805	0.54	0/1084
3	U	0.38	0/788	0.53	0/1062
3	V	0.38	0/805	0.53	0/1084
All	All	0.38	0/33140	0.54	0/45008

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	1654	0	1602	18	0
1	E	1654	0	1602	20	0
1	G	1654	0	1602	21	0
1	K	1654	0	1602	18	0
1	M	1654	0	1602	9	0
1	Q	1654	0	1602	22	0
1	S	1654	0	1602	12	0
1	W	1654	0	1602	11	0
2	B	1612	0	1561	18	0
2	F	1612	0	1561	16	0
2	H	1612	0	1561	14	0
2	L	1612	0	1561	13	0
2	N	1612	0	1561	9	0
2	R	1612	0	1561	17	0
2	T	1612	0	1561	11	0
2	X	1612	0	1561	13	0
3	C	770	0	732	4	0
3	D	787	0	749	2	0
3	I	770	0	732	18	0
3	J	787	0	749	5	0
3	O	770	0	732	3	0
3	P	787	0	749	14	0
3	U	770	0	732	4	0
3	V	787	0	749	8	0
All	All	32356	0	31228	240	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 4.

The worst 5 of 240 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)
3:I:39:TYR:CE2	1:Q:202:SER:HB2	1.78	1.19
2:B:75:LYS:NZ	3:V:44:GLU:HB3	1.83	0.94
3:P:86:HIS:H	2:R:97:GLY:HA2	1.36	0.91

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:I:39:TYR:CZ	1:Q:202:SER:CB	2.54	0.90
3:I:39:TYR:CE2	1:Q:202:SER:CB	2.58	0.87

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	211/213 (99%)	188 (89%)	16 (8%)	7 (3%)	4	28
1	E	211/213 (99%)	190 (90%)	16 (8%)	5 (2%)	6	35
1	G	211/213 (99%)	188 (89%)	19 (9%)	4 (2%)	8	40
1	K	211/213 (99%)	188 (89%)	18 (8%)	5 (2%)	6	35
1	M	211/213 (99%)	189 (90%)	17 (8%)	5 (2%)	6	35
1	Q	211/213 (99%)	189 (90%)	18 (8%)	4 (2%)	8	40
1	S	211/213 (99%)	188 (89%)	18 (8%)	5 (2%)	6	35
1	W	211/213 (99%)	189 (90%)	17 (8%)	5 (2%)	6	35
2	B	212/221 (96%)	203 (96%)	8 (4%)	1 (0%)	29	68
2	F	212/221 (96%)	203 (96%)	8 (4%)	1 (0%)	29	68
2	H	212/221 (96%)	202 (95%)	9 (4%)	1 (0%)	29	68
2	L	212/221 (96%)	201 (95%)	10 (5%)	1 (0%)	29	68
2	N	212/221 (96%)	202 (95%)	9 (4%)	1 (0%)	29	68
2	R	212/221 (96%)	202 (95%)	9 (4%)	1 (0%)	29	68
2	T	212/221 (96%)	203 (96%)	8 (4%)	1 (0%)	29	68
2	X	212/221 (96%)	202 (95%)	9 (4%)	1 (0%)	29	68
3	C	93/97 (96%)	88 (95%)	5 (5%)	0	100	100
3	D	95/97 (98%)	89 (94%)	6 (6%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
3	I	93/97 (96%)	86 (92%)	6 (6%)	1 (1%)	14	52
3	J	95/97 (98%)	89 (94%)	6 (6%)	0	100	100
3	O	93/97 (96%)	87 (94%)	6 (6%)	0	100	100
3	P	95/97 (98%)	89 (94%)	6 (6%)	0	100	100
3	U	93/97 (96%)	87 (94%)	6 (6%)	0	100	100
3	V	95/97 (98%)	90 (95%)	4 (4%)	1 (1%)	14	52
All	All	4136/4248 (97%)	3832 (93%)	254 (6%)	50 (1%)	13	50

5 of 50 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	94(A)	TYR
1	A	69	THR
1	A	92	SER
1	A	93	TYR
1	A	143	GLU

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%)	171 (90%)	18 (10%)	8	34
1	E	189/189 (100%)	171 (90%)	18 (10%)	8	34
1	G	189/189 (100%)	170 (90%)	19 (10%)	7	32
1	K	189/189 (100%)	173 (92%)	16 (8%)	10	39
1	M	189/189 (100%)	170 (90%)	19 (10%)	7	32
1	Q	189/189 (100%)	172 (91%)	17 (9%)	9	37
1	S	189/189 (100%)	172 (91%)	17 (9%)	9	37
1	W	189/189 (100%)	172 (91%)	17 (9%)	9	37
2	B	179/183 (98%)	162 (90%)	17 (10%)	8	34
2	F	179/183 (98%)	162 (90%)	17 (10%)	8	34

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	H	179/183 (98%)	161 (90%)	18 (10%)	7	32
2	L	179/183 (98%)	160 (89%)	19 (11%)	6	30
2	N	179/183 (98%)	161 (90%)	18 (10%)	7	32
2	R	179/183 (98%)	162 (90%)	17 (10%)	8	34
2	T	179/183 (98%)	161 (90%)	18 (10%)	7	32
2	X	179/183 (98%)	161 (90%)	18 (10%)	7	32
3	C	90/92 (98%)	80 (89%)	10 (11%)	6	28
3	D	92/92 (100%)	82 (89%)	10 (11%)	6	29
3	I	90/92 (98%)	80 (89%)	10 (11%)	6	28
3	J	92/92 (100%)	82 (89%)	10 (11%)	6	29
3	O	90/92 (98%)	79 (88%)	11 (12%)	5	23
3	P	92/92 (100%)	82 (89%)	10 (11%)	6	29
3	U	90/92 (98%)	80 (89%)	10 (11%)	6	28
3	V	92/92 (100%)	82 (89%)	10 (11%)	6	29
All	All	3672/3712 (99%)	3308 (90%)	364 (10%)	8	33

5 of 364 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	P	16	LYS
1	S	149	LYS
3	P	87	GLN
2	R	18	LEU
2	T	107	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 82 such sidechains are listed below:

Mol	Chain	Res	Type
1	Q	198	HIS
3	U	87	GLN
2	R	76	ASN
1	S	198	HIS
1	W	90	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 monosaccharides 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 [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	213/213 (100%)	-0.18	0 100 100	16, 60, 93, 109	0
1	E	213/213 (100%)	0.37	7 (3%) 46 41	16, 62, 93, 109	0
1	G	213/213 (100%)	-0.21	0 100 100	16, 62, 93, 109	0
1	K	213/213 (100%)	-0.01	0 100 100	16, 60, 93, 109	0
1	M	213/213 (100%)	0.06	0 100 100	16, 61, 93, 109	0
1	Q	213/213 (100%)	-0.10	1 (0%) 91 88	16, 62, 93, 109	0
1	S	213/213 (100%)	-0.22	0 100 100	16, 62, 93, 109	0
1	W	213/213 (100%)	-0.03	0 100 100	16, 61, 93, 109	0
2	B	216/221 (97%)	-0.16	1 (0%) 91 88	25, 63, 111, 150	0
2	F	216/221 (97%)	0.52	10 (4%) 32 28	25, 63, 111, 150	0
2	H	216/221 (97%)	0.01	1 (0%) 91 88	25, 63, 111, 150	0
2	L	216/221 (97%)	-0.01	5 (2%) 60 54	25, 63, 111, 150	0
2	N	216/221 (97%)	-0.03	0 100 100	25, 63, 111, 150	0
2	R	216/221 (97%)	0.04	2 (0%) 84 79	25, 63, 111, 150	0
2	T	216/221 (97%)	-0.16	2 (0%) 84 79	25, 63, 111, 150	0
2	X	216/221 (97%)	-0.02	0 100 100	25, 63, 111, 150	0
3	C	95/97 (97%)	0.16	2 (2%) 63 58	52, 84, 125, 135	0
3	D	97/97 (100%)	0.06	2 (2%) 63 58	52, 84, 130, 142	0
3	I	95/97 (97%)	0.09	1 (1%) 80 75	52, 84, 125, 135	0
3	J	97/97 (100%)	0.17	2 (2%) 63 58	52, 84, 130, 135	0
3	O	95/97 (97%)	0.08	0 100 100	52, 84, 125, 135	0
3	P	97/97 (100%)	0.15	3 (3%) 49 43	52, 84, 130, 140	0
3	U	95/97 (97%)	-0.01	0 100 100	52, 84, 125, 135	0
3	V	97/97 (100%)	0.04	2 (2%) 63 58	52, 84, 130, 135	0

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Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
All	All	4200/4248 (98%)	0.01	41 (0%) 82 77	16, 66, 110, 150	0

The worst 5 of 41 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	P	109	ASP	7.1
3	D	109	ASP	7.0
3	V	109	ASP	4.7
1	E	181	LEU	4.2
3	J	109	ASP	3.6

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 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.