wwPDB X-ray Structure Validation Summary Report (i)

Aug 17, 2023 – 02:19 PM JST

PDB ID	:	8I5C
Title	:	Crystal structure of a TCR in complex with HLA-A*11:01 bound to KRAS peptide (VVGAVGVGK)
Authors	:	Lu, D.; Chen, Y.; Jiang, M.; Tan, S.G.; Chai, Y.; Gao, G.F.
Deposited on	:	2023-01-24
Resolution	:	3.34 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 (i) 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 (1)) were used in the production of this report:

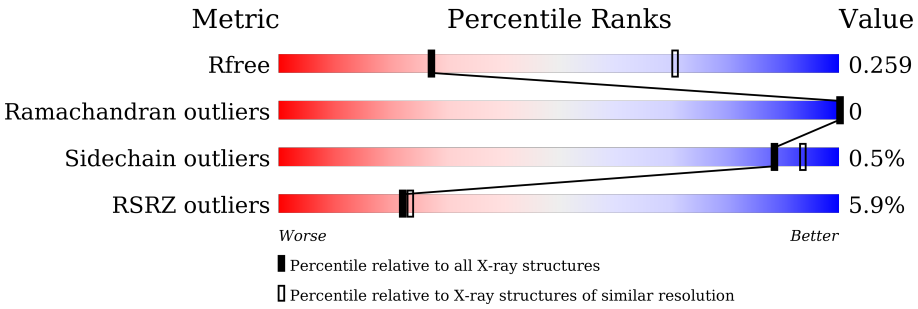
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.35
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.35

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 3.34 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	1060 (3.38-3.30)
Ramachandran outliers	138981	1090 (3.38-3.30)
Sidechain outliers	138945	1089 (3.38-3.30)
RSRZ outliers	127900	1028 (3.38-3.30)

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 <=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	274	99%
1	F	274	99%
1	K	274	99%
1	P	274	99%
1	U	274	99%
1	Z	274	99%
1	e	274	99%

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Mol	Chain	Length	Quality of chain
1	j	274	2% 99%
1	o	274	11% 99%
1	t	274	16% 99%
2	B	99	100%
2	G	99	100%
2	L	99	2% 100%
2	Q	99	100%
2	V	99	% 100%
2	a	99	% 100%
2	f	99	8% 100%
2	k	99	2% 100%
2	p	99	5% 100%
2	u	99	7% 99%
3	C	9	100%
3	H	9	100%
3	M	9	100%
3	R	9	100%
3	W	9	100%
3	b	9	100%
3	g	9	100%
3	l	9	100%
3	q	9	100%
3	v	9	100%
4	D	199	11% 99%
4	I	199	5% 99%

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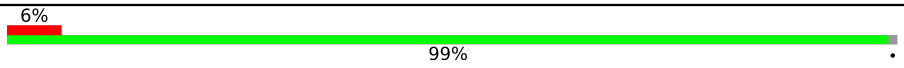
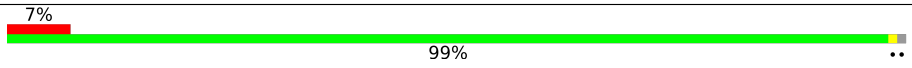
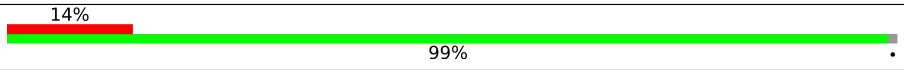
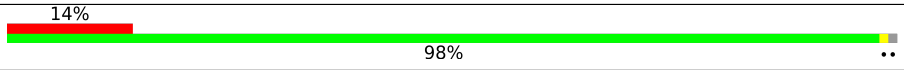
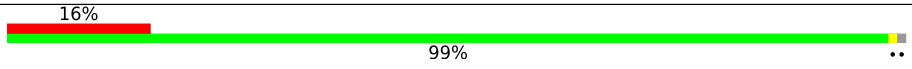
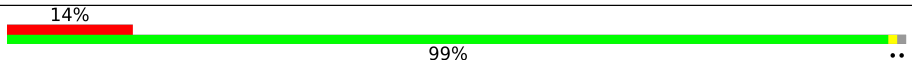
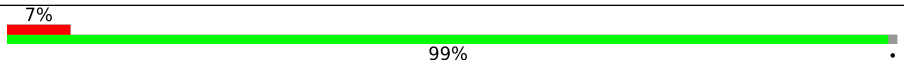
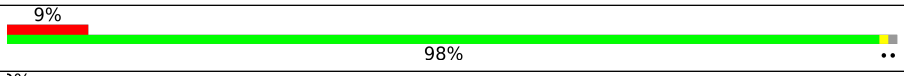
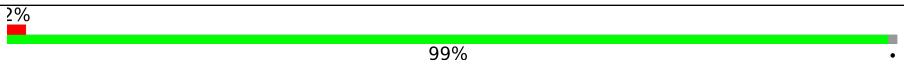
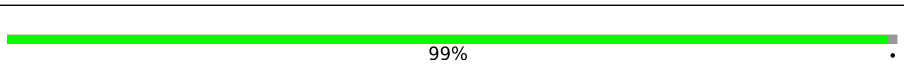
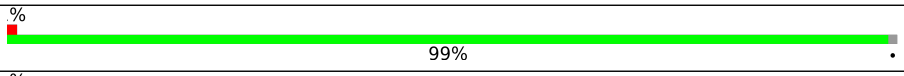
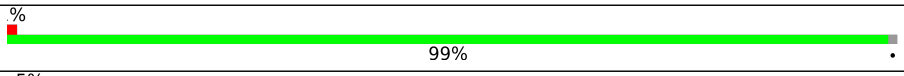
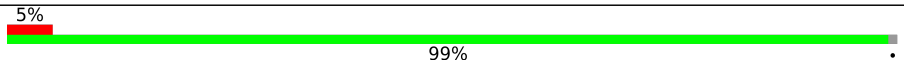
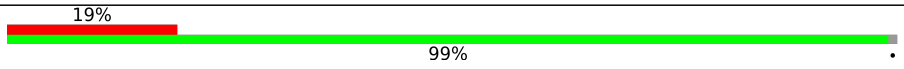
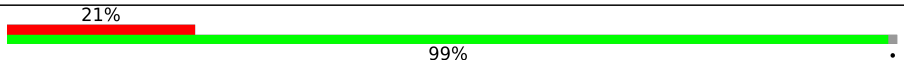
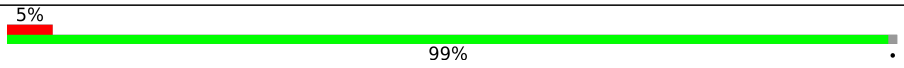
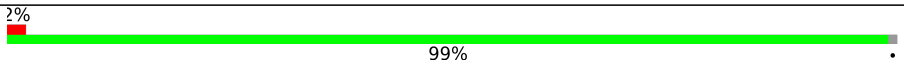
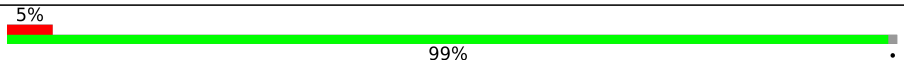
Mol	Chain	Length	Quality of chain
4	N	199	
4	S	199	
4	X	199	
4	c	199	
4	h	199	
4	m	199	
4	r	199	
4	w	199	
5	E	242	
5	J	242	
5	O	242	
5	T	242	
5	Y	242	
5	d	242	
5	i	242	
5	n	242	
5	s	242	
5	x	242	

2 Entry composition (i)

There are 5 unique types of molecules in this entry. The entry contains 65732 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 MHC class I antigen (Fragment).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	274	Total	C	N	O	S	0	0	0
			2237	1391	408	429	9			
1	F	274	Total	C	N	O	S	0	0	0
			2237	1391	408	429	9			
1	K	274	Total	C	N	O	S	0	0	0
			2237	1391	408	429	9			
1	P	274	Total	C	N	O	S	0	0	0
			2237	1391	408	429	9			
1	U	274	Total	C	N	O	S	0	0	0
			2237	1391	408	429	9			
1	Z	274	Total	C	N	O	S	0	0	0
			2237	1391	408	429	9			
1	e	274	Total	C	N	O	S	0	0	0
			2237	1391	408	429	9			
1	j	274	Total	C	N	O	S	0	0	0
			2237	1391	408	429	9			
1	o	274	Total	C	N	O	S	0	0	0
			2237	1391	408	429	9			
1	t	274	Total	C	N	O	S	0	0	0
			2237	1391	408	429	9			

There are 20 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	245	VAL	ALA	engineered mutation	UNP U5YJJ6
A	253	GLN	GLU	engineered mutation	UNP U5YJJ6
F	245	VAL	ALA	engineered mutation	UNP U5YJJ6
F	253	GLN	GLU	engineered mutation	UNP U5YJJ6
K	245	VAL	ALA	engineered mutation	UNP U5YJJ6
K	253	GLN	GLU	engineered mutation	UNP U5YJJ6
P	245	VAL	ALA	engineered mutation	UNP U5YJJ6
P	253	GLN	GLU	engineered mutation	UNP U5YJJ6
U	245	VAL	ALA	engineered mutation	UNP U5YJJ6

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Chain	Residue	Modelled	Actual	Comment	Reference
U	253	GLN	GLU	engineered mutation	UNP U5YJJ6
Z	245	VAL	ALA	engineered mutation	UNP U5YJJ6
Z	253	GLN	GLU	engineered mutation	UNP U5YJJ6
e	245	VAL	ALA	engineered mutation	UNP U5YJJ6
e	253	GLN	GLU	engineered mutation	UNP U5YJJ6
j	245	VAL	ALA	engineered mutation	UNP U5YJJ6
j	253	GLN	GLU	engineered mutation	UNP U5YJJ6
o	245	VAL	ALA	engineered mutation	UNP U5YJJ6
o	253	GLN	GLU	engineered mutation	UNP U5YJJ6
t	245	VAL	ALA	engineered mutation	UNP U5YJJ6
t	253	GLN	GLU	engineered mutation	UNP U5YJJ6

- Molecule 2 is a protein called Beta-2-microglobulin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	99	Total	C	N	O	S	0	0	0
			828	528	140	157	3			
2	G	99	Total	C	N	O	S	0	0	0
			828	528	140	157	3			
2	L	99	Total	C	N	O	S	0	0	0
			828	528	140	157	3			
2	Q	99	Total	C	N	O	S	0	0	0
			828	528	140	157	3			
2	V	99	Total	C	N	O	S	0	0	0
			828	528	140	157	3			
2	a	99	Total	C	N	O	S	0	0	0
			828	528	140	157	3			
2	f	99	Total	C	N	O	S	0	0	0
			828	528	140	157	3			
2	k	99	Total	C	N	O	S	0	0	0
			828	528	140	157	3			
2	p	99	Total	C	N	O	S	0	0	0
			828	528	140	157	3			
2	u	98	Total	C	N	O	S	0	0	0
			820	523	139	156	2			

- Molecule 3 is a protein called peptide KRAS-G12V-9.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	C	9	Total	C	N	O	0	0	0
			55	35	10	10			
3	H	9	Total	C	N	O	0	0	0
			55	35	10	10			

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	M	9	Total	C	N	O	0	0	0
			55	35	10	10			
3	R	9	Total	C	N	O	0	0	0
			55	35	10	10			
3	W	9	Total	C	N	O	0	0	0
			55	35	10	10			
3	b	9	Total	C	N	O	0	0	0
			55	35	10	10			
3	g	9	Total	C	N	O	0	0	0
			55	35	10	10			
3	l	9	Total	C	N	O	0	0	0
			55	35	10	10			
3	q	9	Total	C	N	O	0	0	0
			55	35	10	10			
3	v	9	Total	C	N	O	0	0	0
			55	35	10	10			

- Molecule 4 is a protein called TCR alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	D	198	Total	C	N	O	S	0	0	0
			1562	974	266	312	10			
4	I	198	Total	C	N	O	S	0	0	0
			1562	974	266	312	10			
4	N	198	Total	C	N	O	S	0	0	0
			1562	974	266	312	10			
4	S	198	Total	C	N	O	S	0	0	0
			1562	974	266	312	10			
4	X	198	Total	C	N	O	S	0	0	0
			1562	974	266	312	10			
4	c	198	Total	C	N	O	S	0	0	0
			1562	974	266	312	10			
4	h	198	Total	C	N	O	S	0	0	0
			1562	974	266	312	10			
4	m	198	Total	C	N	O	S	0	0	0
			1562	974	266	312	10			
4	r	198	Total	C	N	O	S	0	0	0
			1562	974	266	312	10			
4	w	198	Total	C	N	O	S	0	0	0
			1562	974	266	312	10			

- Molecule 5 is a protein called TCR beta chain.

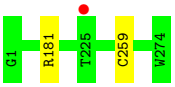
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
5	E	240	Total	C	N	O	S	0	0	0
			1892	1186	331	369	6			
5	J	240	Total	C	N	O	S	0	0	0
			1892	1186	331	369	6			
5	O	240	Total	C	N	O	S	0	0	0
			1892	1186	331	369	6			
5	T	240	Total	C	N	O	S	0	0	0
			1892	1186	331	369	6			
5	Y	240	Total	C	N	O	S	0	0	0
			1892	1186	331	369	6			
5	d	240	Total	C	N	O	S	0	0	0
			1892	1186	331	369	6			
5	i	240	Total	C	N	O	S	0	0	0
			1892	1186	331	369	6			
5	n	240	Total	C	N	O	S	0	0	0
			1892	1186	331	369	6			
5	s	240	Total	C	N	O	S	0	0	0
			1892	1186	331	369	6			
5	x	240	Total	C	N	O	S	0	0	0
			1892	1186	331	369	6			

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.

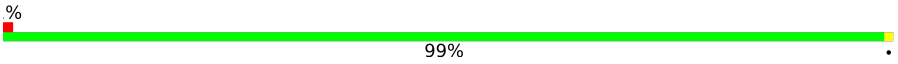
• Molecule 1: MHC class I antigen (Fragment)

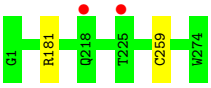
Chain A:



• Molecule 1: MHC class I antigen (Fragment)

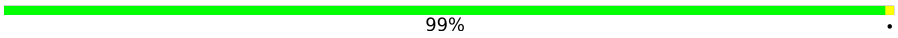
Chain F:





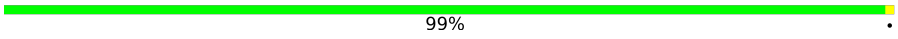
• Molecule 1: MHC class I antigen (Fragment)

Chain K:



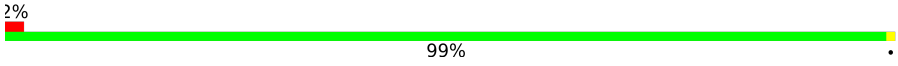
• Molecule 1: MHC class I antigen (Fragment)

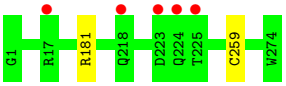
Chain P:



• Molecule 1: MHC class I antigen (Fragment)

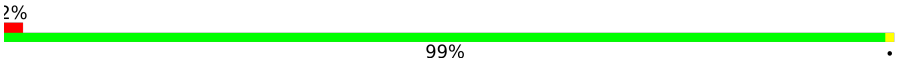
Chain U:

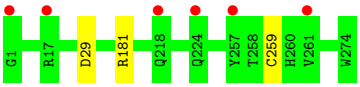




• Molecule 1: MHC class I antigen (Fragment)

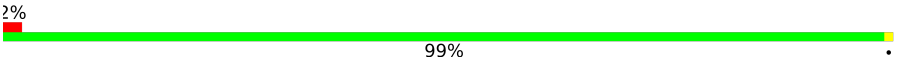
Chain Z:

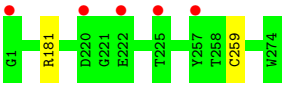




• Molecule 1: MHC class I antigen (Fragment)

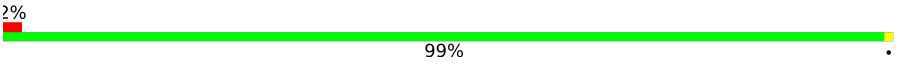
Chain e:

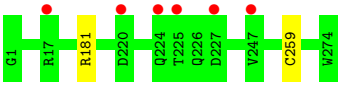




• Molecule 1: MHC class I antigen (Fragment)

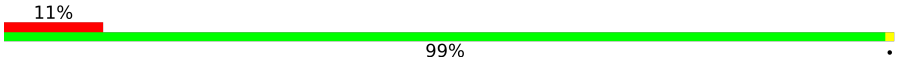
Chain j:

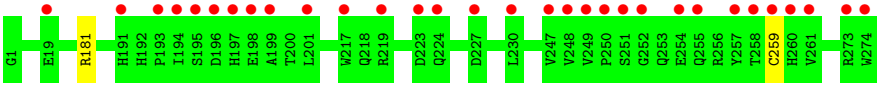




• Molecule 1: MHC class I antigen (Fragment)

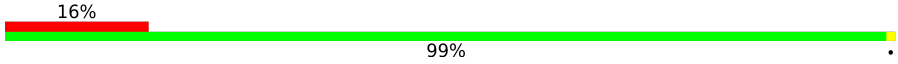
Chain o:

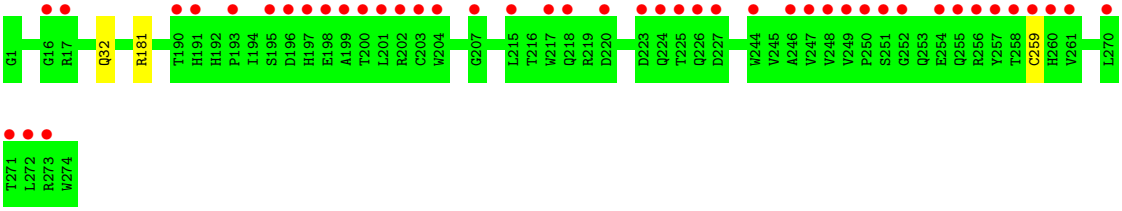




• Molecule 1: MHC class I antigen (Fragment)

Chain t:





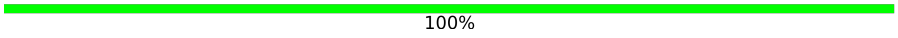
• Molecule 2: Beta-2-microglobulin

Chain B:

There are no outlier residues recorded for this chain.

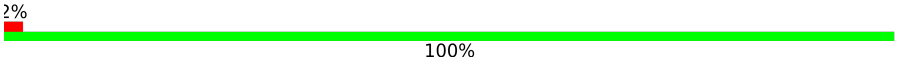
• Molecule 2: Beta-2-microglobulin

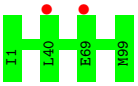
Chain G:



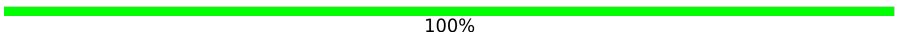
There are no outlier residues recorded for this chain.

• Molecule 2: Beta-2-microglobulin

Chain L: 

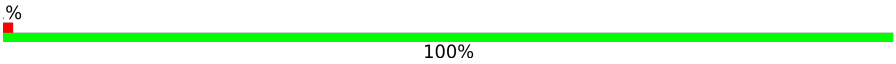


• Molecule 2: Beta-2-microglobulin

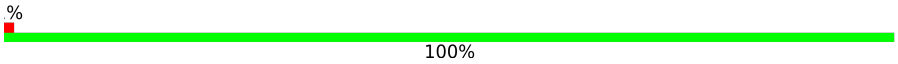
Chain Q: 

There are no outlier residues recorded for this chain.

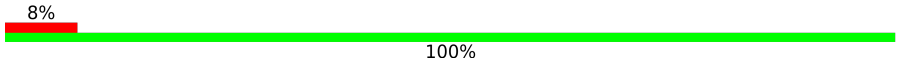
• Molecule 2: Beta-2-microglobulin

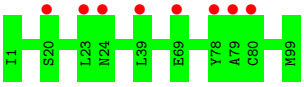
Chain V: 

• Molecule 2: Beta-2-microglobulin

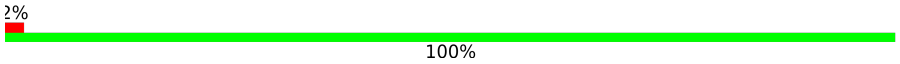
Chain a: 

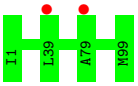
• Molecule 2: Beta-2-microglobulin

Chain f: 

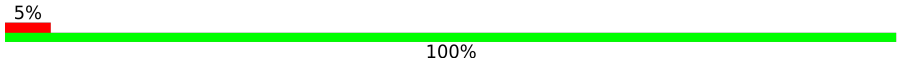


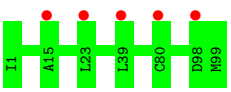
• Molecule 2: Beta-2-microglobulin

Chain k: 



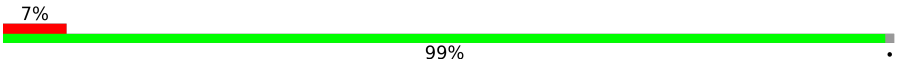
• Molecule 2: Beta-2-microglobulin

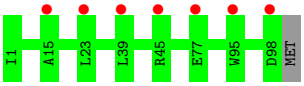
Chain p: 



• Molecule 2: Beta-2-microglobulin

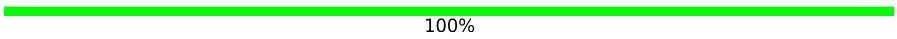
Chain u:





• Molecule 3: peptide KRAS-G12V-9

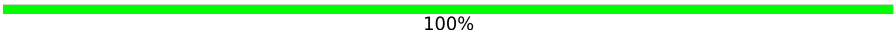
Chain C:



There are no outlier residues recorded for this chain.

• Molecule 3: peptide KRAS-G12V-9

Chain H:



There are no outlier residues recorded for this chain.

• Molecule 3: peptide KRAS-G12V-9

Chain M:

There are no outlier residues recorded for this chain.

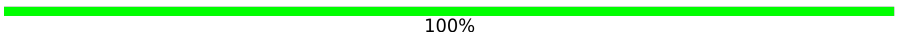
• Molecule 3: peptide KRAS-G12V-9

Chain R:

There are no outlier residues recorded for this chain.

• Molecule 3: peptide KRAS-G12V-9

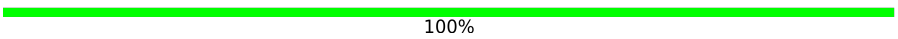
Chain W:



There are no outlier residues recorded for this chain.

• Molecule 3: peptide KRAS-G12V-9

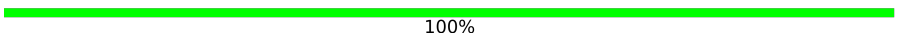
Chain b:



There are no outlier residues recorded for this chain.

• Molecule 3: peptide KRAS-G12V-9

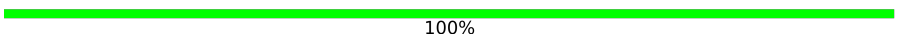
Chain g:



There are no outlier residues recorded for this chain.

• Molecule 3: peptide KRAS-G12V-9

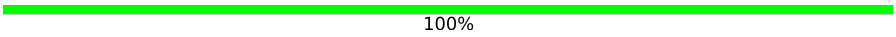
Chain l:



There are no outlier residues recorded for this chain.

• Molecule 3: peptide KRAS-G12V-9

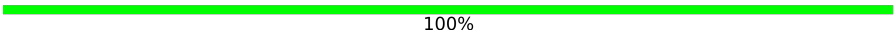
Chain q:



There are no outlier residues recorded for this chain.

• Molecule 3: peptide KRAS-G12V-9

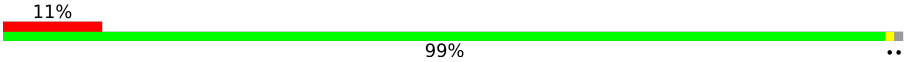
Chain v:

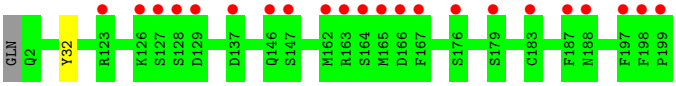


There are no outlier residues recorded for this chain.

• Molecule 4: TCR alpha chain

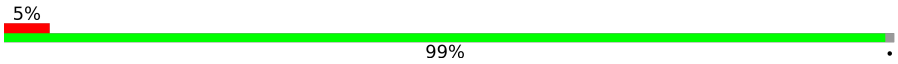
Chain D:

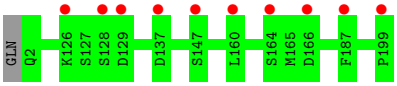




• Molecule 4: TCR alpha chain

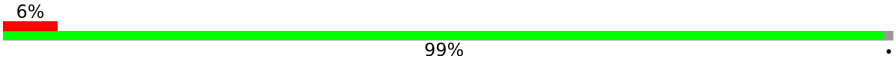
Chain I:

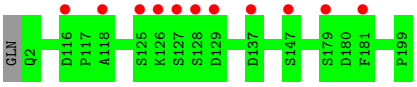




• Molecule 4: TCR alpha chain

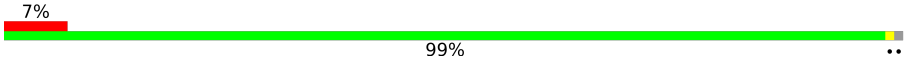
Chain N:

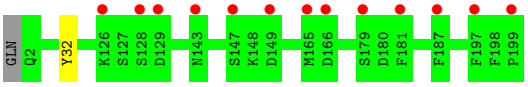




• Molecule 4: TCR alpha chain

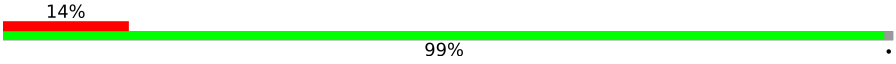
Chain S:

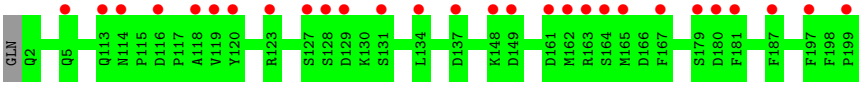




• Molecule 4: TCR alpha chain

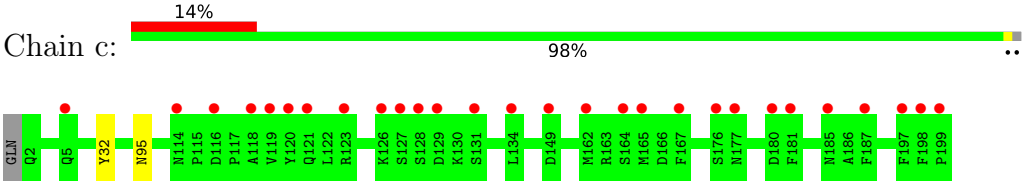
Chain X:





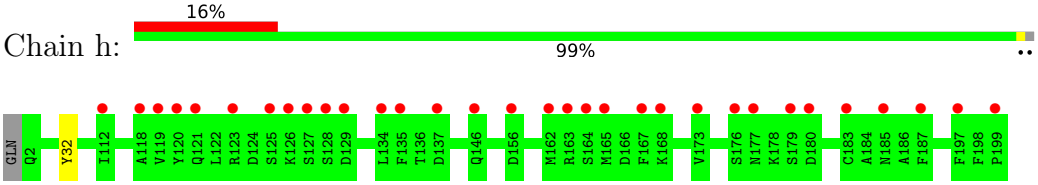
• Molecule 4: TCR alpha chain

Chain c:



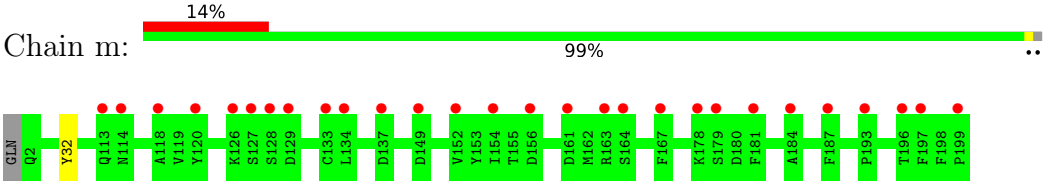
• Molecule 4: TCR alpha chain

Chain h:



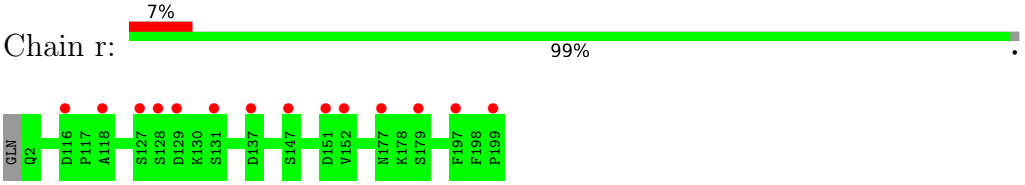
• Molecule 4: TCR alpha chain

Chain m:



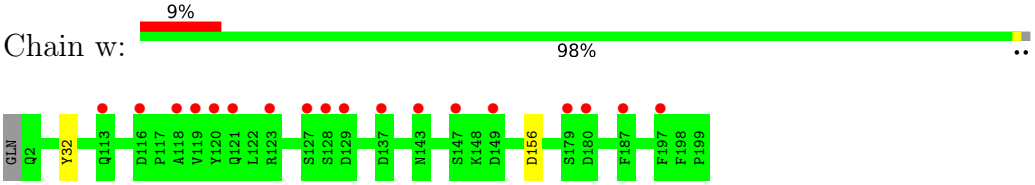
• Molecule 4: TCR alpha chain

Chain r:



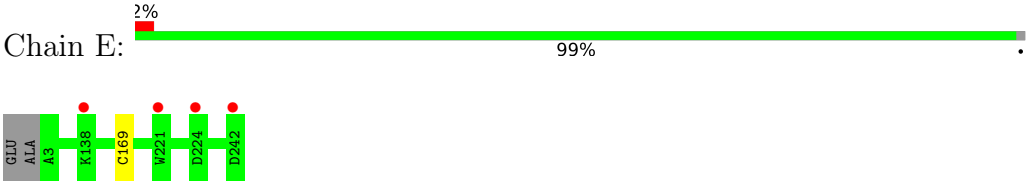
• Molecule 4: TCR alpha chain

Chain w:



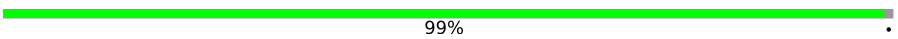
• Molecule 5: TCR beta chain

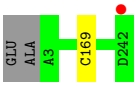
Chain E:



• Molecule 5: TCR beta chain

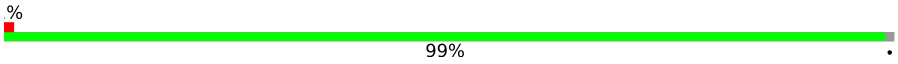
Chain J:

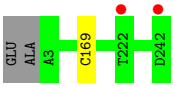




• Molecule 5: TCR beta chain

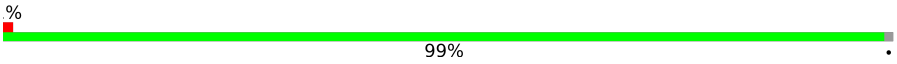
Chain O:

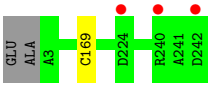




• Molecule 5: TCR beta chain

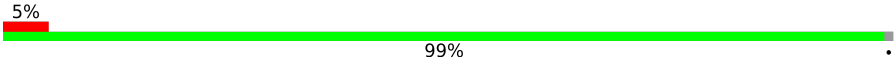
Chain T:

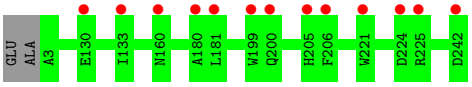




• Molecule 5: TCR beta chain

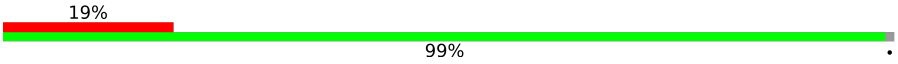
Chain Y:

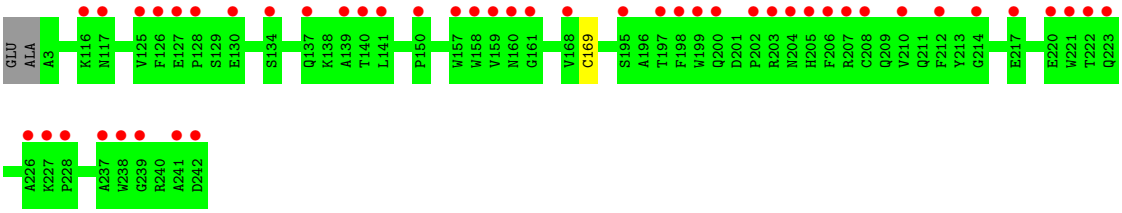




• Molecule 5: TCR beta chain

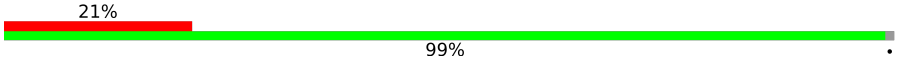
Chain d:

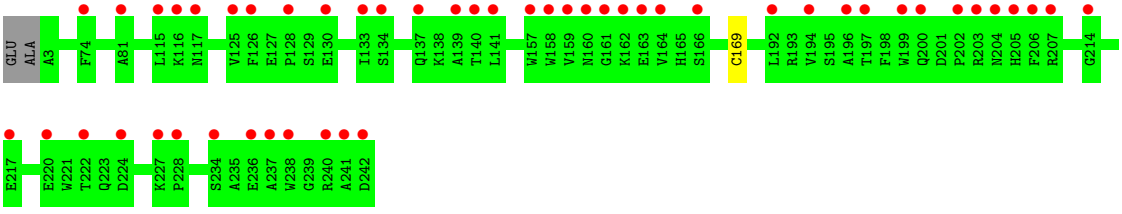




• Molecule 5: TCR beta chain

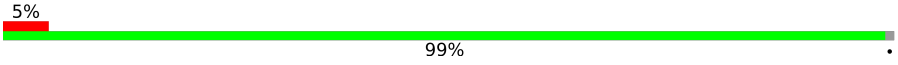
Chain i:

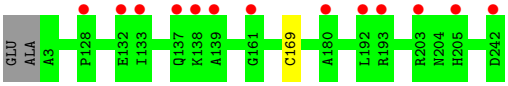




• Molecule 5: TCR beta chain

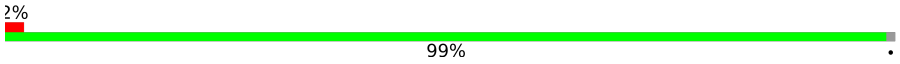
Chain n:





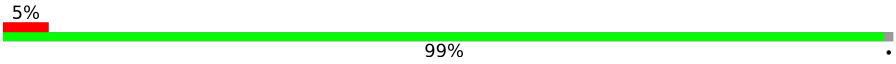
• Molecule 5: TCR beta chain

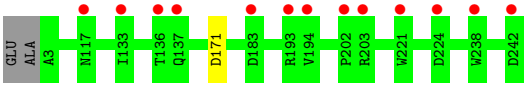
Chain s:



• Molecule 5: TCR beta chain

Chain x:





4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α, β, γ	156.86Å 156.89Å 191.97Å 77.37° 78.13° 82.27°	Depositor
Resolution (Å)	49.82 – 3.34 49.82 – 3.34	Depositor EDS
% Data completeness (in resolution range)	92.3 (49.82-3.34) 92.3 (49.82-3.34)	Depositor EDS
R_{merge}	0.20	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.90 (at 3.33Å)	Xtriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, R_{free}	0.224 , 0.258 0.226 , 0.259	Depositor DCC
R_{free} test set	11615 reflections (4.98%)	wwPDB-VP
Wilson B-factor (Å^2)	79.1	Xtriage
Anisotropy	0.049	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.30 , 48.8	EDS
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.30$	Xtriage
Estimated twinning fraction	0.035 for -k,-h,-l	Xtriage
F_o,F_c correlation	0.88	EDS
Total number of atoms	65732	wwPDB-VP
Average B, all atoms (Å^2)	88.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.91% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ 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

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	0.23	0/2298	0.50	0/3120
1	F	0.23	0/2298	0.50	0/3120
1	K	0.23	0/2298	0.50	0/3120
1	P	0.23	0/2298	0.50	0/3120
1	U	0.23	0/2298	0.50	0/3120
1	Z	0.23	0/2298	0.50	0/3120
1	e	0.23	0/2298	0.50	0/3120
1	j	0.23	0/2298	0.50	0/3120
1	o	0.23	0/2298	0.50	0/3120
1	t	0.23	0/2298	0.50	0/3120
2	B	0.24	0/851	0.50	0/1152
2	G	0.24	0/851	0.49	0/1152
2	L	0.24	0/851	0.50	0/1152
2	Q	0.24	0/851	0.50	0/1152
2	V	0.24	0/851	0.49	0/1152
2	a	0.24	0/851	0.48	0/1152
2	f	0.24	0/851	0.49	0/1152
2	k	0.25	0/851	0.47	0/1152
2	p	0.24	0/851	0.46	0/1152
2	u	0.24	0/843	0.46	0/1142
3	C	0.25	0/54	0.37	0/70
3	H	0.30	0/54	0.42	0/70
3	M	0.29	0/54	0.46	0/70
3	R	0.27	0/54	0.46	0/70
3	W	0.28	0/54	0.41	0/70
3	b	0.26	0/54	0.37	0/70
3	g	0.28	0/54	0.44	0/70
3	l	0.28	0/54	0.44	0/70
3	q	0.23	0/54	0.35	0/70
3	v	0.28	0/54	0.44	0/70
4	D	0.25	0/1598	0.46	0/2163
4	I	0.25	0/1598	0.47	0/2163
4	N	0.25	0/1598	0.47	0/2163
4	S	0.24	0/1598	0.46	0/2163

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\#\|Z\| > 5$	RMSZ	$\#\|Z\| > 5$
4	X	0.25	0/1598	0.46	0/2163
4	c	0.24	0/1598	0.46	0/2163
4	h	0.24	0/1598	0.46	0/2163
4	m	0.24	0/1598	0.46	0/2163
4	r	0.25	0/1598	0.47	0/2163
4	w	0.25	0/1598	0.47	0/2163
5	E	0.24	0/1944	0.47	0/2650
5	J	0.24	0/1944	0.48	0/2650
5	O	0.24	0/1944	0.47	0/2650
5	T	0.24	0/1944	0.48	0/2650
5	Y	0.25	0/1944	0.47	0/2650
5	d	0.24	0/1944	0.47	0/2650
5	i	0.24	0/1944	0.47	0/2650
5	n	0.24	0/1944	0.48	0/2650
5	s	0.24	0/1944	0.47	0/2650
5	x	0.24	0/1944	0.47	0/2650
All	All	0.24	0/67442	0.48	0/91540

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)

Due to software issues we are unable to calculate clashes - this section is therefore empty.

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	272/274 (99%)	270 (99%)	2 (1%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	F	272/274 (99%)	271 (100%)	1 (0%)	0	100	100
1	K	272/274 (99%)	271 (100%)	1 (0%)	0	100	100
1	P	272/274 (99%)	270 (99%)	2 (1%)	0	100	100
1	U	272/274 (99%)	269 (99%)	3 (1%)	0	100	100
1	Z	272/274 (99%)	271 (100%)	1 (0%)	0	100	100
1	e	272/274 (99%)	269 (99%)	3 (1%)	0	100	100
1	j	272/274 (99%)	269 (99%)	3 (1%)	0	100	100
1	o	272/274 (99%)	269 (99%)	3 (1%)	0	100	100
1	t	272/274 (99%)	269 (99%)	3 (1%)	0	100	100
2	B	97/99 (98%)	94 (97%)	3 (3%)	0	100	100
2	G	97/99 (98%)	96 (99%)	1 (1%)	0	100	100
2	L	97/99 (98%)	97 (100%)	0	0	100	100
2	Q	97/99 (98%)	95 (98%)	2 (2%)	0	100	100
2	V	97/99 (98%)	95 (98%)	2 (2%)	0	100	100
2	a	97/99 (98%)	95 (98%)	2 (2%)	0	100	100
2	f	97/99 (98%)	95 (98%)	2 (2%)	0	100	100
2	k	97/99 (98%)	96 (99%)	1 (1%)	0	100	100
2	p	97/99 (98%)	95 (98%)	2 (2%)	0	100	100
2	u	96/99 (97%)	92 (96%)	4 (4%)	0	100	100
3	C	7/9 (78%)	7 (100%)	0	0	100	100
3	H	7/9 (78%)	7 (100%)	0	0	100	100
3	M	7/9 (78%)	5 (71%)	2 (29%)	0	100	100
3	R	7/9 (78%)	5 (71%)	2 (29%)	0	100	100
3	W	7/9 (78%)	7 (100%)	0	0	100	100
3	b	7/9 (78%)	5 (71%)	2 (29%)	0	100	100
3	g	7/9 (78%)	6 (86%)	1 (14%)	0	100	100
3	l	7/9 (78%)	5 (71%)	2 (29%)	0	100	100
3	q	7/9 (78%)	7 (100%)	0	0	100	100
3	v	7/9 (78%)	7 (100%)	0	0	100	100
4	D	196/199 (98%)	193 (98%)	3 (2%)	0	100	100
4	I	196/199 (98%)	193 (98%)	3 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
4	N	196/199 (98%)	192 (98%)	4 (2%)	0	100	100
4	S	196/199 (98%)	190 (97%)	6 (3%)	0	100	100
4	X	196/199 (98%)	194 (99%)	2 (1%)	0	100	100
4	c	196/199 (98%)	194 (99%)	2 (1%)	0	100	100
4	h	196/199 (98%)	193 (98%)	3 (2%)	0	100	100
4	m	196/199 (98%)	193 (98%)	3 (2%)	0	100	100
4	r	196/199 (98%)	192 (98%)	4 (2%)	0	100	100
4	w	196/199 (98%)	192 (98%)	4 (2%)	0	100	100
5	E	238/242 (98%)	237 (100%)	1 (0%)	0	100	100
5	J	238/242 (98%)	234 (98%)	4 (2%)	0	100	100
5	O	238/242 (98%)	236 (99%)	2 (1%)	0	100	100
5	T	238/242 (98%)	233 (98%)	5 (2%)	0	100	100
5	Y	238/242 (98%)	236 (99%)	2 (1%)	0	100	100
5	d	238/242 (98%)	236 (99%)	2 (1%)	0	100	100
5	i	238/242 (98%)	237 (100%)	1 (0%)	0	100	100
5	n	238/242 (98%)	233 (98%)	5 (2%)	0	100	100
5	s	238/242 (98%)	235 (99%)	3 (1%)	0	100	100
5	x	238/242 (98%)	233 (98%)	5 (2%)	0	100	100
All	All	8099/8230 (98%)	7985 (99%)	114 (1%)	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	232/232 (100%)	230 (99%)	2 (1%)	78	88
1	F	232/232 (100%)	230 (99%)	2 (1%)	78	88
1	K	232/232 (100%)	230 (99%)	2 (1%)	78	88

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	P	232/232 (100%)	230 (99%)	2 (1%)	78	88
1	U	232/232 (100%)	230 (99%)	2 (1%)	78	88
1	Z	232/232 (100%)	229 (99%)	3 (1%)	69	83
1	e	232/232 (100%)	230 (99%)	2 (1%)	78	88
1	j	232/232 (100%)	230 (99%)	2 (1%)	78	88
1	o	232/232 (100%)	230 (99%)	2 (1%)	78	88
1	t	232/232 (100%)	229 (99%)	3 (1%)	69	83
2	B	94/94 (100%)	94 (100%)	0	100	100
2	G	94/94 (100%)	94 (100%)	0	100	100
2	L	94/94 (100%)	94 (100%)	0	100	100
2	Q	94/94 (100%)	94 (100%)	0	100	100
2	V	94/94 (100%)	94 (100%)	0	100	100
2	a	94/94 (100%)	94 (100%)	0	100	100
2	f	94/94 (100%)	94 (100%)	0	100	100
2	k	94/94 (100%)	94 (100%)	0	100	100
2	p	94/94 (100%)	94 (100%)	0	100	100
2	u	93/94 (99%)	93 (100%)	0	100	100
3	C	5/5 (100%)	5 (100%)	0	100	100
3	H	5/5 (100%)	5 (100%)	0	100	100
3	M	5/5 (100%)	5 (100%)	0	100	100
3	R	5/5 (100%)	5 (100%)	0	100	100
3	W	5/5 (100%)	5 (100%)	0	100	100
3	b	5/5 (100%)	5 (100%)	0	100	100
3	g	5/5 (100%)	5 (100%)	0	100	100
3	l	5/5 (100%)	5 (100%)	0	100	100
3	q	5/5 (100%)	5 (100%)	0	100	100
3	v	5/5 (100%)	5 (100%)	0	100	100
4	D	180/181 (99%)	179 (99%)	1 (1%)	86	92
4	I	180/181 (99%)	180 (100%)	0	100	100
4	N	180/181 (99%)	180 (100%)	0	100	100
4	S	180/181 (99%)	179 (99%)	1 (1%)	86	92

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
4	X	180/181 (99%)	180 (100%)	0	100	100
4	c	180/181 (99%)	178 (99%)	2 (1%)	73	86
4	h	180/181 (99%)	179 (99%)	1 (1%)	86	92
4	m	180/181 (99%)	179 (99%)	1 (1%)	86	92
4	r	180/181 (99%)	180 (100%)	0	100	100
4	w	180/181 (99%)	178 (99%)	2 (1%)	73	86
5	E	205/206 (100%)	204 (100%)	1 (0%)	88	93
5	J	205/206 (100%)	204 (100%)	1 (0%)	88	93
5	O	205/206 (100%)	204 (100%)	1 (0%)	88	93
5	T	205/206 (100%)	204 (100%)	1 (0%)	88	93
5	Y	205/206 (100%)	205 (100%)	0	100	100
5	d	205/206 (100%)	204 (100%)	1 (0%)	88	93
5	i	205/206 (100%)	204 (100%)	1 (0%)	88	93
5	n	205/206 (100%)	204 (100%)	1 (0%)	88	93
5	s	205/206 (100%)	205 (100%)	0	100	100
5	x	205/206 (100%)	204 (100%)	1 (0%)	88	93
All	All	7159/7180 (100%)	7121 (100%)	38 (0%)	88	93

5 of 38 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
4	m	32	TYR
4	w	32	TYR
5	n	169	CYS
1	t	32	GLN
5	x	171	ASP

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

There are no monosaccharides in this entry.

5.6 Ligand geometry

There are no ligands in this entry.

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

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^{th} 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	274/274 (100%)	-0.04	1 (0%) 92 94	38, 61, 98, 129	0
1	F	274/274 (100%)	0.01	2 (0%) 87 90	46, 66, 101, 127	0
1	K	274/274 (100%)	0.05	0 100 100	41, 68, 105, 130	0
1	P	274/274 (100%)	-0.02	0 100 100	39, 61, 100, 136	0
1	U	274/274 (100%)	0.13	5 (1%) 68 67	42, 71, 113, 151	0
1	Z	274/274 (100%)	0.18	6 (2%) 62 61	50, 73, 108, 155	0
1	e	274/274 (100%)	0.21	5 (1%) 68 67	49, 80, 110, 128	0
1	j	274/274 (100%)	0.11	6 (2%) 62 61	50, 75, 111, 142	0
1	o	274/274 (100%)	0.62	31 (11%) 5 5	48, 83, 175, 197	0
1	t	274/274 (100%)	0.71	45 (16%) 1 1	52, 91, 175, 192	0
2	B	99/99 (100%)	-0.13	0 100 100	45, 66, 97, 122	0
2	G	99/99 (100%)	0.08	0 100 100	54, 76, 111, 126	0
2	L	99/99 (100%)	0.07	2 (2%) 65 64	50, 77, 109, 120	0
2	Q	99/99 (100%)	-0.08	0 100 100	44, 65, 97, 120	0
2	V	99/99 (100%)	0.20	1 (1%) 82 83	59, 87, 116, 132	0
2	a	99/99 (100%)	0.18	1 (1%) 82 83	59, 82, 111, 120	0
2	f	99/99 (100%)	0.62	8 (8%) 12 12	63, 102, 142, 148	0
2	k	99/99 (100%)	0.18	2 (2%) 65 64	62, 86, 111, 138	0
2	p	99/99 (100%)	0.27	5 (5%) 28 28	64, 96, 136, 143	0
2	u	98/99 (98%)	0.58	7 (7%) 16 17	67, 108, 133, 153	0
3	C	9/9 (100%)	0.11	0 100 100	47, 52, 58, 66	0
3	H	9/9 (100%)	0.24	0 100 100	54, 60, 64, 64	0
3	M	9/9 (100%)	0.27	0 100 100	47, 58, 66, 69	0
3	R	9/9 (100%)	0.30	0 100 100	41, 55, 58, 69	0

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Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å^2)	Q<0.9
3	W	9/9 (100%)	0.31	0 100 100	52, 60, 65, 69	0
3	b	9/9 (100%)	0.47	0 100 100	52, 67, 70, 74	0
3	g	9/9 (100%)	0.35	0 100 100	59, 69, 80, 81	0
3	l	9/9 (100%)	0.39	0 100 100	58, 67, 73, 80	0
3	q	9/9 (100%)	0.35	0 100 100	58, 60, 62, 63	0
3	v	9/9 (100%)	0.64	0 100 100	62, 74, 78, 95	0
4	D	198/199 (99%)	0.50	22 (11%) 5 5	42, 81, 160, 177	0
4	I	198/199 (99%)	0.29	10 (5%) 28 28	41, 78, 144, 176	0
4	N	198/199 (99%)	0.30	11 (5%) 24 25	36, 77, 143, 187	0
4	S	198/199 (99%)	0.38	13 (6%) 18 19	43, 79, 154, 174	0
4	X	198/199 (99%)	0.76	28 (14%) 2 2	46, 86, 169, 190	0
4	c	198/199 (99%)	0.74	28 (14%) 2 2	48, 92, 177, 198	0
4	h	198/199 (99%)	0.85	32 (16%) 1 1	56, 92, 176, 196	0
4	m	198/199 (99%)	0.80	28 (14%) 2 2	49, 93, 164, 196	0
4	r	198/199 (99%)	0.53	14 (7%) 16 17	44, 86, 151, 197	0
4	w	198/199 (99%)	0.57	18 (9%) 9 9	45, 85, 161, 195	0
5	E	240/242 (99%)	0.10	4 (1%) 70 69	47, 74, 117, 143	0
5	J	240/242 (99%)	0.07	1 (0%) 92 94	41, 65, 114, 136	0
5	O	240/242 (99%)	0.08	2 (0%) 86 87	41, 66, 113, 135	0
5	T	240/242 (99%)	0.12	3 (1%) 77 78	43, 73, 118, 155	0
5	Y	240/242 (99%)	0.36	13 (5%) 25 26	47, 93, 145, 182	0
5	d	240/242 (99%)	0.92	47 (19%) 1 1	56, 131, 176, 190	0
5	i	240/242 (99%)	1.02	50 (20%) 1 1	66, 136, 181, 198	0
5	n	240/242 (99%)	0.44	13 (5%) 25 26	46, 94, 151, 186	0
5	s	240/242 (99%)	0.11	6 (2%) 57 56	48, 78, 125, 151	0
5	x	240/242 (99%)	0.44	13 (5%) 25 26	54, 98, 147, 180	0
All	All	8199/8230 (99%)	0.34	483 (5%) 22 23	36, 79, 156, 198	0

The worst 5 of 483 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
4	r	129	ASP	9.3
4	r	128	SER	8.4

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Mol	Chain	Res	Type	RSRZ
4	w	128	SER	8.0
1	o	258	THR	8.0
4	h	128	SER	7.7

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.