



# Full wwPDB X-ray Structure Validation Report ⓘ

Jan 30, 2023 – 01:24 pm GMT

PDB ID : 7PA6  
Title : JC polyomavirus VP1 in complex with scFv 27C11  
Authors : Harprecht, C.; Stroeh, L.J.; Nagel, F.; Freytag, J.; Stehle, T.  
Deposited on : 2021-07-29  
Resolution : 1.90 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity : 4.02b-467  
Xtriage (Phenix) : 1.13  
EDS : 2.31.3  
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) : 2.31.3

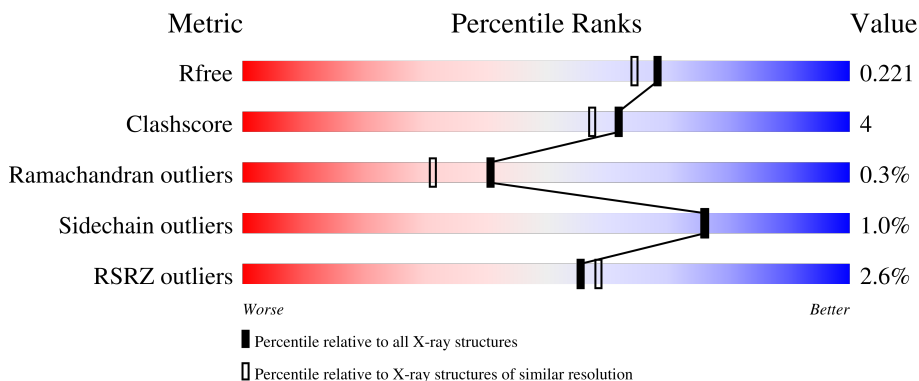
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.90 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.



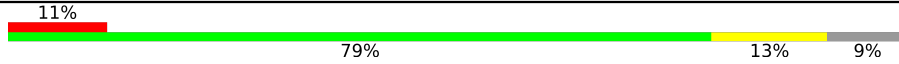
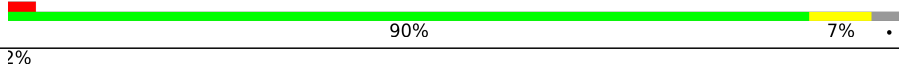
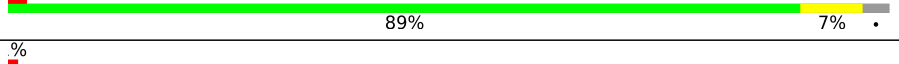
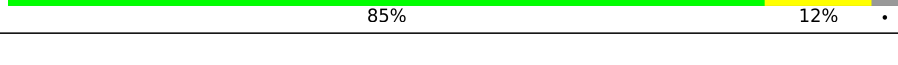

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	130704	6207 (1.90-1.90)
Clashscore	141614	6847 (1.90-1.90)
Ramachandran outliers	138981	6760 (1.90-1.90)
Sidechain outliers	138945	6760 (1.90-1.90)
RSRZ outliers	127900	6082 (1.90-1.90)

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	KKK	253	
1	LLL	253	
1	MMM	253	
1	NNN	253	
1	OOO	253	

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Mol	Chain	Length	Quality of chain
1	PPP	253	 11% 79% 13% 9%
1	QQQ	253	 2% 75% 16% 8%
1	RRR	253	 % 78% 15% 7%
1	SSS	253	 82% 12% 6%
1	TTT	253	 85% 8% 6%
2	AAA	272	 3% 87% 12% 8%
2	BBB	272	 % 88% 8% 6%
2	CCC	272	 2% 88% 9% 1%
2	DDD	272	 2% 88% 8% 2%
2	EEE	272	 2% 89% 7% 1%
2	FFF	272	 % 92% 6% 2%
2	GGG	272	 3% 89% 7% 1%
2	HHH	272	 3% 90% 7% 0%
2	III	272	 2% 89% 7% 1%
2	JJJ	272	 % 85% 12% 3%

## 2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 40319 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 scFv 27C11 antibody heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	KKK	238	Total 1805	C 1142	N 302	O 354	S 7	0	0	0
1	LLL	238	Total 1795	C 1136	N 300	O 352	S 7	0	0	0
1	MMM	230	Total 1690	C 1064	N 285	O 334	S 7	0	0	0
1	NNN	231	Total 1753	C 1105	N 297	O 344	S 7	0	1	0
1	OOO	235	Total 1772	C 1124	N 298	O 343	S 7	0	1	0
1	PPP	231	Total 1710	C 1074	N 287	O 343	S 6	0	1	0
1	QQQ	232	Total 1758	C 1109	N 297	O 346	S 6	0	1	0
1	RRR	236	Total 1774	C 1119	N 299	O 349	S 7	0	0	0
1	SSS	237	Total 1786	C 1129	N 296	O 354	S 7	0	0	0
1	TTT	238	Total 1775	C 1121	N 299	O 348	S 7	0	0	0

- Molecule 2 is a protein called Major capsid protein VP1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	AAA	268	Total 2071	C 1302	N 356	O 401	S 12	0	2	0
2	BBB	261	Total 2030	C 1279	N 350	O 390	S 11	0	1	0
2	CCC	264	Total 2067	C 1304	N 357	O 394	S 12	0	4	0
2	DDD	262	Total 2032	C 1282	N 350	O 389	S 11	0	2	0

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	EEE	261	Total	C	N	O	S	0	3	0
			2049	1290	354	394	11			
2	FFF	260	Total	C	N	O	S	0	4	0
			2026	1277	347	391	11			
2	GGG	261	Total	C	N	O	S	0	3	0
			2046	1291	352	392	11			
2	HHH	262	Total	C	N	O	S	0	5	0
			2058	1301	354	392	11			
2	III	263	Total	C	N	O	S	0	1	0
			2027	1275	350	391	11			
2	JJJ	264	Total	C	N	O	S	0	2	0
			2046	1288	355	391	12			

There are 40 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
AAA	18	GLY	-	expression tag	UNP P03089
AAA	19	SER	-	expression tag	UNP P03089
AAA	20	HIS	-	expression tag	UNP P03089
AAA	21	MET	-	expression tag	UNP P03089
BBB	18	GLY	-	expression tag	UNP P03089
BBB	19	SER	-	expression tag	UNP P03089
BBB	20	HIS	-	expression tag	UNP P03089
BBB	21	MET	-	expression tag	UNP P03089
CCC	18	GLY	-	expression tag	UNP P03089
CCC	19	SER	-	expression tag	UNP P03089
CCC	20	HIS	-	expression tag	UNP P03089
CCC	21	MET	-	expression tag	UNP P03089
DDD	18	GLY	-	expression tag	UNP P03089
DDD	19	SER	-	expression tag	UNP P03089
DDD	20	HIS	-	expression tag	UNP P03089
DDD	21	MET	-	expression tag	UNP P03089
EEE	18	GLY	-	expression tag	UNP P03089
EEE	19	SER	-	expression tag	UNP P03089
EEE	20	HIS	-	expression tag	UNP P03089
EEE	21	MET	-	expression tag	UNP P03089
FFF	18	GLY	-	expression tag	UNP P03089
FFF	19	SER	-	expression tag	UNP P03089
FFF	20	HIS	-	expression tag	UNP P03089
FFF	21	MET	-	expression tag	UNP P03089
GGG	18	GLY	-	expression tag	UNP P03089
GGG	19	SER	-	expression tag	UNP P03089
GGG	20	HIS	-	expression tag	UNP P03089

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Chain	Residue	Modelled	Actual	Comment	Reference
GGG	21	MET	-	expression tag	UNP P03089
HHH	18	GLY	-	expression tag	UNP P03089
HHH	19	SER	-	expression tag	UNP P03089
HHH	20	HIS	-	expression tag	UNP P03089
HHH	21	MET	-	expression tag	UNP P03089
III	18	GLY	-	expression tag	UNP P03089
III	19	SER	-	expression tag	UNP P03089
III	20	HIS	-	expression tag	UNP P03089
III	21	MET	-	expression tag	UNP P03089
JJJ	18	GLY	-	expression tag	UNP P03089
JJJ	19	SER	-	expression tag	UNP P03089
JJJ	20	HIS	-	expression tag	UNP P03089
JJJ	21	MET	-	expression tag	UNP P03089

- Molecule 3 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	KKK	112	Total O 112 112	0	0
3	LLL	90	Total O 90 90	0	0
3	MMM	33	Total O 33 33	0	0
3	NNN	85	Total O 85 85	0	0
3	OOO	83	Total O 83 83	0	0
3	PPP	37	Total O 37 37	0	0
3	QQQ	66	Total O 66 66	0	0
3	RRR	106	Total O 106 106	0	0
3	SSS	121	Total O 121 121	0	0
3	TTT	105	Total O 105 105	0	0
3	AAA	144	Total O 144 144	0	0
3	BBB	134	Total O 134 134	0	0
3	CCC	136	Total O 136 136	0	0

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<b>Mol</b>	<b>Chain</b>	<b>Residues</b>	<b>Atoms</b>		<b>ZeroOcc</b>	<b>AltConf</b>
3	DDD	142	Total 142	O 142	0	0
3	EEE	145	Total 145	O 145	0	0
3	FFF	138	Total 138	O 138	0	0
3	GGG	140	Total 140	O 140	0	0
3	HHH	143	Total 143	O 143	0	0
3	III	150	Total 150	O 150	0	0
3	JJJ	139	Total 139	O 139	0	0

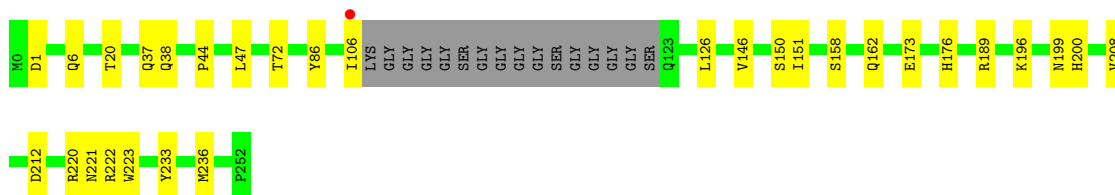






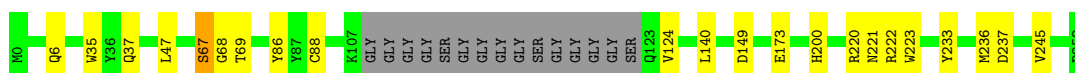
- Molecule 1: scFv 27C11 antibody heavy chain

Chain SSS:  82% 12% 6%




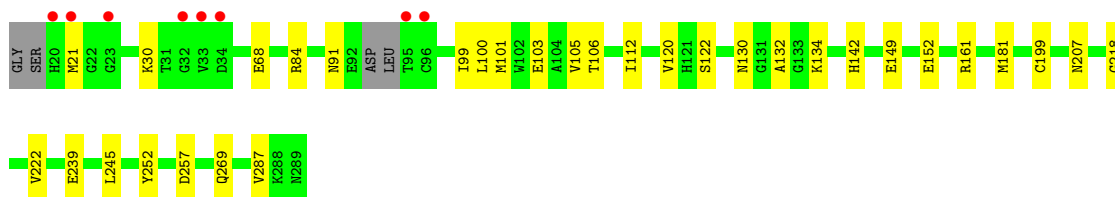
- Molecule 1: scFv 27C11 antibody heavy chain

Chain TTT:  85% 8% 6%

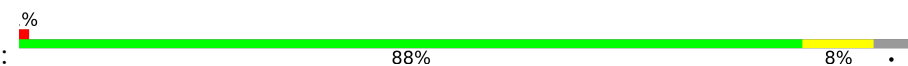


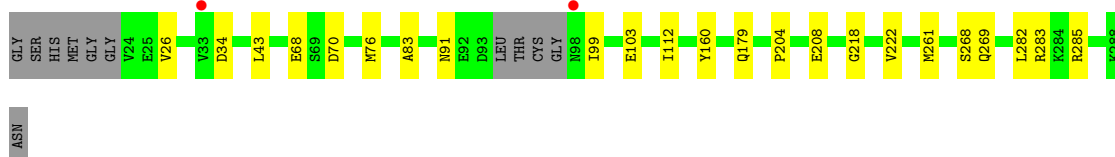
- Molecule 2: Major capsid protein VP1

Chain AAA:  3% 87% 12%

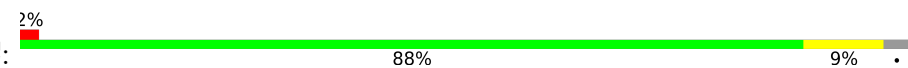


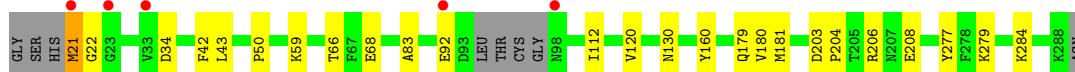
- Molecule 2: Major capsid protein VP1

Chain BBB:  0% 88% 8%

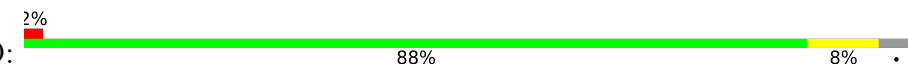


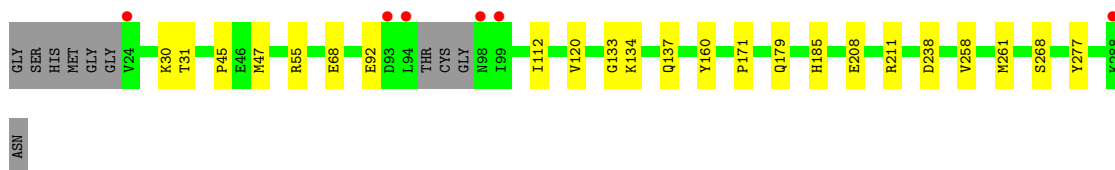
- Molecule 2: Major capsid protein VP1

Chain CCC:  2% 88% 9%

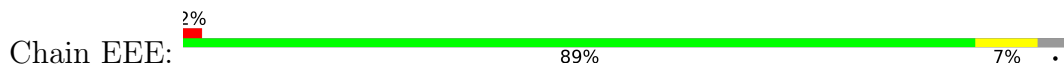


- Molecule 2: Major capsid protein VP1

Chain DDD:  2% 88% 8%



- Molecule 2: Major capsid protein VP1



- Molecule 2: Major capsid protein VP1



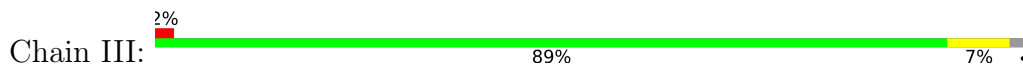
- Molecule 2: Major capsid protein VP1



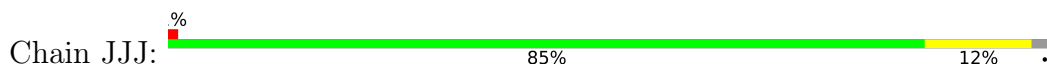
- Molecule 2: Major capsid protein VP1

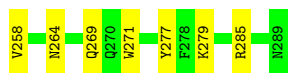


- Molecule 2: Major capsid protein VP1



- Molecule 2: Major capsid protein VP1





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	96.09Å 96.11Å 190.41Å 100.91° 93.01° 113.83°	Depositor
Resolution (Å)	47.81 – 1.90 47.76 – 1.90	Depositor EDS
% Data completeness (in resolution range)	97.6 (47.81-1.90) 97.6 (47.76-1.90)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.00 (at 1.90Å)	Xtrriage
Refinement program	REFMAC 5.8.0258	Depositor
R, $R_{free}$	0.183 , 0.216 0.189 , 0.221	Depositor DCC
$R_{free}$ test set	23290 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	29.7	Xtrriage
Anisotropy	0.087	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.32 , 45.6	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	40319	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	39.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.65% of the height of the origin peak. No significant pseudotranslation is detected.*

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

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 5$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
1	KKK	0.59	0/1851	0.71	0/2518
1	LLL	0.56	0/1840	0.68	0/2504
1	MMM	0.55	0/1733	0.63	0/2368
1	NNN	0.55	0/1801	0.68	0/2454
1	OOO	0.56	0/1821	0.67	0/2479
1	PPP	0.55	0/1753	0.65	0/2395
1	QQQ	0.55	0/1806	0.65	0/2461
1	RRR	0.58	0/1819	0.70	0/2478
1	SSS	0.57	0/1832	0.68	0/2496
1	TTT	0.58	0/1820	0.66	0/2481
2	AAA	0.59	0/2122	0.73	0/2881
2	BBB	0.58	0/2078	0.72	0/2824
2	CCC	0.58	0/2126	0.73	0/2886
2	DDD	0.59	0/2083	0.77	0/2832
2	EEE	0.59	0/2104	0.76	0/2859
2	FFF	0.58	0/2084	0.72	0/2835
2	GGG	0.59	0/2101	0.72	0/2855
2	HHH	0.61	0/2120	0.75	0/2881
2	III	0.58	0/2075	0.76	0/2821
2	JJJ	0.58	0/2098	0.76	0/2849
All	All	0.58	0/39067	0.71	0/53157

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	KKK	1805	0	1720	15	0
1	LLL	1795	0	1704	12	0
1	MMM	1690	0	1530	28	0
1	NNN	1753	0	1648	15	0
1	OOO	1772	0	1672	17	0
1	PPP	1710	0	1545	20	0
1	QQQ	1758	0	1654	29	0
1	RRR	1774	0	1661	21	0
1	SSS	1786	0	1677	20	0
1	TTT	1775	0	1653	10	0
2	AAA	2071	0	1999	23	0
2	BBB	2030	0	1978	19	0
2	CCC	2067	0	2007	18	0
2	DDD	2032	0	1973	18	0
2	EEE	2049	0	1995	16	0
2	FFF	2026	0	1949	10	0
2	GGG	2046	0	2000	18	0
2	HHH	2058	0	2006	13	0
2	III	2027	0	1948	16	0
2	JJJ	2046	0	1978	30	0
3	AAA	144	0	0	2	0
3	BBB	134	0	0	1	0
3	CCC	136	0	0	0	0
3	DDD	142	0	0	0	0
3	EEE	145	0	0	0	0
3	FFF	138	0	0	0	0
3	GGG	140	0	0	1	0
3	HHH	143	0	0	1	0
3	III	150	0	0	0	0
3	JJJ	139	0	0	1	0
3	KKK	112	0	0	0	0
3	LLL	90	0	0	0	0
3	MMM	33	0	0	0	0
3	NNN	85	0	0	0	0
3	OOO	83	0	0	0	0
3	PPP	37	0	0	0	0
3	QQQ	66	0	0	0	0
3	RRR	106	0	0	0	0
3	SSS	121	0	0	0	0
3	TTT	105	0	0	0	0
All	All	40319	0	36297	330	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.

All (330) 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:CCC:160:TYR:H	2:CCC:179:GLN:HE21	1.11	0.98
2:DDD:160:TYR:H	2:DDD:179:GLN:HE21	1.10	0.97
2:BBB:160:TYR:H	2:BBB:179:GLN:HE21	1.13	0.96
2:III:160:TYR:H	2:III:179:GLN:HE21	1.14	0.95
2:GGG:160:TYR:H	2:GGG:179:GLN:HE21	1.17	0.92
2:FFF:160:TYR:H	2:FFF:179:GLN:HE21	1.15	0.92
2:EEE:160:TYR:H	2:EEE:179:GLN:HE21	1.19	0.91
2:AAA:132:ALA:H	2:BBB:269:GLN:HE21	1.20	0.88
2:GGG:132:ALA:H	2:HHH:269:GLN:HE21	1.20	0.87
2:III:132:ALA:H	2:JJJ:269:GLN:HE21	1.21	0.86
2:HHH:209:ASN:HD21	2:HHH:245:LEU:H	1.21	0.86
1:QQQ:213:THR:HG22	1:QQQ:247:VAL:H	1.41	0.86
2:FFF:132:ALA:H	2:GGG:269:GLN:HE21	1.24	0.86
1:PPP:213:THR:HG22	1:PPP:247:VAL:H	1.44	0.82
2:HHH:152:GLU:H	2:HHH:207:ASN:HD21	1.27	0.82
2:AAA:269:GLN:HE21	2:EEE:132:ALA:H	1.26	0.81
2:JJJ:152:GLU:H	2:JJJ:207:ASN:HD21	1.29	0.80
2:AAA:152:GLU:H	2:AAA:207:ASN:HD21	1.28	0.78
1:OOO:213:THR:HG22	1:OOO:247:VAL:H	1.48	0.78
1:MMM:213:THR:HG23	1:MMM:247:VAL:HG12	1.63	0.78
1:RRR:151:ILE:H	1:RRR:199:ASN:HD21	1.32	0.77
1:SSS:38:GLN:HE22	1:SSS:162:GLN:HE22	1.33	0.76
1:MMM:128:GLU:HG2	1:MMM:218:CYS:SG	2.27	0.75
1:LLL:60:SER:OG	1:MMM:189:ARG:HD3	1.86	0.74
1:RRR:60:SER:HB2	1:SSS:189:ARG:HG2	1.70	0.74
2:JJJ:112:ILE:HD11	2:JJJ:277:TYR:HB2	1.70	0.74
1:KKK:39:LYS:NZ	1:KKK:81:GLU:O	2.20	0.72
2:JJJ:47:MET:CE	2:JJJ:271:TRP:HB3	2.19	0.72
1:MMM:6:GLN:HE22	1:MMM:87:TYR:HA	1.54	0.71
1:TTT:173:GLU:OE2	1:TTT:221:ASN:ND2	2.20	0.71
1:OOO:67:SER:O	1:OOO:69:THR:N	2.23	0.70
2:AAA:134:LYS:NZ	3:AAA:301:HOH:O	2.24	0.70
2:III:103:GLU:OE2	2:III:283:ARG:NE	2.23	0.69
1:KKK:173:GLU:OE2	1:KKK:221:ASN:ND2	2.24	0.69
2:CCC:34:ASP:O	2:CCC:284:LYS:NZ	2.26	0.68
1:NNN:60:SER:HB2	1:OOO:189:ARG:HD3	1.75	0.68
1:QQQ:151:ILE:H	1:QQQ:199:ASN:HD21	1.40	0.67

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:RRR:140:LEU:HD13	1:RRR:245:VAL:HG11	1.76	0.66
1:LLL:151:ILE:H	1:LLL:199:ASN:HD21	1.44	0.66
1:PPP:39:LYS:HD3	1:PPP:84:ALA:HB2	1.79	0.65
1:PPP:24:ARG:HH21	1:PPP:24:ARG:HB3	1.63	0.64
2:EEE:91:ASN:O	2:EEE:92:GLU:HG3	1.97	0.64
1:QQQ:78:LEU:HD11	1:QQQ:104:LEU:HD21	1.80	0.63
1:LLL:179:GLY:HA3	2:BBB:68:GLU:OE2	1.99	0.63
2:JJJ:178:SER:OG	2:JJJ:185:HIS:HE1	1.82	0.62
2:BBB:76:MET:HE3	3:BBB:390:HOH:O	1.99	0.62
2:CCC:112:ILE:HD11	2:CCC:277:TYR:HB2	1.80	0.62
2:III:27:LEU:HG	2:III:286:ARG:NH2	2.14	0.62
2:GGG:178:SER:OG	2:GGG:185:HIS:HE1	1.83	0.62
1:MMM:213:THR:HG22	1:MMM:246:THR:HA	1.82	0.61
1:OOO:213:THR:CG2	1:OOO:247:VAL:H	2.13	0.61
1:PPP:140:LEU:HD13	1:PPP:245:VAL:HG11	1.81	0.61
1:KKK:11:LEU:HD23	1:KKK:104:LEU:HD13	1.83	0.60
2:HHH:112:ILE:HG21	2:III:181:MET:HE3	1.83	0.60
1:NNN:163:PRO:HG2	1:NNN:166:LYS:HB2	1.83	0.60
1:KKK:6:GLN:NE2	1:KKK:86:TYR:O	2.32	0.59
1:SSS:6:GLN:NE2	1:SSS:86:TYR:O	2.35	0.59
1:RRR:222:ARG:HD3	1:RRR:237:ASP:OD2	2.02	0.59
1:SSS:151:ILE:H	1:SSS:199:ASN:HD21	1.50	0.59
1:LLL:124:VAL:HG22	1:LLL:149:ASP:HB2	1.84	0.59
1:NNN:151:ILE:H	1:NNN:199:ASN:HD21	1.50	0.59
1:SSS:173:GLU:OE2	1:SSS:221:ASN:ND2	2.32	0.59
2:FFF:181:MET:HE1	2:JJJ:112:ILE:HG21	1.85	0.58
2:AAA:142:HIS:HD2	2:AAA:257:ASP:OD1	1.86	0.58
2:AAA:181:MET:HE1	2:EEE:112:ILE:HG21	1.86	0.58
2:JJJ:277:TYR:OH	2:JJJ:279:LYS:HE3	2.03	0.58
1:RRR:6:GLN:NE2	1:RRR:86:TYR:O	2.35	0.58
2:JJJ:47:MET:HE3	2:JJJ:271:TRP:HB3	1.84	0.58
1:OOO:170:TRP:HZ2	1:OOO:173:GLU:HG3	1.69	0.58
1:QQQ:67:SER:O	1:QQQ:69:THR:N	2.36	0.58
2:III:27:LEU:HG	2:III:286:ARG:HH21	1.67	0.58
1:QQQ:173:GLU:OE2	1:QQQ:221:ASN:ND2	2.26	0.58
1:MMM:213:THR:HG22	1:MMM:247:VAL:H	1.69	0.58
1:RRR:79:GLN:HG2	1:RRR:80:PRO:HD2	1.86	0.57
1:QQQ:151:ILE:H	1:QQQ:199:ASN:ND2	2.01	0.57
1:TTT:37:GLN:HB3	1:TTT:47:LEU:HD11	1.86	0.57
2:EEE:208:GLU:H	2:EEE:208:GLU:CD	2.07	0.57
1:QQQ:213:THR:CG2	1:QQQ:247:VAL:H	2.13	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:RRR:173:GLU:OE2	1:RRR:221:ASN:ND2	2.24	0.57
1:PPP:179:GLY:HA3	2:FFF:68[A]:GLU:OE1	2.05	0.56
1:RRR:151:ILE:H	1:RRR:199:ASN:ND2	2.00	0.56
1:TTT:222:ARG:HD3	1:TTT:237:ASP:OD2	2.05	0.56
1:LLL:37:GLN:HB2	1:LLL:47:LEU:HD11	1.88	0.56
1:SSS:37:GLN:HB2	1:SSS:47:LEU:HD11	1.88	0.56
2:CCC:160:TYR:N	2:CCC:179:GLN:HE21	1.93	0.56
1:QQQ:37:GLN:HB3	1:QQQ:47:LEU:HD11	1.87	0.55
1:MMM:209:THR:O	1:MMM:247:VAL:HG11	2.06	0.55
1:SSS:151:ILE:H	1:SSS:199:ASN:ND2	2.05	0.55
2:CCC:277:TYR:OH	2:CCC:279:LYS:HE3	2.07	0.55
2:EEE:84:ARG:NH1	2:EEE:250:ASN:OD1	2.41	0.54
1:SSS:38:GLN:HB2	1:SSS:44:PRO:HA	1.90	0.54
1:QQQ:140:LEU:HD13	1:QQQ:245:VAL:HG11	1.88	0.54
2:CCC:42[B]:PHE:HD2	2:CCC:112:ILE:HD13	1.73	0.54
2:AAA:122:SER:HB3	2:BBB:70:ASP:OD2	2.08	0.54
1:RRR:61:ARG:NH1	1:RRR:82:ASP:OD2	2.40	0.54
2:DDD:134:LYS:HE2	2:DDD:137:GLN:HE21	1.73	0.54
2:HHH:209:ASN:ND2	2:HHH:245:LEU:H	1.99	0.53
2:GGG:112:ILE:HD11	2:GGG:277:TYR:HB2	1.89	0.53
2:JJJ:160:TYR:HD1	2:JJJ:179:GLN:OE1	1.91	0.53
2:CCC:208:GLU:CD	2:CCC:208:GLU:H	2.11	0.53
2:CCC:43:LEU:HD21	2:CCC:83:ALA:HB2	1.89	0.53
2:HHH:103:GLU:OE2	2:HHH:283:ARG:NE	2.38	0.53
1:OOO:6:GLN:NE2	1:OOO:86:TYR:O	2.42	0.52
2:JJJ:120:VAL:HG22	2:JJJ:133:GLY:O	2.09	0.52
1:NNN:6:GLN:NE2	1:NNN:86:TYR:O	2.34	0.52
1:QQQ:48:ILE:HG12	1:QQQ:54:LEU:HD23	1.91	0.52
2:AAA:218:GLY:O	2:AAA:222:VAL:HG11	2.10	0.52
1:MMM:6:GLN:NE2	1:MMM:88:CYS:H	2.08	0.52
2:AAA:91:ASN:ND2	2:AAA:99:ILE:HG12	2.24	0.52
2:EEE:160:TYR:N	2:EEE:179:GLN:HE21	1.99	0.51
1:MMM:220:ARG:O	1:MMM:236:MET:HA	2.11	0.51
2:DDD:208:GLU:CD	2:DDD:208:GLU:H	2.13	0.51
2:HHH:82:VAL:O	2:HHH:192[B]:ASN:ND2	2.41	0.51
2:AAA:132:ALA:N	2:BBB:269:GLN:HE21	2.00	0.51
2:DDD:55:ARG:HB3	2:EEE:176:VAL:HG22	1.91	0.51
2:III:132:ALA:N	2:JJJ:269:GLN:HE21	1.98	0.51
1:OOO:140:LEU:HD13	1:OOO:245:VAL:HG11	1.93	0.51
2:JJJ:47:MET:HE1	2:JJJ:258:VAL:HG22	1.92	0.51
1:NNN:179:GLY:HA3	2:DDD:68:GLU:OE1	2.11	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:QQQ:227:ASN:OD1	2:GGG:59:LYS:NZ	2.44	0.50
2:III:160:TYR:N	2:III:179:GLN:HE21	1.96	0.50
2:III:239:GLU:H	2:III:239:GLU:CD	2.15	0.50
1:PPP:37:GLN:HG3	1:PPP:86:TYR:CE2	2.46	0.50
2:JJJ:82:VAL:O	2:JJJ:192:ASN:ND2	2.45	0.50
2:CCC:42[B]:PHE:HD2	2:CCC:112:ILE:CD1	2.24	0.50
1:NNN:124:VAL:HG22	1:NNN:149:ASP:HB2	1.93	0.50
1:MMM:213:THR:CG2	1:MMM:247:VAL:HG12	2.37	0.50
1:LLL:34:ASN:HD22	1:LLL:49:SER:HA	1.77	0.49
1:NNN:151:ILE:H	1:NNN:199:ASN:ND2	2.09	0.49
1:LLL:30:SER:OG	1:LLL:31:SER:N	2.45	0.49
2:DDD:120:VAL:HG23	2:DDD:133:GLY:O	2.13	0.49
2:AAA:68[A]:GLU:HG3	2:AAA:161:ARG:HD2	1.93	0.49
2:AAA:103:GLU:HB3	2:AAA:245:LEU:HD23	1.93	0.49
2:JJJ:47:MET:HE3	2:JJJ:271:TRP:CB	2.43	0.49
1:LLL:12:SER:HA	1:LLL:105:GLU:O	2.13	0.49
2:EEE:103:GLU:OE1	2:EEE:285:ARG:HD3	2.13	0.49
1:KKK:37:GLN:HB2	1:KKK:47:LEU:HD11	1.95	0.49
2:GGG:160:TYR:N	2:GGG:179:GLN:HE21	1.98	0.49
2:DDD:112:ILE:HD11	2:DDD:277:TYR:HB2	1.95	0.49
1:MMM:8:PRO:HG3	1:MMM:11:LEU:HD13	1.95	0.48
1:LLL:151:ILE:H	1:LLL:199:ASN:ND2	2.09	0.48
1:PPP:222:ARG:HD3	1:PPP:237:ASP:OD2	2.13	0.48
1:RRR:220:ARG:O	1:RRR:236:MET:HA	2.14	0.48
2:HHH:112:ILE:HG21	2:III:181:MET:CE	2.44	0.48
1:QQQ:213:THR:HG22	1:QQQ:247:VAL:N	2.18	0.48
2:DDD:120:VAL:CG2	2:DDD:133:GLY:O	2.62	0.48
2:JJJ:211:ARG:NH2	2:JJJ:238:ASP:HB3	2.28	0.48
2:JJJ:264:ASN:HB2	3:JJJ:337:HOH:O	2.13	0.48
1:RRR:124:VAL:HG22	1:RRR:149:ASP:HB2	1.95	0.48
2:HHH:163:LYS:NZ	3:HHH:302:HOH:O	2.45	0.48
2:AAA:239:GLU:CD	2:AAA:239:GLU:H	2.17	0.48
1:MMM:130:GLY:HA3	1:MMM:142:LEU:HD23	1.96	0.48
1:PPP:89:GLN:HB2	1:PPP:98:PHE:CD2	2.49	0.48
2:BBB:34:ASP:OD1	2:BBB:34:ASP:N	2.37	0.48
2:CCC:50:PRO:HB3	2:CCC:59:LYS:HB2	1.95	0.48
1:SSS:38:GLN:NE2	1:SSS:162:GLN:HE22	2.08	0.47
1:SSS:20:THR:HG23	1:SSS:72:THR:HG23	1.95	0.47
2:DDD:160:TYR:N	2:DDD:179:GLN:HE21	1.94	0.47
1:RRR:174:ILE:HD13	1:RRR:194:VAL:HG13	1.97	0.47
2:FFF:132:ALA:H	2:GGG:269:GLN:NE2	2.04	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:MMM:6:GLN:HE21	1:MMM:99:GLY:HA3	1.79	0.47
1:SSS:150:SER:HA	1:SSS:199:ASN:HD21	1.79	0.47
1:OOO:19:VAL:HG21	1:OOO:78:LEU:HD22	1.97	0.47
2:III:91:ASN:ND2	2:III:99:ILE:HB	2.30	0.47
1:PPP:24:ARG:HB3	1:PPP:24:ARG:NH2	2.27	0.47
2:AAA:101:MET:HE3	2:AAA:287:VAL:HG11	1.95	0.47
2:EEE:218:GLY:O	2:EEE:222:VAL:HG11	2.15	0.47
2:JJJ:171:PRO:HB3	2:JJJ:185:HIS:CG	2.50	0.47
1:PPP:24:ARG:HA	1:PPP:69:THR:O	2.15	0.47
2:BBB:208:GLU:H	2:BBB:208:GLU:CD	2.16	0.47
1:RRR:78:LEU:HD11	1:RRR:104:LEU:HD21	1.96	0.47
1:SSS:158:SER:OG	1:SSS:173:GLU:HG2	2.15	0.47
2:JJJ:152:GLU:H	2:JJJ:207:ASN:ND2	2.06	0.47
2:CCC:21:MET:HG3	2:CCC:22:GLY:N	2.29	0.47
1:MMM:158:SER:OG	1:MMM:173:GLU:HG2	2.14	0.46
1:QQQ:185:SER:OG	1:QQQ:186:LEU:HG	2.16	0.46
1:QQQ:186:LEU:O	1:QQQ:190:VAL:HG23	2.15	0.46
2:GGG:211:ARG:NH2	2:GGG:238:ASP:HB3	2.29	0.46
1:OOO:213:THR:HG22	1:OOO:246:THR:HA	1.96	0.46
1:QQQ:222:ARG:HD3	1:QQQ:237:ASP:OD2	2.16	0.46
1:NNN:220:ARG:O	1:NNN:236:MET:HA	2.15	0.46
2:HHH:211:ARG:NH2	2:HHH:238:ASP:HB3	2.31	0.46
2:III:103:GLU:HB3	2:III:245:LEU:HD23	1.96	0.46
2:JJJ:217:THR:CG2	2:JJJ:222:VAL:HG21	2.45	0.46
1:PPP:155:ASN:ND2	1:PPP:220:ARG:HD2	2.31	0.46
2:FFF:112:ILE:HD11	2:FFF:277:TYR:HB2	1.96	0.46
1:KKK:158:SER:OG	1:KKK:173:GLU:HG2	2.16	0.46
1:MMM:37:GLN:HG3	1:MMM:86:TYR:CZ	2.51	0.46
2:EEE:42:PHE:CD1	2:EEE:112:ILE:HD13	2.50	0.46
2:GGG:55:ARG:HB3	2:HHH:176:VAL:HG22	1.98	0.46
1:QQQ:20:THR:HG23	1:QQQ:72:THR:HG23	1.97	0.46
1:QQQ:126:LEU:HD22	1:QQQ:146:VAL:HG22	1.96	0.46
1:TTT:124:VAL:HG22	1:TTT:149:ASP:HB2	1.98	0.46
2:FFF:224:PRO:HD2	2:GGG:218:GLY:HA3	1.97	0.46
1:PPP:173:GLU:OE2	1:PPP:221:ASN:ND2	2.37	0.46
2:III:84:ARG:HH11	2:III:84:ARG:HG2	1.81	0.45
1:QQQ:158:SER:OG	1:QQQ:173:GLU:HG2	2.15	0.45
2:DDD:211:ARG:NH2	2:DDD:238:ASP:HB3	2.31	0.45
2:JJJ:120:VAL:CG2	2:JJJ:133:GLY:O	2.64	0.45
1:QQQ:190:VAL:HG22	1:QQQ:205:LEU:HD23	1.98	0.45
1:QQQ:220:ARG:O	1:QQQ:236:MET:HA	2.15	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:PPP:158:SER:OG	1:PPP:173:GLU:HG2	2.16	0.45
2:AAA:120:VAL:HG21	2:BBB:261:MET:HE1	1.99	0.45
2:JJJ:103:GLU:OE2	2:JJJ:285:ARG:HD3	2.16	0.45
1:NNN:186:LEU:O	1:NNN:190:VAL:HG12	2.17	0.45
1:OOO:170:TRP:CZ2	1:OOO:173:GLU:HG3	2.49	0.45
2:BBB:26:VAL:HG13	2:BBB:285:ARG:HD3	1.99	0.45
1:PPP:223:TRP:HA	1:PPP:233:TYR:O	2.17	0.45
1:TTT:6:GLN:NE2	1:TTT:86:TYR:O	2.40	0.45
2:JJJ:42:PHE:HD1	2:JJJ:112:ILE:CD1	2.30	0.45
2:GGG:264:ASN:HB2	3:GGG:353:HOH:O	2.16	0.45
1:PPP:162:GLN:HB3	1:PPP:215:VAL:HG13	1.99	0.44
1:RRR:60:SER:CB	1:SSS:189:ARG:HG2	2.44	0.44
1:OOO:134:VAL:O	1:OOO:247:VAL:HA	2.17	0.44
1:RRR:158:SER:OG	1:RRR:221:ASN:HB2	2.17	0.44
1:NNN:133:LEU:HD23	1:NNN:246:THR:O	2.17	0.44
1:OOO:223:TRP:HA	1:OOO:233:TYR:O	2.17	0.44
2:BBB:43:LEU:HD21	2:BBB:83:ALA:HB2	1.99	0.44
1:MMM:126:LEU:HD22	1:MMM:146:VAL:HG22	2.00	0.44
2:JJJ:103:GLU:CB	2:JJJ:245:LEU:HD23	2.48	0.44
1:OOO:220:ARG:O	1:OOO:236:MET:HA	2.18	0.44
1:SSS:223:TRP:HA	1:SSS:233:TYR:O	2.17	0.44
2:AAA:101:MET:CE	2:AAA:287:VAL:HG11	2.48	0.44
1:SSS:126:LEU:HD22	1:SSS:146:VAL:HG22	2.00	0.44
2:AAA:84:ARG:HD3	2:AAA:252:TYR:CZ	2.53	0.44
2:FFF:160:TYR:N	2:FFF:179:GLN:HE21	1.98	0.44
2:AAA:149:GLU:HG3	3:AAA:384:HOH:O	2.17	0.44
1:LLL:34:ASN:ND2	1:LLL:49:SER:HA	2.33	0.43
1:PPP:36:TYR:HE2	1:PPP:236:MET:O	2.01	0.43
1:MMM:55:GLN:O	1:MMM:58:VAL:HG22	2.18	0.43
1:TTT:223:TRP:HA	1:TTT:233:TYR:O	2.17	0.43
2:BBB:218:GLY:O	2:BBB:222:VAL:HG11	2.18	0.43
1:KKK:157:TRP:HB3	1:KKK:201:PHE:CZ	2.53	0.43
1:MMM:0:MET:SD	1:MMM:27:GLN:NE2	2.91	0.43
1:MMM:214:ALA:HB3	1:MMM:216:TYR:CE1	2.53	0.43
2:GGG:52:GLU:OE1	2:GGG:52:GLU:HA	2.19	0.43
1:KKK:13:ALA:O	1:KKK:106:ILE:HA	2.19	0.43
1:KKK:162:GLN:HG3	1:KKK:167:GLY:O	2.19	0.43
1:PPP:130:GLY:HA3	1:PPP:142:LEU:HD23	2.00	0.43
1:RRR:128:GLU:HG2	1:RRR:243:THR:OG1	2.17	0.43
1:RRR:145:ALA:HA	1:RRR:200:HIS:CD2	2.53	0.43
2:BBB:160:TYR:N	2:BBB:179:GLN:HE21	1.95	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:EEE:91:ASN:ND2	2:EEE:99:ILE:HB	2.34	0.43
1:QQQ:227:ASN:HD21	2:GGG:59:LYS:HG3	1.83	0.43
2:BBB:91:ASN:ND2	2:BBB:99:ILE:HB	2.33	0.43
2:DDD:30:LYS:HE2	2:DDD:31:THR:O	2.18	0.43
2:JJJ:47:MET:HE2	2:JJJ:271:TRP:HB3	2.00	0.43
1:KKK:223:TRP:HA	1:KKK:233:TYR:O	2.18	0.43
2:HHH:218:GLY:O	2:HHH:222:VAL:HG11	2.18	0.43
1:PPP:37:GLN:HB2	1:PPP:47:LEU:HD11	2.01	0.42
1:TTT:140:LEU:HD12	1:TTT:245:VAL:HG11	2.00	0.42
2:AAA:130:ASN:O	2:BBB:268:SER:HA	2.19	0.42
2:GGG:171:PRO:HB3	2:GGG:185:HIS:CG	2.54	0.42
1:OOO:124:VAL:HG22	1:OOO:149:ASP:HB2	2.00	0.42
2:EEE:112:ILE:HD11	2:EEE:277:TYR:HB2	2.01	0.42
2:HHH:112:ILE:CD1	2:III:204:PRO:HG3	2.49	0.42
1:MMM:213:THR:CG2	1:MMM:247:VAL:H	2.31	0.42
2:CCC:120:VAL:HG21	2:DDD:261:MET:HE1	2.01	0.42
1:KKK:11:LEU:HD23	1:KKK:104:LEU:CD1	2.49	0.42
1:LLL:223:TRP:HA	1:LLL:233:TYR:O	2.19	0.42
1:QQQ:144:CYS:O	1:QQQ:200[B]:HIS:HB2	2.19	0.42
2:CCC:66:THR:OG1	2:CCC:68:GLU:HG2	2.20	0.42
2:DDD:30:LYS:HA	2:DDD:30:LYS:HD2	1.74	0.42
2:III:152:GLU:HB3	2:III:206:ARG:CZ	2.50	0.42
1:QQQ:190:VAL:HG22	1:QQQ:205:LEU:CD2	2.50	0.42
1:RRR:61:ARG:HH12	1:RRR:82:ASP:CG	2.22	0.42
2:AAA:68[B]:GLU:HG3	2:AAA:161:ARG:NH1	2.34	0.42
1:LLL:6:GLN:NE2	1:LLL:86:TYR:O	2.47	0.42
1:NNN:11:LEU:HD22	1:NNN:104:LEU:CD1	2.50	0.42
2:EEE:152:GLU:HB3	2:EEE:206[B]:ARG:CZ	2.50	0.42
1:NNN:6:GLN:HG2	1:NNN:102:THR:OG1	2.19	0.42
1:RRR:230:GLY:HA3	2:GGG:130:ASN:HA	2.02	0.42
2:CCC:42[B]:PHE:CD2	2:CCC:112:ILE:HD13	2.54	0.42
2:AAA:105:VAL:HG12	2:AAA:106:THR:HG23	2.02	0.42
2:DDD:47:MET:SD	2:DDD:258:VAL:HG22	2.60	0.42
2:DDD:171:PRO:HB3	2:DDD:185:HIS:CG	2.55	0.42
1:NNN:223:TRP:HA	1:NNN:233:TYR:O	2.20	0.41
2:III:171:PRO:HB3	2:III:185:HIS:CG	2.55	0.41
1:MMM:162:GLN:HB3	1:MMM:215:VAL:CG1	2.50	0.41
1:QQQ:241:GLN:OE1	1:QQQ:241:GLN:N	2.49	0.41
2:AAA:112:ILE:CD1	2:BBB:204:PRO:HG3	2.50	0.41
1:KKK:24:ARG:HA	1:KKK:69:THR:O	2.19	0.41
1:MMM:155:ASN:ND2	1:MMM:220:ARG:HG3	2.35	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:OOO:94:THR:HA	1:OOO:95:PRO:C	2.41	0.41
1:RRR:170:TRP:CZ2	1:RRR:173:GLU:HG3	2.55	0.41
2:JJJ:152:GLU:OE1	2:JJJ:206[B]:ARG:HD2	2.19	0.41
1:NNN:24:ARG:HA	1:NNN:69:THR:O	2.19	0.41
1:NNN:156:TRP:CE3	1:NNN:173:GLU:HG3	2.55	0.41
1:SSS:208:VAL:HA	1:SSS:212:ASP:OD2	2.21	0.41
2:FFF:52:GLU:O	2:GGG:176:VAL:HG21	2.20	0.41
1:KKK:251:VAL:HA	1:KKK:252:PRO:HD3	1.93	0.41
1:MMM:89:GLN:HB2	1:MMM:98:PHE:CD2	2.56	0.41
1:MMM:24:ARG:HA	1:MMM:69:THR:O	2.20	0.41
1:PPP:220:ARG:O	1:PPP:236:MET:HA	2.20	0.41
1:QQQ:13:ALA:O	1:QQQ:106:ILE:HA	2.20	0.41
2:AAA:30:LYS:HE2	2:AAA:100:LEU:HD21	2.02	0.41
2:DDD:45:PRO:HD2	2:EEE:180:VAL:HB	2.03	0.41
2:FFF:130:ASN:O	2:GGG:268:SER:HA	2.21	0.41
1:OOO:144:CYS:O	1:OOO:200[B]:HIS:HB2	2.21	0.41
1:TTT:67:SER:O	1:TTT:69:THR:N	2.53	0.41
2:JJJ:152:GLU:HB3	2:JJJ:206[B]:ARG:CZ	2.51	0.41
1:SSS:220:ARG:O	1:SSS:236:MET:HA	2.21	0.41
1:MMM:47:LEU:HA	1:MMM:58:VAL:HG11	2.03	0.41
1:TTT:35:TRP:CZ3	1:TTT:88:CYS:HB3	2.56	0.41
2:BBB:103:GLU:O	2:BBB:282:LEU:HA	2.21	0.41
2:JJJ:91:ASN:O	2:JJJ:92:GLU:C	2.59	0.41
2:JJJ:217:THR:HG21	2:JJJ:222:VAL:HG21	2.03	0.41
1:KKK:83:PHE:HB3	1:KKK:106:ILE:HD12	2.02	0.41
1:QQQ:106:ILE:N	1:QQQ:106:ILE:HD12	2.36	0.41
1:RRR:60:SER:HB2	1:SSS:189:ARG:CG	2.47	0.40
1:MMM:162:GLN:HB3	1:MMM:215:VAL:HG13	2.03	0.40
1:PPP:60:SER:OG	1:QQQ:189:ARG:HD3	2.21	0.40
1:QQQ:124:VAL:HG22	1:QQQ:149:ASP:HB2	2.03	0.40
1:SSS:158:SER:CB	1:SSS:173:GLU:HG2	2.52	0.40
1:SSS:176:HIS:O	1:SSS:196:LYS:HE3	2.21	0.40
2:CCC:130:ASN:O	2:DDD:268:SER:HA	2.21	0.40
1:MMM:67:SER:O	1:MMM:69:THR:N	2.54	0.40
1:OOO:195:ASP:OD2	1:OOO:198:LYS:HG3	2.20	0.40
2:BBB:283:ARG:HH21	2:BBB:285:ARG:HH11	1.69	0.40
2:DDD:160:TYR:HD1	2:DDD:179:GLN:NE2	2.19	0.40
2:JJJ:42:PHE:CD1	2:JJJ:112:ILE:HD13	2.56	0.40
1:MMM:48:ILE:HD13	1:MMM:54:LEU:HA	2.03	0.40
1:QQQ:140:LEU:HD12	1:QQQ:141:SER:H	1.87	0.40
2:BBB:112:ILE:CD1	2:CCC:204:PRO:HG3	2.52	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:CCC:203:ASP:OD2	2:CCC:206[B]:ARG:HD3	2.22	0.40
2:JJJ:103:GLU:HA	2:JJJ:244:PRO:O	2.22	0.40
1:KKK:130:GLY:HA3	1:KKK:142:LEU:HD23	2.04	0.40
1:TTT:220:ARG:O	1:TTT:236:MET:HA	2.21	0.40
2:CCC:180:VAL:O	2:CCC:181:MET:HG2	2.22	0.40
2:EEE:152:GLU:OE1	2:EEE:206[B]:ARG:HD2	2.22	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles [i](#)

### 5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	KKK	234/253 (92%)	228 (97%)	5 (2%)	1 (0%)	34	24
1	LLL	234/253 (92%)	228 (97%)	5 (2%)	1 (0%)	34	24
1	MMM	226/253 (89%)	218 (96%)	6 (3%)	2 (1%)	17	7
1	NNN	228/253 (90%)	222 (97%)	5 (2%)	1 (0%)	34	24
1	OOO	232/253 (92%)	228 (98%)	3 (1%)	1 (0%)	34	24
1	PPP	227/253 (90%)	215 (95%)	10 (4%)	2 (1%)	17	7
1	QQQ	229/253 (90%)	223 (97%)	5 (2%)	1 (0%)	34	24
1	RRR	232/253 (92%)	228 (98%)	3 (1%)	1 (0%)	34	24
1	SSS	233/253 (92%)	227 (97%)	6 (3%)	0	100	100
1	TTT	234/253 (92%)	227 (97%)	6 (3%)	1 (0%)	34	24
2	AAA	266/272 (98%)	256 (96%)	10 (4%)	0	100	100
2	BBB	258/272 (95%)	248 (96%)	10 (4%)	0	100	100
2	CCC	264/272 (97%)	253 (96%)	10 (4%)	1 (0%)	34	24
2	DDD	260/272 (96%)	251 (96%)	8 (3%)	1 (0%)	34	24
2	EEE	260/272 (96%)	249 (96%)	11 (4%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	FFF	260/272 (96%)	251 (96%)	9 (4%)	0	100	100
2	GGG	260/272 (96%)	251 (96%)	9 (4%)	0	100	100
2	HHH	263/272 (97%)	254 (97%)	9 (3%)	0	100	100
2	III	260/272 (96%)	249 (96%)	10 (4%)	1 (0%)	34	24
2	JJJ	262/272 (96%)	251 (96%)	11 (4%)	0	100	100
All	All	4922/5250 (94%)	4757 (97%)	151 (3%)	14 (0%)	41	31

All (14) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	OOO	68	GLY
1	QQQ	68	GLY
1	LLL	68	GLY
1	MMM	68	GLY
1	PPP	68	GLY
1	TTT	68	GLY
1	RRR	68	GLY
2	III	92	GLU
1	NNN	68	GLY
2	CCC	92	GLU
2	DDD	92	GLU
1	KKK	68	GLY
1	PPP	131	PRO
1	MMM	131	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	KKK	196/208 (94%)	193 (98%)	3 (2%)	65	62
1	LLL	191/208 (92%)	186 (97%)	5 (3%)	46	39
1	MMM	171/208 (82%)	168 (98%)	3 (2%)	59	55
1	NNN	187/208 (90%)	186 (100%)	1 (0%)	88	89

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	OOO	186/208 (89%)	183 (98%)	3 (2%)	62	60
1	PPP	174/208 (84%)	174 (100%)	0	100	100
1	QQQ	188/208 (90%)	183 (97%)	5 (3%)	44	38
1	RRR	188/208 (90%)	181 (96%)	7 (4%)	34	25
1	SSS	191/208 (92%)	187 (98%)	4 (2%)	53	48
1	TTT	184/208 (88%)	182 (99%)	2 (1%)	73	73
2	AAA	228/237 (96%)	226 (99%)	2 (1%)	78	79
2	BBB	227/237 (96%)	227 (100%)	0	100	100
2	CCC	229/237 (97%)	228 (100%)	1 (0%)	91	91
2	DDD	225/237 (95%)	225 (100%)	0	100	100
2	EEE	230/237 (97%)	230 (100%)	0	100	100
2	FFF	224/237 (94%)	223 (100%)	1 (0%)	91	91
2	GGG	230/237 (97%)	230 (100%)	0	100	100
2	HHH	230/237 (97%)	227 (99%)	3 (1%)	69	68
2	III	223/237 (94%)	222 (100%)	1 (0%)	91	91
2	JJJ	225/237 (95%)	223 (99%)	2 (1%)	78	79
All	All	4127/4450 (93%)	4084 (99%)	43 (1%)	76	76

All (43) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	KKK	189	ARG
1	KKK	200	HIS
1	KKK	222	ARG
1	LLL	10	SER
1	LLL	67	SER
1	LLL	166	LYS
1	LLL	222	ARG
1	LLL	241	GLN
1	MMM	200	HIS
1	MMM	221	ASN
1	MMM	222	ARG
1	NNN	222	ARG
1	OOO	60	SER
1	OOO	221	ASN
1	OOO	222	ARG

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Mol	Chain	Res	Type
1	QQQ	7	SER
1	QQQ	63	SER
1	QQQ	67	SER
1	QQQ	188	SER
1	QQQ	222	ARG
1	RRR	9	SER
1	RRR	37	GLN
1	RRR	67	SER
1	RRR	77	SER
1	RRR	100	GLN
1	RRR	122	SER
1	RRR	248	SER
1	SSS	1	ASP
1	SSS	106	ILE
1	SSS	200	HIS
1	SSS	222	ARG
1	TTT	67	SER
1	TTT	200	HIS
2	AAA	21	MET
2	AAA	199	CYS
2	CCC	21	MET
2	FFF	199	CYS
2	HHH	71[A]	SER
2	HHH	71[B]	SER
2	HHH	288	LYS
2	III	199	CYS
2	JJJ	21	MET
2	JJJ	27	LEU

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

### 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, 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	KKK	238/253 (94%)	-0.32	1 (0%) 92 93	23, 37, 63, 82	0
1	LLL	238/253 (94%)	-0.37	0 100 100	25, 39, 64, 91	0
1	MMM	230/253 (90%)	0.74	31 (13%) 3 3	32, 58, 79, 95	0
1	NNN	231/253 (91%)	-0.04	8 (3%) 44 47	25, 41, 62, 75	0
1	OOO	235/253 (92%)	-0.22	1 (0%) 92 93	24, 42, 65, 90	0
1	PPP	231/253 (91%)	0.59	27 (11%) 4 5	30, 56, 81, 107	0
1	QQQ	232/253 (91%)	-0.03	6 (2%) 56 58	25, 44, 66, 91	0
1	RRR	236/253 (93%)	-0.28	3 (1%) 77 79	22, 37, 62, 95	0
1	SSS	237/253 (93%)	-0.34	1 (0%) 92 93	22, 35, 58, 75	0
1	TTT	238/253 (94%)	-0.46	0 100 100	26, 38, 59, 98	0
2	AAA	268/272 (98%)	-0.13	8 (2%) 50 53	23, 31, 67, 101	0
2	BBB	261/272 (95%)	-0.25	2 (0%) 86 87	25, 33, 58, 89	0
2	CCC	264/272 (97%)	-0.22	5 (1%) 66 69	24, 34, 57, 95	0
2	DDD	262/272 (96%)	-0.12	6 (2%) 60 63	23, 31, 57, 94	0
2	EEE	261/272 (95%)	-0.00	6 (2%) 60 63	22, 30, 54, 97	0
2	FFF	260/272 (95%)	-0.18	2 (0%) 86 87	25, 34, 55, 99	0
2	GGG	261/272 (95%)	-0.13	7 (2%) 54 57	23, 31, 55, 92	0
2	HHH	262/272 (96%)	-0.08	7 (2%) 54 57	21, 30, 55, 92	0
2	III	263/272 (96%)	-0.22	6 (2%) 60 63	22, 30, 56, 90	0
2	JJJ	264/272 (97%)	-0.14	3 (1%) 80 82	25, 33, 56, 101	0
All	All	4972/5250 (94%)	-0.11	130 (2%) 56 58	21, 36, 68, 107	0

All (130) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	AAA	20	HIS	5.6
2	III	33	VAL	5.3
2	HHH	24	VAL	4.8
1	MMM	165	GLY	4.7
2	EEE	289	ASN	4.7
2	EEE	99	ILE	4.7
2	DDD	94	LEU	4.6
2	AAA	33	VAL	4.6
1	MMM	200	HIS	4.5
2	JJJ	21	MET	4.5
2	CCC	21	MET	4.4
2	DDD	93	ASP	4.4
2	HHH	33	VAL	4.3
2	GGG	93	ASP	4.2
2	AAA	21	MET	4.2
2	FFF	289	ASN	4.2
1	QQQ	23	CYS	4.1
2	HHH	289	ASN	4.1
2	III	92	GLU	4.0
2	CCC	33	VAL	4.0
1	PPP	81	GLU	4.0
1	NNN	15	VAL	3.9
1	MMM	164	PRO	3.9
1	PPP	16	GLY	3.9
1	PPP	248	SER	3.8
2	GGG	94	LEU	3.8
1	MMM	58	VAL	3.7
2	HHH	93	ASP	3.6
2	CCC	23	GLY	3.6
1	PPP	245	VAL	3.5
1	MMM	124	VAL	3.4
1	QQQ	165	GLY	3.4
2	HHH	99	ILE	3.4
1	MMM	83	PHE	3.3
2	BBB	33	VAL	3.3
2	JJJ	34	ASP	3.2
2	DDD	99	ILE	3.2
2	EEE	98	ASN	3.2
1	PPP	164	PRO	3.2
1	MMM	245	VAL	3.1
1	MMM	131	PRO	3.1
1	MMM	148	GLY	3.1
1	MMM	40	PRO	3.1

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	MMM	144	CYS	3.1
1	PPP	14	SER	3.1
2	BBB	98	ASN	3.1
2	EEE	33	VAL	3.0
2	AAA	23	GLY	3.0
2	DDD	24	VAL	3.0
2	HHH	98	ASN	3.0
1	PPP	124	VAL	2.9
2	GGG	288	LYS	2.9
1	MMM	126	LEU	2.9
1	PPP	148	GLY	2.9
1	MMM	12	SER	2.9
1	NNN	11	LEU	2.9
1	PPP	80	PRO	2.9
1	MMM	125	GLN	2.8
2	EEE	92	GLU	2.8
2	AAA	95	THR	2.8
2	DDD	98	ASN	2.8
1	RRR	80	PRO	2.8
1	PPP	131	PRO	2.8
1	PPP	151	ILE	2.8
1	PPP	83	PHE	2.8
1	PPP	202	SER	2.8
1	RRR	83	PHE	2.7
2	AAA	34	ASP	2.7
2	GGG	33	VAL	2.7
1	PPP	43	ALA	2.7
2	DDD	288	LYS	2.7
1	NNN	76	SER	2.7
1	NNN	16	GLY	2.6
2	CCC	92	GLU	2.6
2	III	94	LEU	2.6
1	PPP	40	PRO	2.6
1	PPP	77	SER	2.6
1	PPP	130	GLY	2.5
2	GGG	99	ILE	2.5
2	FFF	33	VAL	2.5
2	III	289	ASN	2.5
2	AAA	32	GLY	2.5
1	OOO	165	GLY	2.5
1	MMM	149	ASP	2.5
1	NNN	80	PRO	2.4

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	KKK	11	LEU	2.4
1	MMM	80	PRO	2.4
2	AAA	96	CYS	2.4
2	JJJ	22	GLY	2.4
1	QQQ	133	LEU	2.4
2	CCC	98	ASN	2.4
1	NNN	19	VAL	2.4
1	MMM	11	LEU	2.4
1	MMM	151	ILE	2.4
1	PPP	15	VAL	2.3
1	MMM	86	TYR	2.3
1	MMM	150	SER	2.3
1	MMM	160	VAL	2.3
1	MMM	215	VAL	2.3
1	SSS	106	ILE	2.3
1	QQQ	211	ALA	2.3
1	PPP	149	ASP	2.3
1	PPP	137	SER	2.3
1	PPP	197	SER	2.3
1	PPP	247	VAL	2.3
1	PPP	133	LEU	2.3
2	GGG	25	GLU	2.3
2	III	93	ASP	2.3
1	MMM	85	THR	2.2
1	MMM	202	SER	2.2
2	HHH	288	LYS	2.2
1	PPP	146	VAL	2.2
1	NNN	17	ASP	2.2
2	III	32	GLY	2.2
1	PPP	17	ASP	2.2
2	EEE	34	ASP	2.2
1	QQQ	78	LEU	2.1
1	PPP	244	THR	2.1
1	MMM	217	TYR	2.1
1	MMM	132	GLY	2.1
1	MMM	246	THR	2.1
1	MMM	76	SER	2.1
1	MMM	211	ALA	2.1
1	QQQ	164	PRO	2.1
1	MMM	240	GLY	2.1
1	MMM	197	SER	2.0
1	RRR	122	SER	2.0

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Mol	Chain	Res	Type	RSRZ
1	PPP	216	TYR	2.0
1	NNN	40	PRO	2.0
2	GGG	27	LEU	2.0

## 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.