



Full wwPDB X-ray Structure Validation Report ⓘ

Jan 7, 2024 – 04:46 pm GMT

PDB ID : 6ERG
Title : Complex of XLF and heterodimer Ku bound to DNA
Authors : Nemoz, C.; Legrand, P.; Ropars, V.; Charbonnier, J.B.
Deposited on : 2017-10-18
Resolution : 2.90 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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

MolProbity : 4.02b-467
Mogul : 1.8.4, CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.36
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) : 2.36

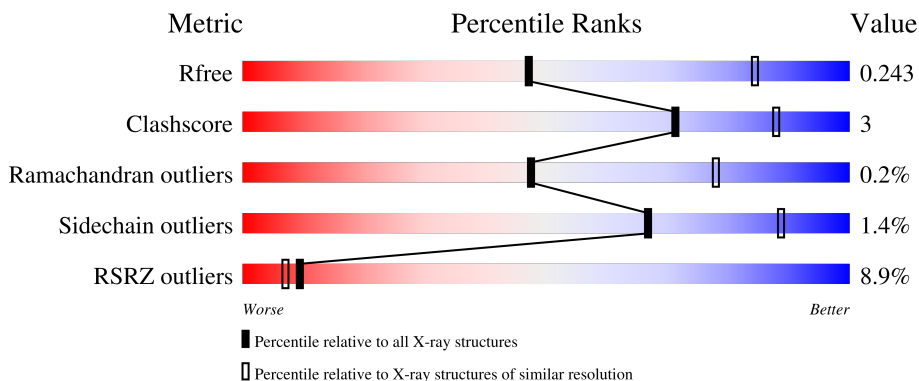
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.90 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.



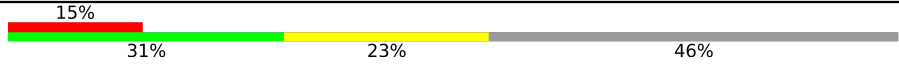


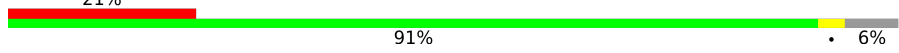

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1957 (2.90-2.90)
Clashscore	141614	2172 (2.90-2.90)
Ramachandran outliers	138981	2115 (2.90-2.90)
Sidechain outliers	138945	2117 (2.90-2.90)
RSRZ outliers	127900	1906 (2.90-2.90)

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 ≥ 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	544	<div style="display: flex; align-items: center;"> <div style="width: 10%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 83%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 8%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 8%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 10px;">10% 83% 8% 8%</p>
1	D	544	<div style="display: flex; align-items: center;"> <div style="width: 8%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 83%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 8%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 8%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 10px;">8% 83% 8% 8%</p>
2	B	572	<div style="display: flex; align-items: center;"> <div style="width: 9%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 83%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 10%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 7%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 10px;">9% 83% 10% 7%</p>
2	E	572	<div style="display: flex; align-items: center;"> <div style="width: 5%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 84%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 10%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 6%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 10px;">5% 84% 10% 6%</p>
3	C	13	<div style="display: flex; align-items: center;"> <div style="width: 38%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 15%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 46%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 10px;">38% 15% 46%</p>

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Mol	Chain	Length	Quality of chain
3	F	13	
4	H	21	
4	K	21	
5	M	34	
5	R	34	

2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 18997 atoms, of which 8 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 X-ray repair cross-complementing protein 6.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	501	4048	2589	686	755	18	0	0	0
1	D	503	4066	2601	688	759	18	0	0	0

- Molecule 2 is a protein called X-ray repair cross-complementing protein 5.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	531	4278	2736	731	787	24	0	0	0
2	E	536	4315	2755	737	799	24	0	0	0

There are 36 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	-16	MET	-	initiating methionine	UNP P13010
B	-15	HIS	-	expression tag	UNP P13010
B	-14	HIS	-	expression tag	UNP P13010
B	-13	HIS	-	expression tag	UNP P13010
B	-12	HIS	-	expression tag	UNP P13010
B	-11	HIS	-	expression tag	UNP P13010
B	-10	HIS	-	expression tag	UNP P13010
B	-9	HIS	-	expression tag	UNP P13010
B	-8	HIS	-	expression tag	UNP P13010
B	-7	HIS	-	expression tag	UNP P13010
B	-6	HIS	-	expression tag	UNP P13010
B	-5	GLU	-	expression tag	UNP P13010
B	-4	ASN	-	expression tag	UNP P13010
B	-3	LEU	-	expression tag	UNP P13010
B	-2	TYR	-	expression tag	UNP P13010
B	-1	PHE	-	expression tag	UNP P13010

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Chain	Residue	Modelled	Actual	Comment	Reference
B	0	GLN	-	expression tag	UNP P13010
B	1	GLY	-	expression tag	UNP P13010
E	-16	MET	-	initiating methionine	UNP P13010
E	-15	HIS	-	expression tag	UNP P13010
E	-14	HIS	-	expression tag	UNP P13010
E	-13	HIS	-	expression tag	UNP P13010
E	-12	HIS	-	expression tag	UNP P13010
E	-11	HIS	-	expression tag	UNP P13010
E	-10	HIS	-	expression tag	UNP P13010
E	-9	HIS	-	expression tag	UNP P13010
E	-8	HIS	-	expression tag	UNP P13010
E	-7	HIS	-	expression tag	UNP P13010
E	-6	HIS	-	expression tag	UNP P13010
E	-5	GLU	-	expression tag	UNP P13010
E	-4	ASN	-	expression tag	UNP P13010
E	-3	LEU	-	expression tag	UNP P13010
E	-2	TYR	-	expression tag	UNP P13010
E	-1	PHE	-	expression tag	UNP P13010
E	0	GLN	-	expression tag	UNP P13010
E	1	GLY	-	expression tag	UNP P13010

- Molecule 3 is a protein called Non-homologous end-joining factor 1.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace	
3	C	7	Total	C	H	N	O	0	0	0
			61	37	4	11	9			
3	F	7	Total	C	H	N	O	0	0	0
			61	37	4	11	9			

- Molecule 4 is a DNA chain called DNA (21-MER).

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace	
4	H	21	Total	C	N	O	P	0	0	0
			431	208	71	132	20			
4	K	21	Total	C	N	O	P	0	0	0
			431	208	71	132	20			

- Molecule 5 is a DNA chain called DNA (34-MER).

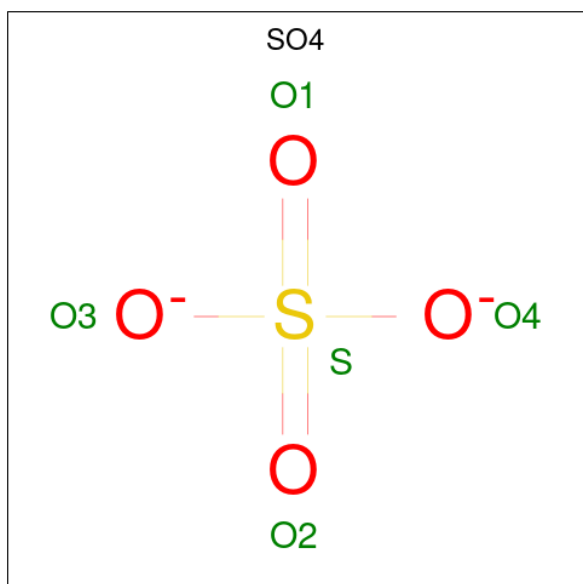
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace	
5	M	32	Total	C	N	O	P	0	0	0
			645	308	124	182	31			

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
5	R	31	626	299	121	176	30	0	0	0

- Molecule 6 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	O	S		
6	B	1	5	4	1	5	0
6	D	1	5	4	1	5	0
6	E	1	5	4	1	5	0

- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
7	A	2	2	2	0	0
7	B	5	5	5	0	0
7	D	2	2	2	0	0
7	E	5	5	5	0	0
7	H	1	1	1	0	0

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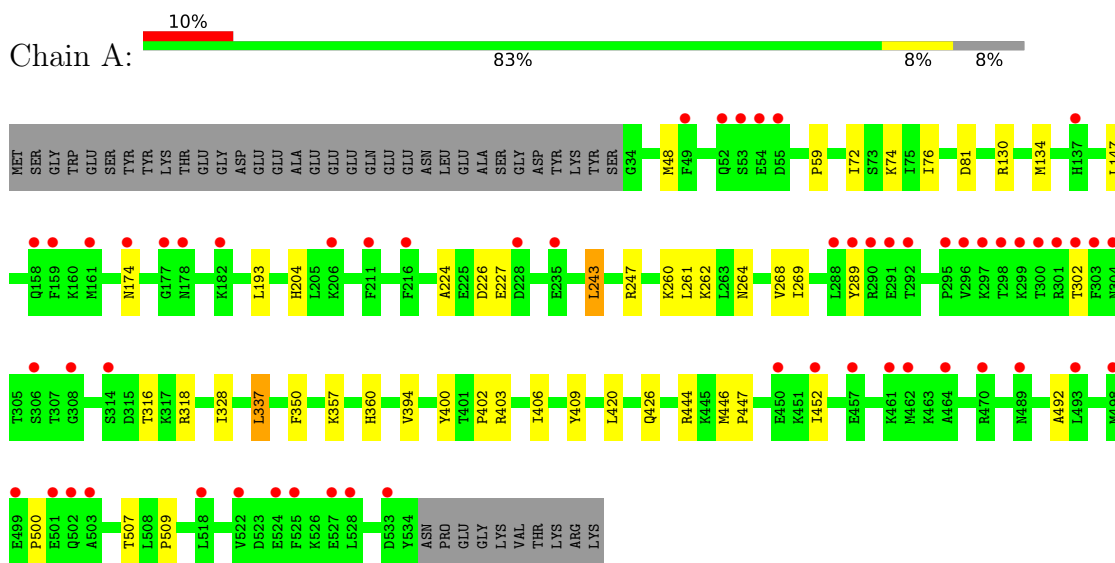
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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	K	2	Total O 2 2	0	0
7	M	3	Total O 3 3	0	0

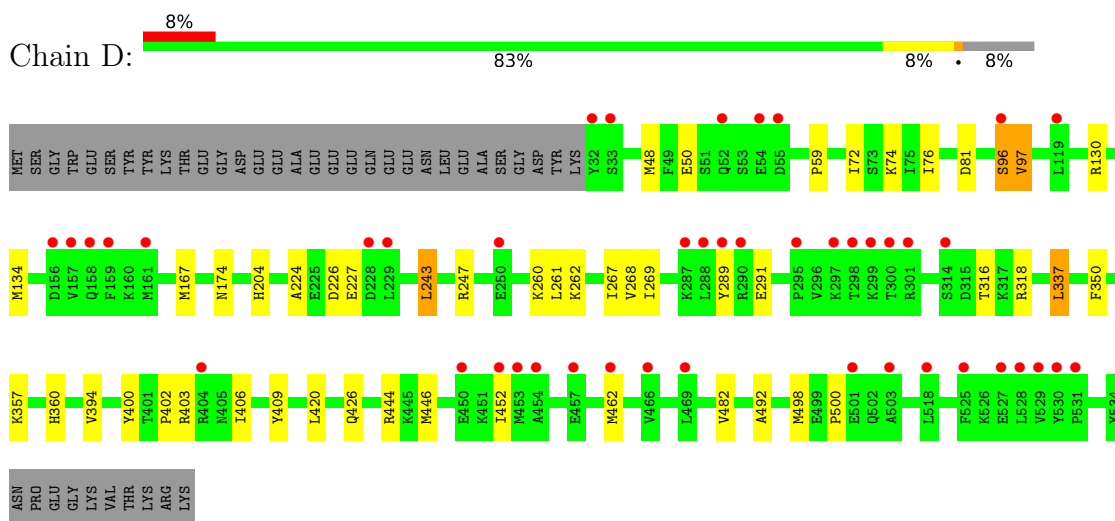
3 Residue-property plots i

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.

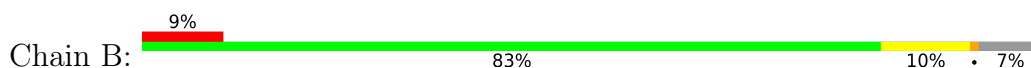
- Molecule 1: X-ray repair cross-complementing protein 6

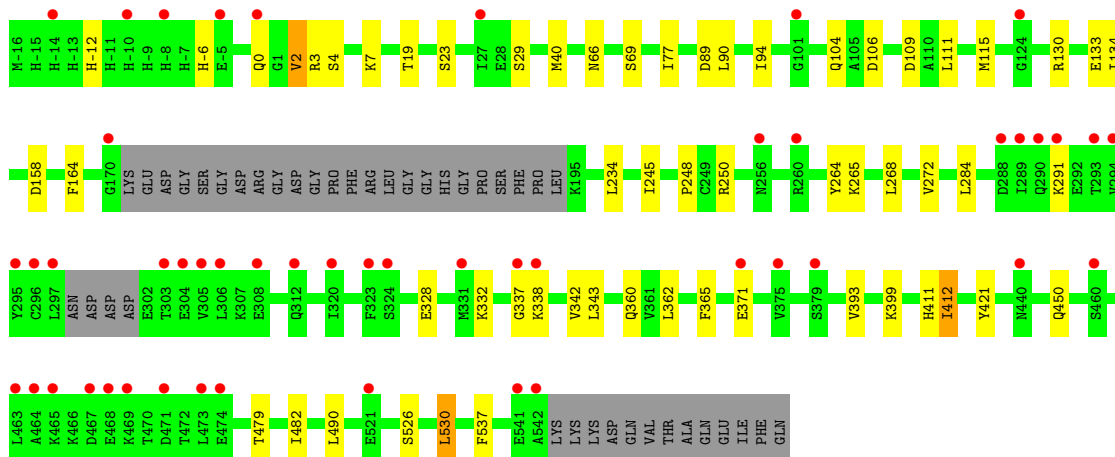


- Molecule 1: X-ray repair cross-complementing protein 6

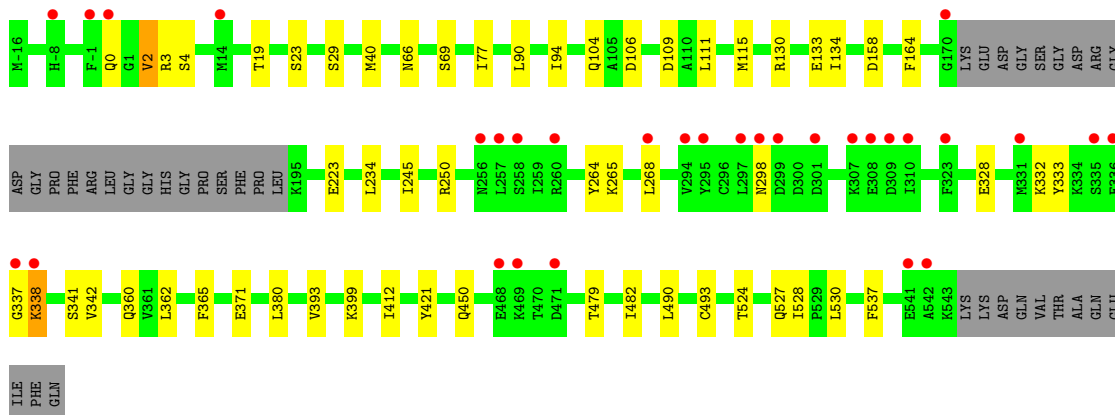
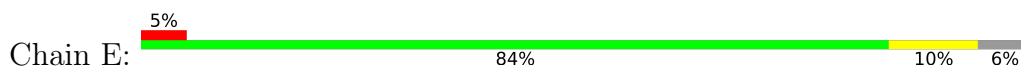


- Molecule 2: X-ray repair cross-complementing protein 5

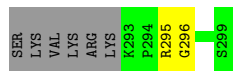




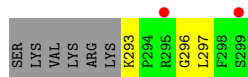
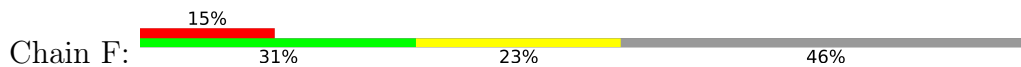
• Molecule 2: X-ray repair cross-complementing protein 5



• Molecule 3: Non-homologous end-joining factor 1



• Molecule 3: Non-homologous end-joining factor 1



• Molecule 4: DNA (21-MER)

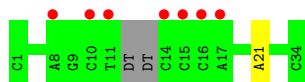




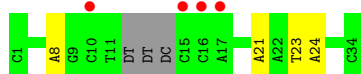
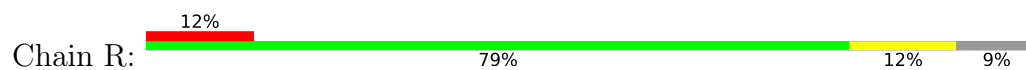
- Molecule 4: DNA (21-MER)



- Molecule 5: DNA (34-MER)



- Molecule 5: DNA (34-MER)



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	111.71Å 114.26Å 127.17Å 90.00° 93.14° 90.00°	Depositor
Resolution (Å)	48.76 – 2.90 47.62 – 2.90	Depositor EDS
% Data completeness (in resolution range)	72.9 (48.76-2.90) 72.9 (47.62-2.90)	Depositor EDS
R_{merge}	0.17	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.26 (at 2.91Å)	Xtrriage
Refinement program	BUSTER 2.10.3	Depositor
R, R_{free}	0.218 , 0.244 0.228 , 0.243	Depositor DCC
R_{free} test set	2605 reflections (5.04%)	wwPDB-VP
Wilson B-factor (Å ²)	80.8	Xtrriage
Anisotropy	0.049	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.29 , 51.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	18997	wwPDB-VP
Average B, all atoms (Å ²)	100.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 28.03 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 1.9798e-03. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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](#)

Bond lengths and bond angles in the following residue types are not validated in this section: SO4

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	0.34	0/4127	0.57	0/5560
1	D	0.35	0/4146	0.58	1/5586 (0.0%)
2	B	0.33	0/4370	0.60	2/5893 (0.0%)
2	E	0.34	0/4408	0.59	0/5947
3	C	0.44	0/58	0.61	0/74
3	F	0.42	0/58	0.57	0/74
4	H	0.99	0/481	0.99	0/743
4	K	0.97	0/481	0.98	0/743
5	M	0.94	0/723	0.92	0/1108
5	R	0.98	0/702	0.95	1/1076 (0.1%)
All	All	0.47	0/19554	0.65	4/26804 (0.0%)

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	411	HIS	C-N-CA	7.34	140.06	121.70
5	R	8	DA	O4'-C1'-N9	6.71	112.69	108.00
2	B	530	LEU	CA-CB-CG	5.80	128.64	115.30
1	D	96	SER	C-N-CA	5.15	134.56	121.70

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	4048	0	4125	32	0
1	D	4066	0	4139	33	0
2	B	4278	0	4302	42	0
2	E	4315	0	4323	38	0
3	C	57	4	60	1	0
3	F	57	4	60	3	0
4	H	431	0	243	4	0
4	K	431	0	243	4	0
5	M	645	0	359	1	0
5	R	626	0	348	2	0
6	B	5	0	0	0	0
6	D	5	0	0	0	0
6	E	5	0	0	0	0
7	A	2	0	0	0	0
7	B	5	0	0	0	0
7	D	2	0	0	0	0
7	E	5	0	0	0	0
7	H	1	0	0	0	0
7	K	2	0	0	0	0
7	M	3	0	0	0	0
All	All	18989	8	18202	129	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 3.

All (129) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:446:MET:HE2	2:E:365:PHE:HE2	1.48	0.78
2:B:111:LEU:HD13	2:B:134:ILE:HD11	1.71	0.73
2:E:111:LEU:HD13	2:E:134:ILE:HD11	1.71	0.72
1:A:264:ASN:HB3	2:B:530:LEU:HD21	1.72	0.72
2:E:479:THR:HA	2:E:482:ILE:HD12	1.72	0.71
1:A:302:THR:HG22	2:B:291:LYS:HG2	1.71	0.71
2:B:479:THR:HA	2:B:482:ILE:HD12	1.73	0.71
1:D:350:PHE:HB3	1:D:394:VAL:HG11	1.77	0.66
1:A:446:MET:HE2	2:B:365:PHE:HE2	1.62	0.65
4:K:6:DT:H2''	4:K:7:DA:C8	2.32	0.64
1:A:350:PHE:HB3	1:A:394:VAL:CG1	2.27	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:350:PHE:HB3	1:D:394:VAL:CG1	2.28	0.64
4:H:6:DT:H2"	4:H:7:DA:C8	2.33	0.64
1:A:446:MET:HE1	2:B:264:TYR:HB2	1.80	0.63
1:A:350:PHE:HB3	1:A:394:VAL:HG11	1.79	0.63
2:B:0:GLN:HA	2:B:4:SER:HB3	1.79	0.63
2:E:0:GLN:HA	2:E:4:SER:HB3	1.81	0.62
1:D:96:SER:O	1:D:97:VAL:HG22	2.03	0.59
2:E:337:GLY:HA3	2:E:399:LYS:HA	1.88	0.56
1:D:316:THR:HG23	1:D:318:ARG:HH12	1.71	0.56
2:B:337:GLY:HA3	2:B:399:LYS:HA	1.87	0.55
2:B:-12:HIS:HB2	3:F:293:LYS:NZ	2.22	0.55
1:A:316:THR:HG23	1:A:318:ARG:HH12	1.72	0.55
1:D:446:MET:HE1	2:E:264:TYR:HB2	1.88	0.55
2:B:3:ARG:HD3	5:R:21:DA:C2	2.42	0.55
2:B:362:LEU:HB2	2:B:421:TYR:HB3	1.90	0.54
1:A:130:ARG:O	1:A:134:MET:HB2	2.08	0.53
2:B:66:ASN:HD21	2:B:77:ILE:HB	1.73	0.53
2:E:66:ASN:HD21	2:E:77:ILE:HB	1.74	0.53
2:E:362:LEU:HB2	2:E:421:TYR:HB3	1.91	0.52
1:A:48:MET:HA	1:A:59:PRO:HG2	1.92	0.52
1:D:337:LEU:HD11	2:E:490:LEU:HD12	1.93	0.51
1:A:444:ARG:CZ	2:B:268:LEU:HD21	2.41	0.51
1:D:48:MET:HA	1:D:59:PRO:HG2	1.92	0.50
2:B:106:ASP:HB3	2:B:109:ASP:HB2	1.94	0.50
1:D:130:ARG:O	1:D:134:MET:HB2	2.11	0.50
2:E:23:SER:HB3	2:E:29:SER:HA	1.93	0.50
2:B:23:SER:HB3	2:B:29:SER:HA	1.93	0.50
2:B:526:SER:O	2:B:530:LEU:HB2	2.11	0.50
4:K:11:DT:H2"	4:K:12:DA:C8	2.47	0.49
1:A:261:LEU:HD23	1:A:269:ILE:HD11	1.95	0.49
2:B:90:LEU:O	2:B:94:ILE:HG12	2.12	0.49
1:D:72:ILE:O	1:D:76:ILE:HG12	2.13	0.49
4:H:11:DT:H2"	4:H:12:DA:C8	2.48	0.49
1:D:262:LYS:HG2	1:D:268:VAL:HG22	1.95	0.49
1:D:446:MET:HE2	2:E:365:PHE:CE2	2.39	0.49
2:E:106:ASP:HB3	2:E:109:ASP:HB2	1.95	0.49
2:E:19:THR:H	2:E:104:GLN:NE2	2.11	0.48
2:B:412:ILE:HG22	2:B:412:ILE:O	2.12	0.48
2:B:111:LEU:HG	2:B:115:MET:CE	2.44	0.48
1:D:261:LEU:HD23	1:D:269:ILE:HD11	1.96	0.48
2:E:90:LEU:O	2:E:94:ILE:HG12	2.12	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:130:ARG:HH21	2:B:158:ASP:HB3	1.78	0.48
1:A:403:ARG:O	1:A:406:ILE:HG22	2.14	0.48
2:B:19:THR:H	2:B:104:GLN:NE2	2.11	0.48
2:B:328:GLU:O	2:B:332:LYS:HB2	2.13	0.48
1:A:72:ILE:O	1:A:76:ILE:HG12	2.14	0.47
1:D:446:MET:CE	2:E:264:TYR:HB2	2.44	0.47
2:E:130:ARG:HH21	2:E:158:ASP:HB3	1.80	0.47
1:A:262:LYS:HG2	1:A:268:VAL:HG22	1.96	0.47
1:A:447:PRO:HB3	2:B:-6:HIS:CD2	2.50	0.47
1:D:403:ARG:O	1:D:406:ILE:HG22	2.14	0.47
2:E:66:ASN:HB2	2:E:69:SER:HB2	1.97	0.47
2:E:111:LEU:HG	2:E:115:MET:CE	2.45	0.47
1:D:289:TYR:CE2	1:D:291:GLU:HB2	2.50	0.47
2:B:66:ASN:HB2	2:B:69:SER:HB2	1.97	0.47
1:A:224:ALA:HB3	1:A:227:GLU:HG3	1.96	0.47
1:D:420:LEU:HD23	1:D:426:GLN:HA	1.97	0.46
2:E:342:VAL:HA	2:E:393:VAL:HG12	1.97	0.46
2:B:-12:HIS:HB2	3:F:293:LYS:HZ3	1.81	0.46
2:B:342:VAL:HA	2:B:393:VAL:HG12	1.98	0.46
1:D:482:VAL:HG22	2:E:333:TYR:CD2	2.50	0.46
1:A:420:LEU:HD23	1:A:426:GLN:HA	1.96	0.46
1:D:357:LYS:HD2	1:D:360:HIS:CE1	2.51	0.46
2:B:40:MET:HB3	2:B:234:LEU:HB3	1.98	0.45
2:E:524:THR:O	2:E:527:GLN:HG2	2.16	0.45
1:D:289:TYR:HE2	1:D:291:GLU:HB2	1.80	0.45
1:A:452:ILE:HD13	2:B:371:GLU:HG3	1.98	0.45
1:D:482:VAL:HG22	2:E:333:TYR:HD2	1.81	0.45
2:E:40:MET:HB3	2:E:234:LEU:HB3	1.98	0.45
2:B:450:GLN:HB3	2:B:537:PHE:CZ	2.52	0.45
2:E:328:GLU:O	2:E:332:LYS:HB2	2.16	0.45
1:A:337:LEU:HD11	2:B:490:LEU:HD12	2.00	0.44
1:D:267:ILE:HD12	2:E:530:LEU:HD22	1.99	0.44
2:E:527:GLN:HG3	2:E:528:ILE:HD12	1.98	0.44
1:D:260:LYS:HB3	1:D:268:VAL:HG13	2.00	0.44
1:D:462:MET:HG2	2:E:380:LEU:HA	1.99	0.44
1:D:74:LYS:HE3	1:D:81:ASP:HB2	2.00	0.44
2:E:450:GLN:HB3	2:E:537:PHE:CZ	2.53	0.44
4:K:13:DT:H2 [?]	4:K:14:DT:C6	2.53	0.44
2:E:133:GLU:HG3	2:E:164:PHE:HE2	1.82	0.43
3:C:295:ARG:HH21	2:E:223:GLU:HG3	1.82	0.43
1:D:224:ALA:HB3	1:D:227:GLU:HG3	2.00	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:400:TYR:CE2	1:A:402:PRO:HG3	2.53	0.43
1:A:357:LYS:HD2	1:A:360:HIS:CE1	2.53	0.43
1:A:492:ALA:HB2	1:A:500:PRO:HA	2.01	0.43
1:A:507:THR:O	2:B:343:LEU:HD21	2.18	0.43
2:B:412:ILE:O	2:B:412:ILE:CG2	2.65	0.43
2:B:265:LYS:HE2	2:B:360:GLN:OE1	2.19	0.43
1:D:260:LYS:HB3	1:D:268:VAL:CG1	2.48	0.43
1:A:74:LYS:HE3	1:A:81:ASP:HB2	2.01	0.43
1:D:492:ALA:HB2	1:D:500:PRO:HA	2.01	0.43
2:B:133:GLU:HG3	2:B:164:PHE:HE2	1.83	0.43
1:D:444:ARG:CZ	2:E:268:LEU:HD21	2.49	0.43
2:B:248:PRO:O	2:B:338:LYS:HE2	2.19	0.42
4:H:13:DT:H2''	4:H:14:DT:C6	2.53	0.42
2:E:265:LYS:HE2	2:E:360:GLN:OE1	2.19	0.42
1:A:260:LYS:HB3	1:A:268:VAL:CG1	2.49	0.42
1:D:400:TYR:CE2	1:D:402:PRO:HG3	2.55	0.42
2:B:133:GLU:HG2	3:F:297:LEU:HD13	2.02	0.42
1:A:260:LYS:HB3	1:A:268:VAL:HG13	2.01	0.41
1:D:337:LEU:HD12	2:E:493:CYS:HB2	2.01	0.41
1:A:243:LEU:HD21	1:A:247:ARG:CZ	2.50	0.41
2:E:2:VAL:HG21	2:E:245:ILE:HG12	2.02	0.41
1:A:509:PRO:HG3	2:B:343:LEU:HD23	2.02	0.41
2:B:2:VAL:HG21	2:B:245:ILE:HG12	2.02	0.41
2:E:265:LYS:HD3	2:E:268:LEU:HD23	2.01	0.41
1:A:264:ASN:CB	2:B:530:LEU:HD21	2.48	0.41
1:D:243:LEU:HD21	1:D:247:ARG:CZ	2.51	0.41
2:E:3:ARG:HD3	5:M:21:DA:C2	2.56	0.41
5:R:23:DT:H2''	5:R:24:DA:C8	2.56	0.40
1:A:147:LEU:HB3	1:A:193:LEU:HD11	2.03	0.40
2:B:265:LYS:HD3	2:B:268:LEU:HD23	2.03	0.40
2:E:337:GLY:O	2:E:338:LYS:HG2	2.22	0.40
1:A:328:ILE:HG12	2:B:284:LEU:HD22	2.03	0.40
1:A:446:MET:CE	2:B:264:TYR:HB2	2.49	0.40
4:K:9:DT:H2'	4:K:10:DT:C6	2.57	0.40
1:D:452:ILE:HD13	2:E:371:GLU:HG3	2.03	0.40
4:H:9:DT:H2'	4:H:10:DT:C6	2.57	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	A	499/544 (92%)	490 (98%)	9 (2%)	0	100	100
1	D	501/544 (92%)	489 (98%)	11 (2%)	1 (0%)	47	78
2	B	525/572 (92%)	513 (98%)	11 (2%)	1 (0%)	47	78
2	E	532/572 (93%)	518 (97%)	14 (3%)	0	100	100
3	C	5/13 (38%)	4 (80%)	0	1 (20%)	0	0
3	F	5/13 (38%)	4 (80%)	0	1 (20%)	0	0
All	All	2067/2258 (92%)	2018 (98%)	45 (2%)	4 (0%)	47	78

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	97	VAL
3	C	296	GLY
3	F	296	GLY
2	B	412	ILE

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	455/492 (92%)	448 (98%)	7 (2%)	65	87
1	D	457/492 (93%)	448 (98%)	9 (2%)	55	82
2	B	480/513 (94%)	475 (99%)	5 (1%)	76	92

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	E	484/513 (94%)	478 (99%)	6 (1%)	71	91
3	C	6/12 (50%)	6 (100%)	0	100	100
3	F	6/12 (50%)	6 (100%)	0	100	100
All	All	1888/2034 (93%)	1861 (99%)	27 (1%)	67	89

All (27) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	174	ASN
1	A	204	HIS
1	A	226	ASP
1	A	243	LEU
1	A	289	TYR
1	A	337	LEU
1	A	409	TYR
2	B	2	VAL
2	B	7	LYS
2	B	89	ASP
2	B	250	ARG
2	B	272	VAL
1	D	50	GLU
1	D	167	MET
1	D	174	ASN
1	D	204	HIS
1	D	226	ASP
1	D	243	LEU
1	D	337	LEU
1	D	409	TYR
1	D	498	MET
2	E	2	VAL
2	E	250	ARG
2	E	298	ASN
2	E	338	LYS
2	E	341	SER
2	E	412	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (7) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	101	ASN

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Mol	Chain	Res	Type
1	A	174	ASN
1	A	360	HIS
2	B	0	GLN
1	D	174	ASN
1	D	360	HIS
2	E	0	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](#)

3 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
6	SO4	B	601	-	4,4,4	0.14	0	6,6,6	0.05	0
6	SO4	E	601	-	4,4,4	0.14	0	6,6,6	0.05	0
6	SO4	D	601	-	4,4,4	0.14	0	6,6,6	0.05	0

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 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	501/544 (92%)	0.78	57 (11%) 5 3	55, 103, 179, 211	0
1	D	503/544 (92%)	0.49	44 (8%) 10 7	35, 86, 160, 192	0
2	B	531/572 (92%)	0.55	49 (9%) 9 6	48, 90, 155, 210	0
2	E	536/572 (93%)	0.40	31 (5%) 23 19	35, 80, 145, 198	0
3	C	7/13 (53%)	0.11	0 100 100	69, 72, 97, 108	0
3	F	7/13 (53%)	1.03	2 (28%) 0 0	69, 75, 113, 113	0
4	H	21/21 (100%)	-0.15	0 100 100	88, 105, 174, 194	0
4	K	21/21 (100%)	0.06	0 100 100	82, 105, 160, 165	0
5	M	32/34 (94%)	0.95	7 (21%) 0 0	69, 126, 210, 218	0
5	R	31/34 (91%)	0.84	4 (12%) 3 2	67, 135, 180, 201	0
All	All	2190/2368 (92%)	0.55	194 (8%) 9 7	35, 91, 166, 218	0

All (194) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	159	PHE	7.3
2	B	468	GLU	7.3
1	A	300	THR	7.0
1	A	289	TYR	6.9
5	M	15	DC	6.2
1	A	301	ARG	6.2
2	B	323	PHE	6.1
1	A	206	LYS	6.1
1	A	501	GLU	5.9
5	R	15	DC	5.7
1	D	158	GLN	5.5
1	D	161	MET	5.5
1	A	299	LYS	5.4

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Mol	Chain	Res	Type	RSRZ
2	B	542	ALA	5.4
1	D	32	TYR	5.3
2	B	473	LEU	5.1
1	A	298	THR	5.1
2	B	296	CYS	4.9
1	D	525	PHE	4.7
1	A	457	GLU	4.6
2	E	298	ASN	4.4
2	B	469	LYS	4.4
1	A	503	ALA	4.4
1	A	527	GLU	4.4
1	A	295	PRO	4.4
2	E	335	SER	4.3
1	A	314	SER	4.3
1	D	297	LYS	4.3
1	A	177	GLY	4.2
1	A	450	GLU	4.2
1	A	525	PHE	4.2
2	E	323	PHE	4.1
2	B	471	ASP	4.1
2	B	295	TYR	4.1
2	B	331	MET	4.0
2	B	293	THR	3.9
2	E	337	GLY	3.9
1	D	501	GLU	3.9
2	E	469	LYS	3.9
1	A	452	ILE	3.8
1	A	489	ASN	3.8
1	D	52	GLN	3.8
2	E	294	VAL	3.8
1	A	288	LEU	3.7
1	D	55	ASP	3.7
1	A	462	MET	3.7
2	E	471	ASP	3.7
1	A	297	LYS	3.7
1	A	533	ASP	3.7
1	D	295	PRO	3.6
2	E	260	ARG	3.6
2	E	299	ASP	3.6
2	E	468	GLU	3.6
2	B	256	ASN	3.5
2	B	297	LEU	3.5

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Mol	Chain	Res	Type	RSRZ
2	E	301	ASP	3.5
5	M	14	DC	3.4
1	D	159	PHE	3.4
1	A	498	MET	3.4
1	D	452	ILE	3.4
5	M	16	DC	3.4
1	A	464	ALA	3.4
2	B	294	VAL	3.4
5	R	17	DA	3.3
1	D	454	ALA	3.3
1	D	54	GLU	3.3
1	D	457	GLU	3.3
2	B	101	GLY	3.3
1	A	55	ASP	3.2
2	E	170	GLY	3.2
1	A	518	LEU	3.2
2	E	258	SER	3.2
2	B	304	GLU	3.2
1	A	296	VAL	3.1
1	A	161	MET	3.1
2	B	338	LYS	3.1
1	D	289	TYR	3.1
2	B	463	LEU	3.1
2	B	464	ALA	3.1
2	B	-8	HIS	3.1
1	D	156	ASP	3.1
1	D	503	ALA	3.0
1	A	291	GLU	3.0
1	A	292	THR	3.0
1	D	288	LEU	3.0
2	B	467	ASP	3.0
2	B	465	LYS	2.9
1	A	522	VAL	2.9
1	A	306	SER	2.9
2	B	170	GLY	2.9
1	A	158	GLN	2.9
1	D	404	ARG	2.9
5	M	8	DA	2.9
2	E	308	GLU	2.9
2	B	306	LEU	2.9
1	A	52	GLN	2.8
5	R	16	DC	2.8

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Mol	Chain	Res	Type	RSRZ
1	A	182	LYS	2.8
1	A	308	GLY	2.8
2	B	308	GLU	2.8
2	B	460	SER	2.8
1	A	211	PHE	2.8
2	B	379	SER	2.8
2	B	337	GLY	2.8
2	B	320	ILE	2.8
1	A	493	LEU	2.8
2	E	541	GLU	2.7
1	A	470	ARG	2.7
1	A	302	THR	2.7
2	B	541	GLU	2.7
1	A	178	ASN	2.7
3	F	295	ARG	2.6
1	D	96	SER	2.6
1	D	157	VAL	2.6
2	B	371	GLU	2.6
2	B	288	ASP	2.6
2	E	336	GLU	2.6
1	D	462	MET	2.6
1	A	304	ASN	2.6
1	A	524	GLU	2.6
1	D	453	MET	2.6
1	D	33	SER	2.6
2	E	297	LEU	2.6
1	A	499	GLU	2.6
1	A	502	GLN	2.5
2	E	309	ASP	2.5
5	M	10	DC	2.5
2	B	-14	HIS	2.5
2	E	542	ALA	2.5
1	D	298	THR	2.5
2	E	-8	HIS	2.5
1	A	235	GLU	2.5
1	D	466	VAL	2.5
2	B	303	THR	2.5
1	D	287	LYS	2.4
1	A	528	LEU	2.4
1	A	49	PHE	2.4
5	M	11	DT	2.4
2	E	256	ASN	2.4

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Mol	Chain	Res	Type	RSRZ
2	B	-10	HIS	2.4
1	D	290	ARG	2.4
2	E	295	TYR	2.4
1	D	527	GLU	2.4
1	A	228	ASP	2.4
5	R	10	DC	2.4
2	B	375	VAL	2.3
1	D	299	LYS	2.3
2	E	331	MET	2.3
1	A	174	ASN	2.3
1	D	314	SER	2.3
1	D	229	LEU	2.3
1	D	528	LEU	2.3
2	B	0	GLN	2.3
2	E	338	LYS	2.3
5	M	17	DA	2.2
2	B	-5	GLU	2.2
1	A	53	SER	2.2
2	E	307	LYS	2.2
1	A	303	PHE	2.2
1	D	518	LEU	2.2
2	B	290	GLN	2.2
2	B	312	GLN	2.2
1	D	529	VAL	2.2
1	D	530	TYR	2.2
2	B	291	LYS	2.2
2	B	289	ILE	2.2
2	E	310	ILE	2.2
2	B	474	GLU	2.2
2	B	124	GLY	2.2
1	A	54	GLU	2.2
2	E	0	GLN	2.1
2	B	521	GLU	2.1
2	B	324	SER	2.1
2	B	27	ILE	2.1
2	E	14	MET	2.1
1	A	137	HIS	2.1
1	A	461	LYS	2.1
1	D	228	ASP	2.1
1	D	531	PRO	2.1
1	A	216	PHE	2.1
1	D	119	LEU	2.1

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Mol	Chain	Res	Type	RSRZ
1	D	469	LEU	2.1
1	A	290	ARG	2.1
2	B	305	VAL	2.1
2	E	257	LEU	2.1
1	D	301	ARG	2.1
1	D	250	GLU	2.1
1	D	450	GLU	2.1
3	F	299	SER	2.0
1	D	300	THR	2.0
2	B	440	ASN	2.0
2	B	260	ARG	2.0
2	E	-1	PHE	2.0
2	E	268	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](#)

LIGAND-RSR INFOmissingINFO

6.5 Other polymers [i](#)

There are no such residues in this entry.