Full wwPDB X-ray Structure Validation Report (i)

Jun 16, 2024 – 11:52 PM EDT

PDB ID	:	5JEM
Title	:	Complex of IRF-3 with CBP
Authors	:	Zhao, B.; Li, P.
Deposited on	:	2016-04-18
Resolution	:	2.50 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 (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:

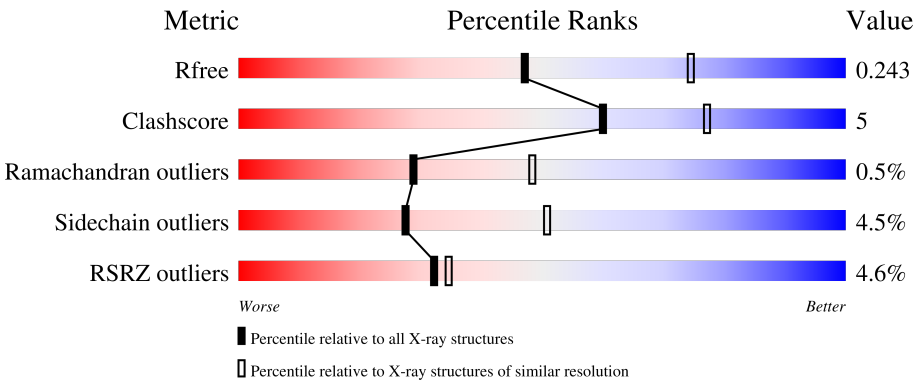
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.37.1
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.37.1

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 2.50 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	4661 (2.50-2.50)
Clashscore	141614	5346 (2.50-2.50)
Ramachandran outliers	138981	5231 (2.50-2.50)
Sidechain outliers	138945	5233 (2.50-2.50)
RSRZ outliers	127900	4559 (2.50-2.50)

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	213	3% 80% 13% • 5%
1	B	213	3% 80% 15% 5%
1	E	213	6% 86% 8% 5%
1	G	213	4% 83% 10% • 6%
2	C	47	2% 77% 11% • 11%

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Mol	Chain	Length	Quality of chain
2	D	47	2% 81% 6% • 11%
2	F	47	15% 70% 17% • 11%
2	H	47	9% 72% 15% • 11%

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 7872 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 Interferon regulatory factor 3.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	203	1589	1014	275	291	9	0	0	0
1	B	203	1589	1014	275	291	9	0	0	0
1	E	203	1589	1014	275	291	9	0	0	0
1	G	200	1567	998	272	288	9	0	0	0

There are 20 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	186	SER	-	expression tag	UNP Q14653
A	187	GLU	-	expression tag	UNP Q14653
A	188	PHE	-	expression tag	UNP Q14653
A	386	GLU	SER	conflict	UNP Q14653
A	396	GLU	SER	conflict	UNP Q14653
B	186	SER	-	expression tag	UNP Q14653
B	187	GLU	-	expression tag	UNP Q14653
B	188	PHE	-	expression tag	UNP Q14653
B	386	GLU	SER	conflict	UNP Q14653
B	396	GLU	SER	conflict	UNP Q14653
E	186	SER	-	expression tag	UNP Q14653
E	187	GLU	-	expression tag	UNP Q14653
E	188	PHE	-	expression tag	UNP Q14653
E	386	GLU	SER	conflict	UNP Q14653
E	396	GLU	SER	conflict	UNP Q14653
G	186	SER	-	expression tag	UNP Q14653
G	187	GLU	-	expression tag	UNP Q14653
G	188	PHE	-	expression tag	UNP Q14653
G	386	GLU	SER	conflict	UNP Q14653
G	396	GLU	SER	conflict	UNP Q14653

- Molecule 2 is a protein called CREB-binding protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	C	42	328	205	61	61	1	0	0	0
2	D	42	328	205	61	61	1	0	0	0
2	F	42	328	205	61	61	1	0	0	0
2	H	42	328	205	61	61	1	0	0	0

- Molecule 3 is water.

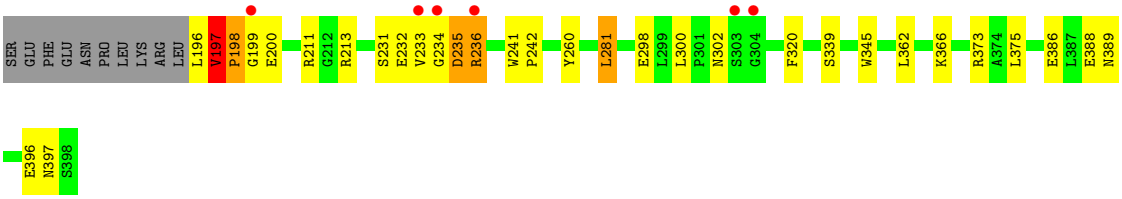
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
3	A	67	67	67	0	0
3	C	8	8	8	0	0
3	B	59	59	59	0	0
3	D	9	9	9	0	0
3	E	33	33	33	0	0
3	F	9	9	9	0	0
3	G	37	37	37	0	0
3	H	4	4	4	0	0

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.

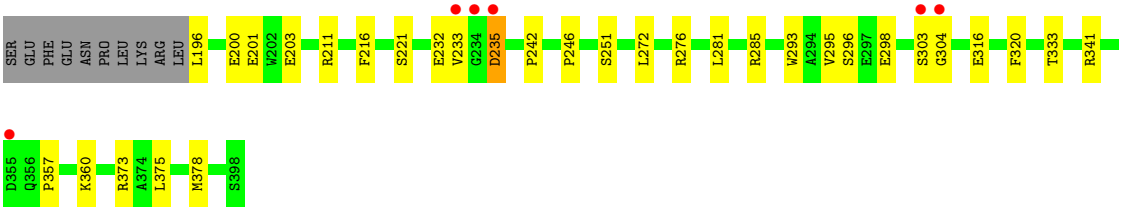
• Molecule 1: Interferon regulatory factor 3

Chain A:



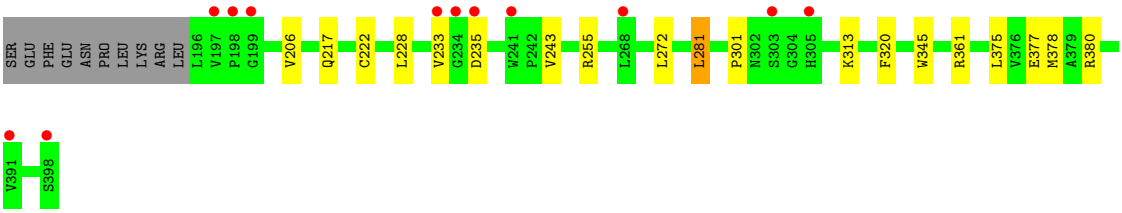
• Molecule 1: Interferon regulatory factor 3

Chain B:



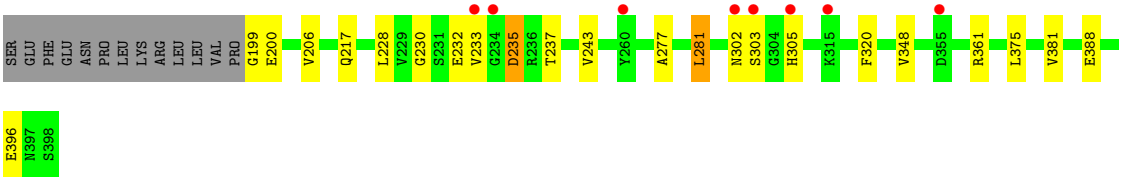
• Molecule 1: Interferon regulatory factor 3

Chain E:



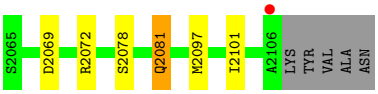
• Molecule 1: Interferon regulatory factor 3

Chain G:



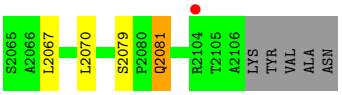
- Molecule 2: CREB-binding protein

Chain C:



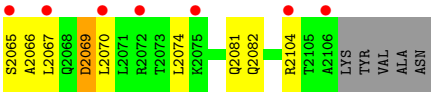
- Molecule 2: CREB-binding protein

Chain D:



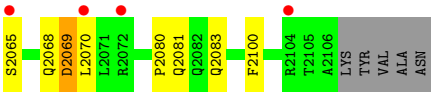
- Molecule 2: CREB-binding protein

Chain F:



- Molecule 2: CREB-binding protein

Chain H:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	85.23Å 88.66Å 92.81Å 90.00° 113.09° 90.00°	Depositor
Resolution (Å)	36.99 – 2.50 78.40 – 2.50	Depositor EDS
% Data completeness (in resolution range)	96.0 (36.99-2.50) 86.2 (78.40-2.50)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	0.79 (at 2.51Å)	Xtriage
Refinement program	PHENIX 1.9_1692	Depositor
R, R_{free}	0.192 , 0.242 0.195 , 0.243	Depositor DCC
R_{free} test set	1988 reflections (4.69%)	wwPDB-VP
Wilson B-factor (Å^2)	40.6	Xtriage
Anisotropy	0.353	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 50.5	EDS
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	7872	wwPDB-VP
Average B, all atoms (Å^2)	62.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.24% 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 (i)

5.1 Standard geometry (i)

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\#\|Z\| >5$	RMSZ	$\#\|Z\| >5$
1	A	0.23	0/1636	0.41	0/2230
1	B	0.23	0/1636	0.39	0/2230
1	E	0.21	0/1636	0.38	0/2230
1	G	0.21	0/1613	0.39	0/2197
2	C	0.22	0/331	0.38	0/446
2	D	0.22	0/331	0.38	0/446
2	F	0.21	0/331	0.39	0/446
2	H	0.20	0/331	0.36	0/446
All	All	0.22	0/7845	0.39	0/10671

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts (i)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1589	0	1538	20	0
1	B	1589	0	1538	19	0
1	E	1589	0	1538	9	0
1	G	1567	0	1511	13	0
2	C	328	0	350	4	0
2	D	328	0	350	3	0
2	F	328	0	350	6	0
2	H	328	0	350	4	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	A	67	0	0	3	0
3	B	59	0	0	3	0
3	C	8	0	0	0	0
3	D	9	0	0	0	0
3	E	33	0	0	1	0
3	F	9	0	0	3	0
3	G	37	0	0	2	0
3	H	4	0	0	0	0
All	All	7872	0	7525	69	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 5.

All (69) 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:F:2082:GLN:NE2	3:F:2202:HOH:O	2.16	0.77
1:A:232:GLU:OE1	3:A:401:HOH:O	2.02	0.77
1:G:302:ASN:HA	1:G:303:SER:HB3	1.70	0.72
2:F:2104:ARG:O	3:F:2201:HOH:O	2.07	0.72
1:A:197:VAL:H	1:A:198:PRO:HD3	1.56	0.71
1:E:377:GLU:OE2	1:E:380:ARG:NH1	2.28	0.67
1:A:300:LEU:O	1:A:302:ASN:ND2	2.29	0.65
1:E:222:CYS:SG	3:E:411:HOH:O	2.54	0.65
1:B:357:PRO:HG2	1:B:360:LYS:HG2	1.80	0.64
2:F:2065:SER:N	3:F:2204:HOH:O	2.31	0.64
1:E:281:LEU:HB2	1:E:320:PHE:HB3	1.80	0.63
1:E:255:ARG:NH2	1:G:381:VAL:O	2.32	0.62
1:A:281:LEU:HB2	1:A:320:PHE:HB3	1.83	0.61
1:B:201:GLU:OE2	3:B:401:HOH:O	2.16	0.59
1:G:281:LEU:HB2	1:G:320:PHE:HB3	1.83	0.59
1:E:313:LYS:NZ	1:G:396:GLU:OE2	2.36	0.58
1:B:281:LEU:HB2	1:B:320:PHE:HB3	1.86	0.58
1:A:233:VAL:HG11	1:A:242:PRO:HG3	1.86	0.57
1:A:234:GLY:O	3:A:402:HOH:O	2.18	0.57
1:G:348:VAL:O	3:G:401:HOH:O	2.17	0.56
1:B:251:SER:OG	3:B:402:HOH:O	2.18	0.56
1:B:200:GLU:O	1:B:276:ARG:NH2	2.38	0.55
1:B:360:LYS:NZ	3:B:408:HOH:O	2.42	0.53
1:G:230:GLY:O	3:G:402:HOH:O	2.19	0.53
1:A:233:VAL:HG12	1:A:236:ARG:HG2	1.91	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:235:ASP:OD2	1:A:235:ASP:N	2.44	0.51
1:G:388:GLU:N	1:G:388:GLU:OE1	2.43	0.51
1:B:298:GLU:OE1	1:B:373:ARG:NH2	2.37	0.50
1:A:231:SER:OG	1:A:232:GLU:N	2.45	0.50
1:B:203:GLU:HG3	1:B:221:SER:HB2	1.94	0.49
2:C:2072:ARG:NE	1:G:233:VAL:O	2.35	0.49
2:C:2069:ASP:OD1	2:C:2072:ARG:NH1	2.46	0.49
1:G:228:LEU:HD23	1:G:243:VAL:HB	1.95	0.48
1:B:235:ASP:OD2	1:B:235:ASP:N	2.43	0.48
1:G:235:ASP:OD2	1:G:235:ASP:N	2.38	0.48
1:A:339:SER:HB2	1:A:386:GLU:HG2	1.96	0.48
2:H:2065:SER:O	2:H:2069:ASP:N	2.39	0.48
1:B:233:VAL:HG11	1:B:242:PRO:HG3	1.95	0.47
2:H:2081:GLN:NE2	2:H:2081:GLN:H	2.13	0.46
2:H:2070:LEU:HD21	2:H:2100:PHE:HB3	1.97	0.46
2:C:2081:GLN:NE2	2:C:2081:GLN:H	2.13	0.46
1:E:301:PRO:HB3	1:E:345:TRP:CD2	2.51	0.46
1:B:203:GLU:OE1	2:D:2079:SER:OG	2.22	0.45
1:E:228:LEU:HD23	1:E:243:VAL:HB	1.98	0.45
1:B:303:SER:HA	1:B:304:GLY:HA2	1.78	0.45
1:E:378:MET:HG3	2:F:2074:LEU:HD21	1.98	0.45
1:A:389:ASN:ND2	3:A:405:HOH:O	2.50	0.44
2:D:2081:GLN:NE2	2:D:2081:GLN:H	2.16	0.44
1:B:293:TRP:HZ3	1:B:295:VAL:HG23	1.83	0.44
1:A:281:LEU:HD12	1:A:281:LEU:HA	1.76	0.44
1:B:216:PHE:HB2	1:B:246:PRO:HG3	2.00	0.44
1:A:388:GLU:OE2	1:B:211:ARG:NH2	2.48	0.43
2:F:2066:ALA:HA	2:F:2069:ASP:HB2	2.01	0.42
1:E:206:VAL:O	1:E:217:GLN:HA	2.19	0.42
2:F:2081:GLN:H	2:F:2081:GLN:NE2	2.18	0.42
1:B:360:LYS:HA	1:B:360:LYS:HD3	1.83	0.42
1:A:345:TRP:CZ2	1:A:366:LYS:HD3	2.56	0.41
1:A:396:GLU:CD	1:B:285:ARG:HH12	2.23	0.41
1:A:241:TRP:CD2	2:H:2080:PRO:HG3	2.56	0.41
1:G:281:LEU:HD12	1:G:281:LEU:HA	1.81	0.41
1:A:260:TYR:HB3	1:A:362:LEU:HD13	2.02	0.41
1:B:296:SER:HA	1:B:341:ARG:HD2	2.03	0.41
1:A:198:PRO:HD2	1:A:200:GLU:HG2	2.02	0.40
1:A:298:GLU:OE1	1:A:373:ARG:NH2	2.47	0.40
1:G:199:GLY:HA2	1:G:277:ALA:HA	2.03	0.40
1:A:198:PRO:HB2	1:A:199:GLY:H	1.60	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:C:2097:MET:O	2:C:2101:ILE:HG12	2.20	0.40
1:B:378:MET:HE1	2:D:2070:LEU:HD13	2.03	0.40
1:G:206:VAL:O	1:G:217:GLN:HA	2.21	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	201/213 (94%)	189 (94%)	10 (5%)	2 (1%)	15	28
1	B	201/213 (94%)	188 (94%)	13 (6%)	0	100	100
1	E	201/213 (94%)	191 (95%)	8 (4%)	2 (1%)	15	28
1	G	198/213 (93%)	180 (91%)	17 (9%)	1 (0%)	29	48
2	C	40/47 (85%)	38 (95%)	2 (5%)	0	100	100
2	D	40/47 (85%)	39 (98%)	1 (2%)	0	100	100
2	F	40/47 (85%)	38 (95%)	2 (5%)	0	100	100
2	H	40/47 (85%)	39 (98%)	1 (2%)	0	100	100
All	All	961/1040 (92%)	902 (94%)	54 (6%)	5 (0%)	29	48

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	197	VAL
1	A	198	PRO
1	E	233	VAL
1	E	235	ASP
1	G	305	HIS

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	170/180 (94%)	161 (95%)	9 (5%)	22	43
1	B	170/180 (94%)	163 (96%)	7 (4%)	30	55
1	E	170/180 (94%)	166 (98%)	4 (2%)	49	74
1	G	167/180 (93%)	160 (96%)	7 (4%)	30	54
2	C	38/42 (90%)	36 (95%)	2 (5%)	22	43
2	D	38/42 (90%)	36 (95%)	2 (5%)	22	43
2	F	38/42 (90%)	35 (92%)	3 (8%)	12	24
2	H	38/42 (90%)	35 (92%)	3 (8%)	12	24
All	All	829/888 (93%)	792 (96%)	37 (4%)	27	51

All (37) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	196	LEU
1	A	197	VAL
1	A	211	ARG
1	A	213	ARG
1	A	235	ASP
1	A	236	ARG
1	A	281	LEU
1	A	375	LEU
1	A	397	ASN
2	C	2078	SER
2	C	2081	GLN
1	B	196	LEU
1	B	232	GLU
1	B	235	ASP
1	B	272	LEU
1	B	316	GLU
1	B	333	THR
1	B	375	LEU
2	D	2067	LEU

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Mol	Chain	Res	Type
2	D	2081	GLN
1	E	272	LEU
1	E	281	LEU
1	E	361	ARG
1	E	375	LEU
2	F	2067	LEU
2	F	2069	ASP
2	F	2070	LEU
1	G	200	GLU
1	G	232	GLU
1	G	235	ASP
1	G	237	THR
1	G	281	LEU
1	G	361	ARG
1	G	375	LEU
2	H	2068	GLN
2	H	2069	ASP
2	H	2083	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (20) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	218	GLN
1	A	284	GLN
1	A	302	ASN
1	A	397	ASN
2	C	2081	GLN
2	C	2084	GLN
2	C	2088	ASN
1	B	218	GLN
1	B	284	GLN
2	D	2081	GLN
2	D	2083	GLN
1	E	284	GLN
2	F	2081	GLN
2	F	2084	GLN
2	F	2088	ASN
1	G	218	GLN
1	G	284	GLN
2	H	2081	GLN
2	H	2084	GLN
2	H	2088	ASN

5.3.3 RNA (i)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains (i)

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

There are no ligands in this entry.

5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data (i)

6.1 Protein, DNA and RNA chains (i)

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled 'Q< 0.9' lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å^2)	Q<0.9
1	A	203/213 (95%)	0.25	6 (2%)	50	53	29, 46, 97, 130	0
1	B	203/213 (95%)	0.27	6 (2%)	50	53	29, 48, 97, 150	0
1	E	203/213 (95%)	0.38	12 (5%)	22	23	37, 63, 116, 152	0
1	G	200/213 (93%)	0.40	8 (4%)	38	41	38, 65, 107, 139	0
2	C	42/47 (89%)	0.28	1 (2%)	59	62	36, 56, 91, 125	0
2	D	42/47 (89%)	0.17	1 (2%)	59	62	36, 57, 86, 128	0
2	F	42/47 (89%)	0.56	7 (16%)	1	1	50, 74, 115, 133	0
2	H	42/47 (89%)	0.77	4 (9%)	8	8	47, 89, 122, 137	0
All	All	977/1040 (93%)	0.35	45 (4%)	32	34	29, 58, 111, 152	0

All (45) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	E	398	SER	11.0
1	G	234	GLY	9.7
1	B	234	GLY	9.0
1	G	233	VAL	7.9
1	B	233	VAL	7.7
1	B	303	SER	7.0
1	E	234	GLY	5.0
1	A	233	VAL	4.6
1	A	234	GLY	4.4
1	E	198	PRO	4.2
2	F	2065	SER	4.1
2	H	2065	SER	3.5
1	A	303	SER	3.4
2	F	2106	ALA	3.3
1	E	199	GLY	3.2
2	H	2072	ARG	3.2

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Mol	Chain	Res	Type	RSRZ
1	G	302	ASN	3.1
1	A	304	GLY	3.1
2	F	2075	LYS	3.1
1	G	305	HIS	2.9
1	B	304	GLY	2.9
1	E	233	VAL	2.7
1	E	305	HIS	2.7
1	E	241	TRP	2.7
1	B	235	ASP	2.6
1	E	197	VAL	2.5
1	G	303	SER	2.5
2	D	2104	ARG	2.5
2	H	2104	ARG	2.4
2	H	2070	LEU	2.4
1	A	236	ARG	2.4
1	G	355	ASP	2.4
1	G	260	TYR	2.4
1	A	199	GLY	2.3
2	F	2072	ARG	2.3
2	F	2104	ARG	2.3
2	F	2070	LEU	2.3
2	C	2106	ALA	2.2
2	F	2067	LEU	2.2
1	E	303	SER	2.2
1	E	235	ASP	2.2
1	B	355	ASP	2.1
1	E	268	LEU	2.1
1	E	391	VAL	2.1
1	G	315	LYS	2.1

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.