



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 11:37 PM UTC

PDB ID : 5AQN / pdb_00005aqn
Title : Fragment-based screening of HSP70 sheds light on the functional role of ATP-binding site residues
Authors : Jones, A.M.; Westwood, I.M.; Osborne, J.D.; Matthews, T.P.; Cheeseman, M.D.; Rowlands, M.G.; Jeganathan, F.; Burke, R.; Lee, D.; Kadi, N.; Liu, M.; Richards, M.; McAndrew, C.; Yahya, N.; Dobson, S.E.; Jones, K.; Workman, P.; Collins, I.; van Montfort, R.L.M.
Deposited on : 2015-09-22
Resolution : 2.45 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:

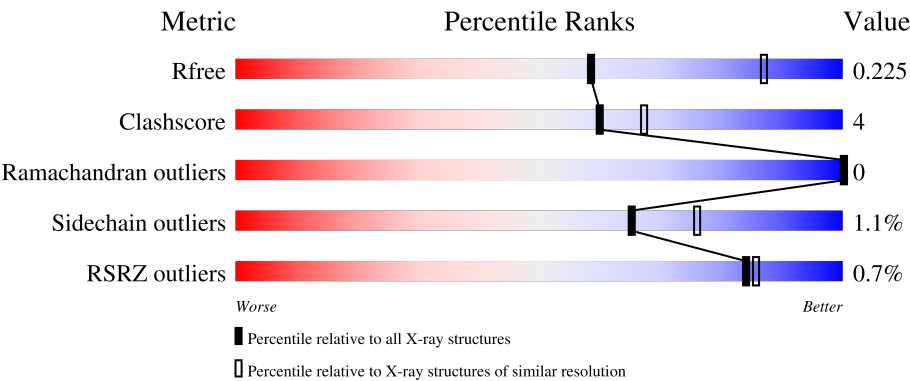
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)

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 2.45 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}	180053	1190 (2.46-2.46)
Clashscore	190562	1229 (2.46-2.46)
Ramachandran outliers	187476	1218 (2.46-2.46)
Sidechain outliers	187428	1218 (2.46-2.46)
RSRZ outliers	180081	1190 (2.46-2.46)

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	386	89%9%..
1	C	386	90%8%..
1	E	386	%90%9%.
2	B	118	83%12%..

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
2	D	118	3% 87% 7% 6%
2	F	118	% 88% 8% •

2 Entry composition

There are 8 unique types of molecules in this entry. The entry contains 11530 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 HEAT SHOCK COGNATE 71 KDA PROTEIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	381	Total	C	N	O	S	0	0	0
			2902	1826	500	567	9			
1	C	382	Total	C	N	O	S	0	0	0
			2907	1824	504	570	9			
1	E	382	Total	C	N	O	S	0	0	0
			2817	1764	487	557	9			

There are 15 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-4	GLY	-	expression tag	UNP P11142
A	-3	PRO	-	expression tag	UNP P11142
A	-2	LEU	-	expression tag	UNP P11142
A	-1	GLY	-	expression tag	UNP P11142
A	0	SER	-	expression tag	UNP P11142
C	-4	GLY	-	expression tag	UNP P11142
C	-3	PRO	-	expression tag	UNP P11142
C	-2	LEU	-	expression tag	UNP P11142
C	-1	GLY	-	expression tag	UNP P11142
C	0	SER	-	expression tag	UNP P11142
E	-4	GLY	-	expression tag	UNP P11142
E	-3	PRO	-	expression tag	UNP P11142
E	-2	LEU	-	expression tag	UNP P11142
E	-1	GLY	-	expression tag	UNP P11142
E	0	SER	-	expression tag	UNP P11142

- Molecule 2 is a protein called BAG FAMILY MOLECULAR CHAPERONE REGULATOR 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	113	Total	C	N	O	S	0	0	1
			852	540	143	165	4			

Continued on next page...

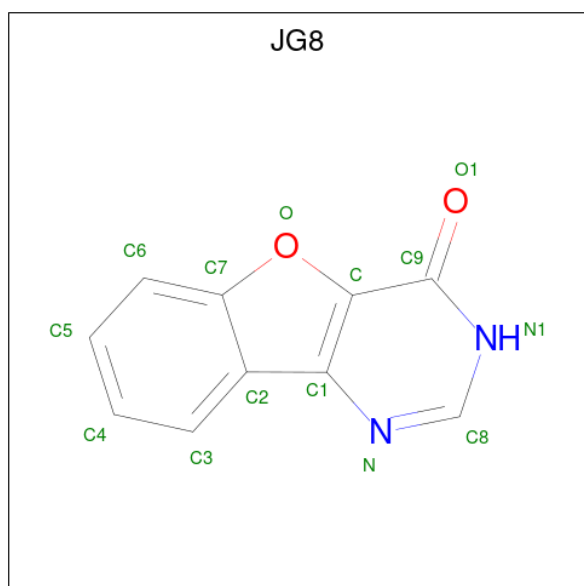
Continued from previous page...

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	D	111	Total	C	N	O	S	0	0	0
			831	528	140	159	4			
2	F	113	Total	C	N	O	S	0	0	1
			853	540	140	169	4			

There are 15 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	146	GLY	-	expression tag	UNP Q99933
B	147	PRO	-	expression tag	UNP Q99933
B	148	LEU	-	expression tag	UNP Q99933
B	149	GLY	-	expression tag	UNP Q99933
B	150	SER	-	expression tag	UNP Q99933
D	146	GLY	-	expression tag	UNP Q99933
D	147	PRO	-	expression tag	UNP Q99933
D	148	LEU	-	expression tag	UNP Q99933
D	149	GLY	-	expression tag	UNP Q99933
D	150	SER	-	expression tag	UNP Q99933
F	146	GLY	-	expression tag	UNP Q99933
F	147	PRO	-	expression tag	UNP Q99933
F	148	LEU	-	expression tag	UNP Q99933
F	149	GLY	-	expression tag	UNP Q99933
F	150	SER	-	expression tag	UNP Q99933

- Molecule 3 is BENZOFURO[3,2-D]PYRIMIDIN-4(3H)-ONE (CCD ID: JG8) (formula: $C_{10}H_6N_2O_2$).



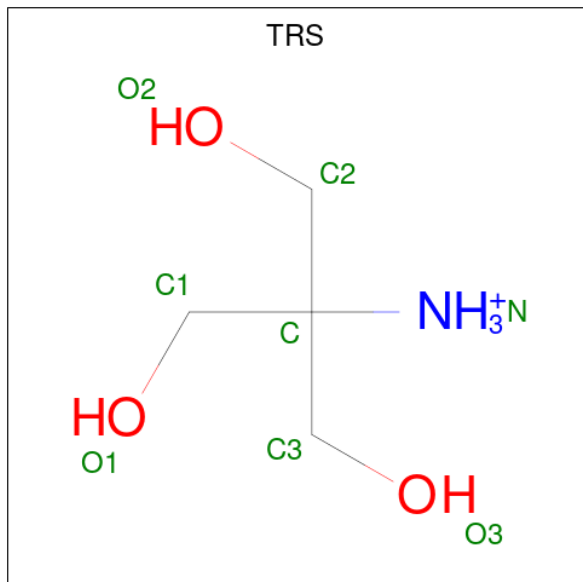
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			14	10	2	2		
3	C	1	Total	C	N	O	0	0
			14	10	2	2		
3	E	1	Total	C	N	O	0	0
			14	10	2	2		

- Molecule 4 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).



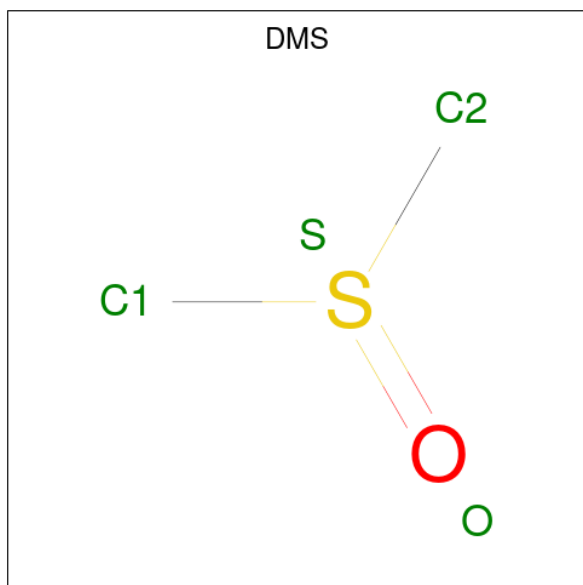
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			6	3	3		
4	A	1	Total	C	O	0	0
			6	3	3		
4	A	1	Total	C	O	0	0
			6	3	3		
4	B	1	Total	C	O	0	0
			6	3	3		
4	C	1	Total	C	O	0	0
			6	3	3		
4	C	1	Total	C	O	0	0
			6	3	3		
4	D	1	Total	C	O	0	0
			6	3	3		
4	E	1	Total	C	O	0	0
			6	3	3		
4	F	1	Total	C	O	0	0
			6	3	3		

- Molecule 5 is 2-AMINO-2-HYDROXYMETHYL-PROPANE-1,3-DIOL (CCD ID: TRS) (formula: $C_4H_{12}NO_3$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	A	1	Total	C	N	O	0	0
			8	4	1	3		
5	C	1	Total	C	N	O	0	0
			8	4	1	3		
5	E	1	Total	C	N	O	0	0
			8	4	1	3		

- Molecule 6 is DIMETHYL SULFOXIDE (CCD ID: DMS) (formula: C_2H_6OS).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	1	Total C O S 4 2 1 1	0	0
6	C	1	Total C O S 4 2 1 1	0	0
6	E	1	Total C O S 4 2 1 1	0	0

- Molecule 7 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	C	1	Total Cl 1 1	0	0

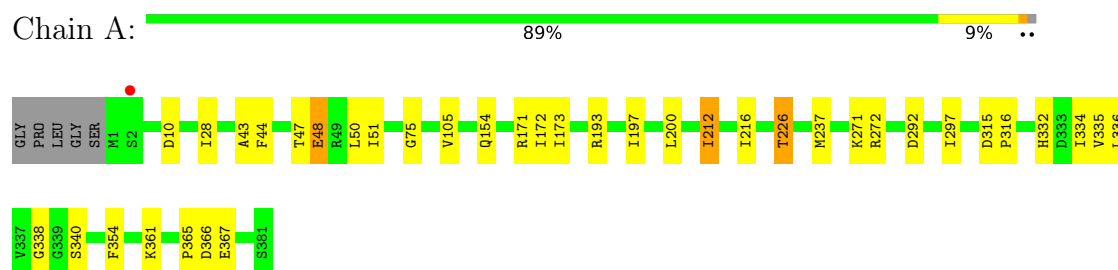
- Molecule 8 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	A	107	Total O 107 107	0	0
8	B	20	Total O 20 20	0	0
8	C	63	Total O 63 63	0	0
8	D	11	Total O 11 11	0	0
8	E	28	Total O 28 28	0	0
8	F	6	Total O 6 6	0	0

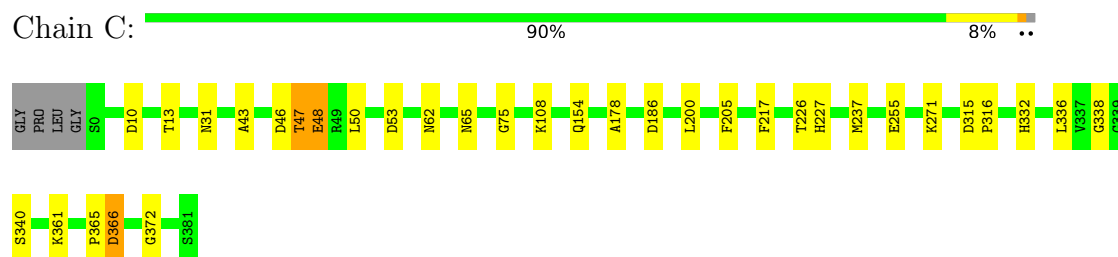
3 Residue-property plots [i](#)

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.

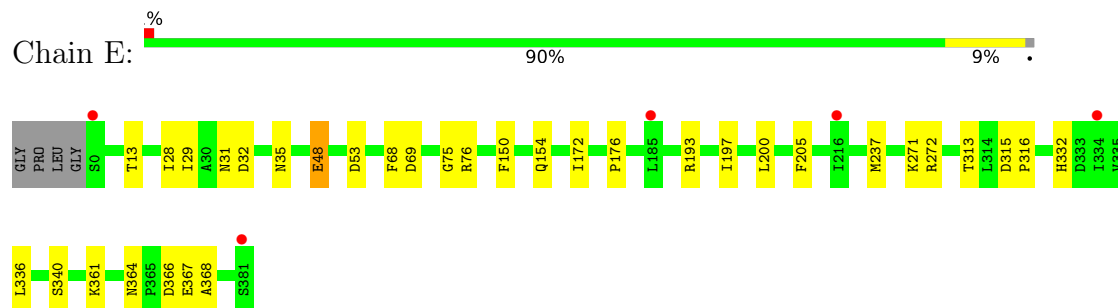
• Molecule 1: HEAT SHOCK COGNATE 71 KDA PROTEIN



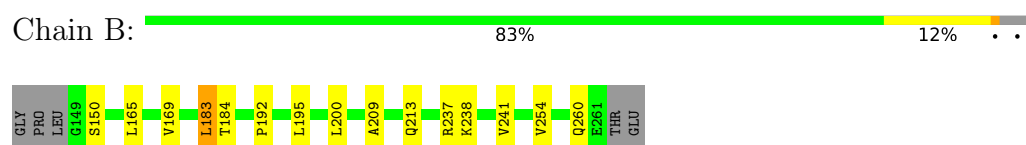
• Molecule 1: HEAT SHOCK COGNATE 71 KDA PROTEIN



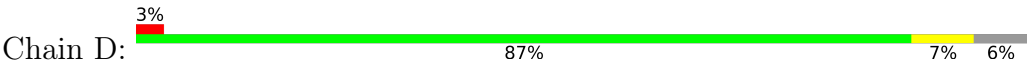
• Molecule 1: HEAT SHOCK COGNATE 71 KDA PROTEIN



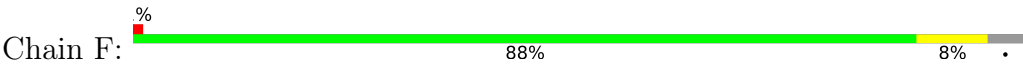
• Molecule 2: BAG FAMILY MOLECULAR CHAPERONE REGULATOR 1



● Molecule 2: BAG FAMILY MOLECULAR CHAPERONE REGULATOR 1



● Molecule 2: BAG FAMILY MOLECULAR CHAPERONE REGULATOR 1



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	233.29Å 41.03Å 205.25Å 90.00° 123.13° 90.00°	Depositor
Resolution (Å)	48.84 – 2.45 48.84 – 2.45	Depositor EDS
% Data completeness (in resolution range)	99.9 (48.84-2.45) 99.9 (48.84-2.45)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.38 (at 2.45Å)	Xtriage
Refinement program	BUSTER 2.10.2	Depositor
R, R_{free}	0.193 , 0.228 (Not available) , 0.225	Depositor DCC
R_{free} test set	3008 reflections (4.92%)	wwPDB-VP
Wilson B-factor (Å ²)	44.9	Xtriage
Anisotropy	0.220	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 53.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	0.017 for h,-k,-h-l	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	11530	wwPDB-VP
Average B, all atoms (Å ²)	59.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 11.51% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: CL, DMS, GOL, JG8, TRS

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	0.78	0/2948	1.21	3/3991 (0.1%)
1	C	0.75	0/2953	1.20	3/4000 (0.1%)
1	E	0.75	0/2862	1.22	6/3892 (0.2%)
2	B	0.89	1/859 (0.1%)	1.43	4/1159 (0.3%)
2	D	0.87	0/838	1.42	0/1132
2	F	0.88	1/860 (0.1%)	1.45	0/1162
All	All	0.79	2/11320 (0.0%)	1.26	16/15336 (0.1%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	260	GLN	C-N	-5.52	1.25	1.33
2	F	260	GLN	C-N	-5.42	1.25	1.33

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	48	GLU	N-CA-C	7.04	117.89	108.38
1	A	48	GLU	N-CA-C	6.30	116.89	108.38
1	C	47	THR	N-CA-C	6.20	118.12	111.36
1	E	48	GLU	N-CA-C	5.98	115.98	108.45
2	B	254	VAL	CA-C-N	5.92	128.49	120.38
2	B	254	VAL	C-N-CA	5.92	128.49	120.38
1	E	368	ALA	N-CA-C	5.82	117.62	111.28
1	C	332	HIS	N-CA-C	5.74	117.34	111.14
1	E	29	ILE	N-CA-C	5.63	116.21	107.99
1	E	172	ILE	N-CA-C	-5.29	100.12	107.80
2	B	150	SER	CA-C-N	5.07	128.30	121.05
2	B	150	SER	C-N-CA	5.07	128.30	121.05
1	A	272	ARG	CA-C-N	5.02	127.00	120.28

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	272	ARG	C-N-CA	5.02	127.00	120.28
1	E	272	ARG	CA-C-N	5.00	126.99	120.28
1	E	272	ARG	C-N-CA	5.00	126.99	120.28

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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	2902	0	2842	26	0
1	C	2907	0	2839	28	0
1	E	2817	0	2645	20	0
2	B	852	0	831	11	0
2	D	831	0	803	8	0
2	F	853	0	820	7	0
3	A	14	0	0	0	0
3	C	14	0	0	0	0
3	E	14	0	0	0	0
4	A	18	0	24	2	0
4	B	6	0	8	0	0
4	C	12	0	16	0	0
4	D	6	0	8	0	0
4	E	6	0	8	3	0
4	F	6	0	8	1	0
5	A	8	0	12	2	0
5	C	8	0	12	1	0
5	E	8	0	12	0	0
6	A	4	0	6	1	0
6	C	4	0	6	0	0
6	E	4	0	6	2	0
7	C	1	0	0	0	0
8	A	107	0	0	1	0
8	B	20	0	0	0	0
8	C	63	0	0	1	0
8	D	11	0	0	0	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
8	E	28	0	0	0	0
8	F	6	0	0	0	0
All	All	11530	0	10906	95	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 (95) 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:C:47:THR:HG23	2:D:205:ARG:HH12	1.36	0.89
1:A:315:ASP:HB2	1:A:316:PRO:HD3	1.55	0.88
1:C:46:ASP:O	1:C:108:LYS:HG2	1.76	0.85
2:D:209:ALA:O	2:D:213:GLN:HG3	1.77	0.84
1:C:47:THR:HG23	2:D:205:ARG:NH1	1.96	0.80
1:E:315:ASP:HB2	1:E:316:PRO:HD3	1.67	0.77
1:E:205:PHE:HE2	1:E:316:PRO:HG2	1.48	0.77
5:A:1386:TRS:H12	8:A:2007:HOH:O	1.87	0.74
1:C:237:MET:HE1	1:C:271:LYS:HB2	1.71	0.72
1:C:75:GLY:HA3	1:C:154:GLN:HA	1.72	0.72
1:C:46:ASP:HA	1:C:108:LYS:HA	1.73	0.70
1:A:47:THR:OG1	1:A:48:GLU:OE1	2.07	0.70
1:C:47:THR:CG2	2:D:205:ARG:HH12	2.05	0.69
1:E:31:ASN:OD1	1:E:35:ASN:N	2.25	0.69
1:C:315:ASP:HB2	1:C:316:PRO:HD3	1.74	0.69
1:C:10:ASP:OD2	5:C:1385:TRS:H12	1.96	0.66
2:B:209:ALA:O	2:B:213:GLN:HG3	1.97	0.64
2:B:183:LEU:C	2:B:183:LEU:HD13	2.23	0.64
1:C:46:ASP:OD1	1:C:47:THR:HG23	1.99	0.63
2:D:258:ILE:HG22	2:D:259:CYS:SG	2.39	0.63
1:A:237:MET:HE1	1:A:271:LYS:HB2	1.80	0.62
1:E:76:ARG:HH21	6:E:1385:DMS:H23	1.65	0.62
1:A:10:ASP:OD2	5:A:1386:TRS:H32	2.00	0.62
2:F:149:GLY:N	4:F:1261:GOL:HO1	1.98	0.61
1:A:315:ASP:HB2	1:A:316:PRO:CD	2.31	0.60
1:A:171:ARG:HD2	1:A:173:ILE:HG22	1.83	0.59
2:D:192:PRO:HD2	2:D:195:LEU:HB2	1.84	0.59
2:F:191:LEU:HD23	2:F:196:GLN:HA	1.85	0.59
1:E:237:MET:HE1	1:E:271:LYS:HB2	1.85	0.58
1:E:75:GLY:HA3	1:E:154:GLN:HA	1.86	0.58
1:A:171:ARG:CD	1:A:173:ILE:HG22	2.35	0.56

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:75:GLY:HA3	1:A:154:GLN:HA	1.86	0.56
1:A:292:ASP:OD1	2:B:238:LYS:NZ	2.37	0.56
1:E:315:ASP:N	1:E:316:PRO:CD	2.69	0.55
1:C:336:LEU:HD12	1:C:361:LYS:HB3	1.87	0.55
2:B:183:LEU:CD2	2:B:200:LEU:HD22	2.37	0.55
4:E:1383:GOL:H12	2:F:245:GLN:NE2	2.21	0.55
1:E:313:THR:C	1:E:316:PRO:HD2	2.31	0.55
1:A:75:GLY:H	4:A:1385:GOL:H32	1.72	0.55
1:A:171:ARG:HD2	1:A:173:ILE:CG2	2.37	0.54
1:C:46:ASP:OD1	1:C:47:THR:N	2.40	0.54
2:B:183:LEU:HD22	2:B:200:LEU:CD2	2.39	0.52
4:E:1383:GOL:H12	2:F:245:GLN:HE21	1.73	0.52
1:C:47:THR:OG1	1:C:48:GLU:OE1	2.28	0.52
1:E:336:LEU:HD12	1:E:361:LYS:HB3	1.92	0.52
1:E:31:ASN:ND2	1:E:53:ASP:OD2	2.39	0.51
1:E:205:PHE:CE2	1:E:316:PRO:HG2	2.38	0.51
1:A:193:ARG:HA	1:A:332:HIS:ND1	2.26	0.50
1:C:47:THR:CG2	2:D:205:ARG:NH1	2.67	0.50
1:C:255:GLU:HB2	8:C:2039:HOH:O	2.11	0.50
4:E:1383:GOL:C1	2:F:245:GLN:HE21	2.24	0.50
1:A:171:ARG:HG2	1:A:172:ILE:N	2.27	0.50
2:F:230:PHE:HB3	2:F:233:SER:HB2	1.94	0.49
1:E:150:PHE:HE1	6:E:1385:DMS:H21	1.77	0.48
1:A:336:LEU:HD12	1:A:361:LYS:HB3	1.94	0.48
1:E:28:ILE:HG13	1:E:367:GLU:OE1	2.14	0.48
1:C:46:ASP:O	1:C:108:LYS:CG	2.56	0.48
1:A:44:PHE:CD2	1:A:105:VAL:HG21	2.50	0.47
1:A:200:LEU:HG	1:A:340:SER:HB2	1.97	0.47
2:B:237:ARG:O	2:B:241:VAL:HG23	2.16	0.46
1:A:334:ILE:HD13	1:A:354:PHE:CD2	2.51	0.45
1:E:364:ASN:HD22	1:E:367:GLU:CD	2.23	0.45
1:C:186:ASP:HB3	1:C:217:PHE:CZ	2.51	0.45
1:E:176:PRO:CB	1:E:197:ILE:HG13	2.47	0.45
1:C:62:ASN:ND2	1:C:65:ASN:HB2	2.32	0.44
2:B:183:LEU:HD23	2:B:200:LEU:HD22	1.98	0.44
1:A:338:GLY:O	1:A:365:PRO:HB2	2.18	0.44
1:C:200:LEU:HG	1:C:340:SER:HB2	2.00	0.43
1:C:338:GLY:O	1:C:365:PRO:HB2	2.18	0.43
1:A:75:GLY:HA2	4:A:1385:GOL:H11	1.99	0.43
1:A:338:GLY:C	1:A:365:PRO:HB2	2.44	0.43
1:C:31:ASN:ND2	1:C:53:ASP:OD2	2.44	0.43

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:192:PRO:HD2	2:B:195:LEU:HD12	2.01	0.43
1:C:226:THR:HG22	1:C:227:HIS:CE1	2.54	0.42
1:A:212:ILE:HA	1:A:216:ILE:O	2.19	0.42
1:E:193:ARG:HA	1:E:332:HIS:ND1	2.34	0.42
2:F:209:ALA:O	2:F:213:GLN:HG3	2.19	0.42
1:E:200:LEU:HG	1:E:340:SER:HB2	2.01	0.42
1:A:43:ALA:HB3	1:A:50:LEU:HB2	2.01	0.42
1:C:46:ASP:OD1	2:D:205:ARG:NH1	2.53	0.42
1:C:62:ASN:HD21	1:C:65:ASN:HB2	1.84	0.42
2:B:183:LEU:HD13	2:B:184:THR:N	2.34	0.42
1:C:205:PHE:HE2	1:C:316:PRO:HG2	1.85	0.42
2:B:165:LEU:O	2:B:169:VAL:HG23	2.20	0.42
1:E:32:ASP:OD1	1:E:32:ASP:N	2.52	0.42
1:A:197:ILE:HD13	1:A:335:VAL:HB	2.01	0.41
1:C:178:ALA:O	1:C:372:GLY:HA3	2.19	0.41
1:C:366:ASP:OD1	1:C:366:ASP:N	2.42	0.41
1:A:226:THR:HG22	6:A:1387:DMS:C1	2.50	0.41
1:A:28:ILE:HG13	1:A:367:GLU:OE1	2.21	0.41
2:B:183:LEU:C	2:B:183:LEU:CD1	2.93	0.40
1:C:43:ALA:HB3	1:C:50:LEU:HB2	2.03	0.40
1:E:68:PHE:O	1:E:69:ASP:HB2	2.20	0.40
1:A:315:ASP:CB	1:A:316:PRO:HD3	2.36	0.40
1:E:315:ASP:N	1:E:316:PRO:HD2	2.36	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	379/386 (98%)	375 (99%)	4 (1%)	0	100	100
1	C	380/386 (98%)	377 (99%)	3 (1%)	0	100	100

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	E	380/386 (98%)	376 (99%)	4 (1%)	0	100	100
2	B	111/118 (94%)	110 (99%)	1 (1%)	0	100	100
2	D	109/118 (92%)	107 (98%)	2 (2%)	0	100	100
2	F	111/118 (94%)	111 (100%)	0	0	100	100
All	All	1470/1512 (97%)	1456 (99%)	14 (1%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

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	300/319 (94%)	295 (98%)	5 (2%)	53	67
1	C	302/319 (95%)	300 (99%)	2 (1%)	76	84
1	E	277/319 (87%)	274 (99%)	3 (1%)	65	76
2	B	86/107 (80%)	85 (99%)	1 (1%)	63	74
2	D	82/107 (77%)	81 (99%)	1 (1%)	63	74
2	F	86/107 (80%)	86 (100%)	0	100	100
All	All	1133/1278 (89%)	1121 (99%)	12 (1%)	65	76

All (12) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	51	ILE
1	A	212	ILE
1	A	226	THR
1	A	297	ILE
1	A	366	ASP
2	B	183	LEU
1	C	13	THR
1	C	366	ASP
2	D	183	LEU

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	E	13	THR
1	E	48	GLU
1	E	366	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (15) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	249	HIS
2	B	245	GLN
1	C	22	GLN
1	C	168	ASN
1	C	249	HIS
2	D	151	ASN
2	D	175	GLN
2	D	245	GLN
1	E	65	ASN
1	E	168	ASN
1	E	227	HIS
1	E	240	HIS
2	F	245	GLN
2	F	256	GLN
2	F	260	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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 19 ligands modelled in this entry, 1 is monoatomic - leaving 18 for Mogul analysis.

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	$\# Z > 2$
3	JG8	E	1382	-	15,16,16	0.41	0	22,23,23	2.92	5 (22%)
4	GOL	C	1384	-	5,5,5	0.10	0	5,5,5	0.17	0
5	TRS	C	1385	-	7,7,7	0.27	0	9,9,9	0.29	0
3	JG8	A	1382	-	15,16,16	0.46	0	22,23,23	2.92	5 (22%)
4	GOL	F	1261	-	5,5,5	0.16	0	5,5,5	0.67	0
4	GOL	A	1384	-	5,5,5	0.17	0	5,5,5	0.61	0
6	DMS	E	1385	-	3,3,3	0.31	0	3,3,3	0.44	0
4	GOL	D	1261	-	5,5,5	0.17	0	5,5,5	0.28	0
4	GOL	C	1383	-	5,5,5	0.18	0	5,5,5	0.41	0
4	GOL	E	1383	-	5,5,5	0.06	0	5,5,5	0.36	0
4	GOL	A	1383	-	5,5,5	0.20	0	5,5,5	0.67	0
5	TRS	A	1386	-	7,7,7	0.27	0	9,9,9	0.40	0
4	GOL	A	1385	-	5,5,5	0.09	0	5,5,5	0.37	0
4	GOL	B	1261	-	5,5,5	0.09	0	5,5,5	0.44	0
5	TRS	E	1384	-	7,7,7	0.29	0	9,9,9	0.35	0
6	DMS	A	1387	-	3,3,3	0.30	0	3,3,3	0.59	0
3	JG8	C	1382	-	15,16,16	0.47	0	22,23,23	2.93	5 (22%)
6	DMS	C	1386	-	3,3,3	0.26	0	3,3,3	0.34	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	GOL	C	1384	-	-	0/4/4/4	-
3	JG8	E	1382	-	-	-	0/3/3/3
5	TRS	C	1385	-	-	0/9/9/9	-
4	GOL	F	1261	-	-	0/4/4/4	-
3	JG8	A	1382	-	-	-	0/3/3/3
3	JG8	C	1382	-	-	-	0/3/3/3
4	GOL	A	1384	-	-	0/4/4/4	-
4	GOL	D	1261	-	-	0/4/4/4	-
4	GOL	C	1383	-	-	0/4/4/4	-

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	GOL	E	1383	-	-	0/4/4/4	-
5	TRS	A	1386	-	-	3/9/9/9	-
4	GOL	A	1385	-	-	1/4/4/4	-
4	GOL	B	1261	-	-	0/4/4/4	-
5	TRS	E	1384	-	-	0/9/9/9	-
4	GOL	A	1383	-	-	3/4/4/4	-

There are no bond length outliers.

All (15) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	1382	JG8	C1-C-C9	-9.66	116.13	123.71
3	C	1382	JG8	C1-C-C9	-9.66	116.13	123.71
3	E	1382	JG8	C1-C-C9	-9.57	116.20	123.71
3	E	1382	JG8	C-C1-N	6.77	128.93	124.17
3	C	1382	JG8	C-C1-N	6.72	128.89	124.17
3	A	1382	JG8	C-C1-N	6.66	128.85	124.17
3	C	1382	JG8	C2-C1-C	-5.36	104.17	106.14
3	E	1382	JG8	C2-C1-C	-5.32	104.19	106.14
3	A	1382	JG8	C2-C1-C	-5.27	104.20	106.14
3	A	1382	JG8	O-C-C9	3.43	130.42	124.00
3	C	1382	JG8	O-C-C9	3.42	130.40	124.00
3	E	1382	JG8	O-C-C9	3.36	130.29	124.00
3	C	1382	JG8	C7-C2-C1	2.20	106.89	104.88
3	A	1382	JG8	C7-C2-C1	2.12	106.82	104.88
3	E	1382	JG8	C7-C2-C1	2.10	106.80	104.88

There are no chirality outliers.

All (7) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	1383	GOL	C1-C2-C3-O3
4	A	1383	GOL	O2-C2-C3-O3
5	A	1386	TRS	N-C-C3-O3
5	A	1386	TRS	C1-C-C3-O3
5	A	1386	TRS	C2-C-C3-O3
4	A	1383	GOL	O1-C1-C2-C3
4	A	1385	GOL	O2-C2-C3-O3

There are no ring outliers.

7 monomers are involved in 12 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	C	1385	TRS	1	0
4	F	1261	GOL	1	0
6	E	1385	DMS	2	0
4	E	1383	GOL	3	0
5	A	1386	TRS	2	0
4	A	1385	GOL	2	0
6	A	1387	DMS	1	0

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	381/386 (98%)	-0.34	1 (0%) 90 91	31, 48, 67, 85	0
1	C	382/386 (98%)	-0.20	0 100 100	42, 56, 76, 91	0
1	E	382/386 (98%)	0.21	5 (1%) 75 77	42, 73, 98, 124	0
2	B	113/118 (95%)	-0.32	0 100 100	34, 48, 71, 121	0
2	D	111/118 (94%)	0.00	4 (3%) 46 46	43, 59, 94, 103	0
2	F	113/118 (95%)	-0.13	1 (0%) 81 82	41, 55, 92, 117	0
All	All	1482/1512 (98%)	-0.12	11 (0%) 84 86	31, 56, 89, 124	0

All (11) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	E	381	SER	3.3
2	D	260	GLN	3.3
1	E	0	SER	2.7
1	E	334	ILE	2.4
1	A	2	SER	2.3
1	E	216	ILE	2.3
2	D	150	SER	2.3
2	D	179	LEU	2.2
2	D	186	ILE	2.2
2	F	192	PRO	2.1
1	E	185	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 ⓘ

There are no oligosaccharides in this entry.

6.4 Ligands ⓘ

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
4	GOL	A	1384	6/6	0.76	0.15	58,66,71,73	0
4	GOL	C	1384	6/6	0.77	0.15	85,88,89,89	0
4	GOL	D	1261	6/6	0.78	0.14	52,68,73,75	0
5	TRS	E	1384	8/8	0.80	0.17	80,82,90,92	0
5	TRS	A	1386	8/8	0.84	0.12	52,63,65,65	0
4	GOL	A	1385	6/6	0.84	0.17	76,77,80,82	0
4	GOL	B	1261	6/6	0.85	0.13	68,72,79,83	0
4	GOL	F	1261	6/6	0.85	0.11	58,70,77,81	0
6	DMS	A	1387	4/4	0.86	0.21	77,80,80,81	0
3	JG8	E	1382	14/14	0.87	0.10	66,74,77,78	0
4	GOL	C	1383	6/6	0.89	0.13	55,59,60,61	0
5	TRS	C	1385	8/8	0.90	0.10	60,73,74,74	0
6	DMS	C	1386	4/4	0.90	0.19	96,97,98,98	0
3	JG8	A	1382	14/14	0.92	0.08	42,54,57,59	0
6	DMS	E	1385	4/4	0.92	0.17	109,110,110,111	0
7	CL	C	1387	1/1	0.92	0.08	64,64,64,64	0
3	JG8	C	1382	14/14	0.93	0.08	51,56,58,61	0
4	GOL	A	1383	6/6	0.93	0.11	44,48,52,52	0
4	GOL	E	1383	6/6	0.94	0.09	56,56,61,66	0

6.5 Other polymers ⓘ

There are no such residues in this entry.