



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 03:26 PM UTC

PDB ID : 2FSY / pdb_00002fsy
Title : Bacteriophage HK97 Pepsin-treated Expansion Intermediate IV
Authors : Gan, L.; Speir, J.A.; Conway, J.F.; Lander, G.; Cheng, N.; Firek, B.A.; Hendrix, R.W.; Duda, R.L.; Liljas, L.; Johnson, J.E.
Deposited on : 2006-01-23
Resolution : 3.80 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	:	NOT EXECUTED
Xtriage (Phenix)	:	2.0
EDS	:	NOT EXECUTED
Buster-report	:	NOT EXECUTED
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

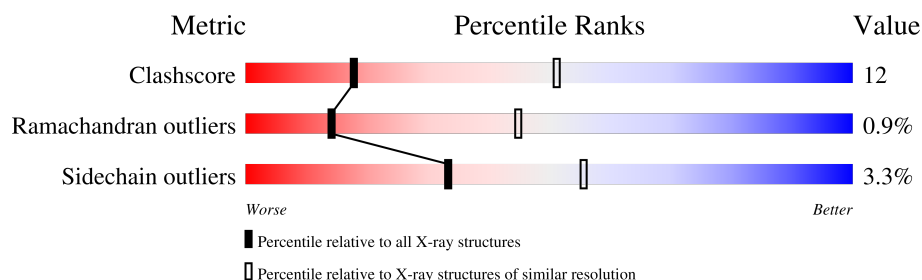
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.80 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))
Clashscore	190562	1012 (3.94-3.66)
Ramachandran outliers	187476	1048 (3.96-3.64)
Sidechain outliers	187428	1043 (3.96-3.64)

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 $\leq 5\%$.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	282	
1	B	282	
1	C	282	
1	D	282	
1	E	282	
1	F	282	
1	G	282	

2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 14631 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 major capsid protein.

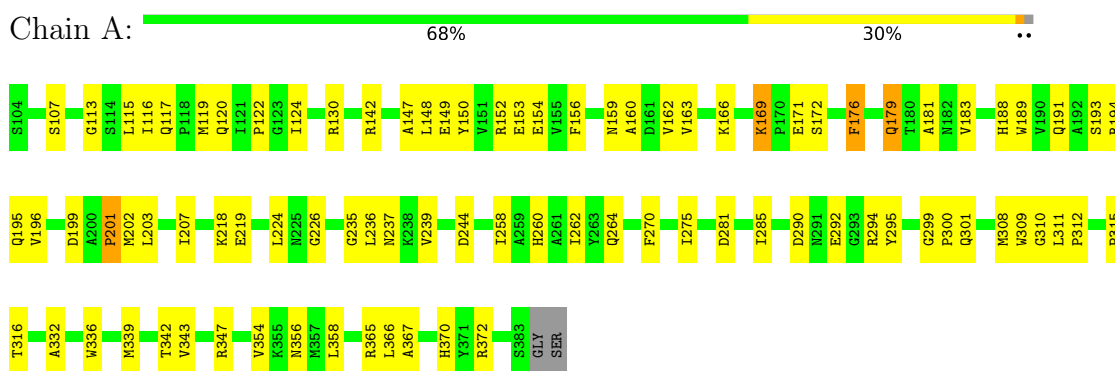
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	280	Total	C	N	O	S	0	0	0
			2151	1344	375	422	10			
1	B	280	Total	C	N	O	S	0	0	0
			2151	1344	375	422	10			
1	C	280	Total	C	N	O	S	0	0	0
			2151	1344	375	422	10			
1	D	280	Total	C	N	O	S	0	0	0
			2151	1344	375	422	10			
1	E	280	Total	C	N	O	S	0	0	0
			2151	1344	375	422	10			
1	F	256	Total	C	N	O	S	0	0	0
			1986	1241	349	388	8			
1	G	243	Total	C	N	O	S	0	0	0
			1890	1181	333	368	8			

3 Residue-property plots

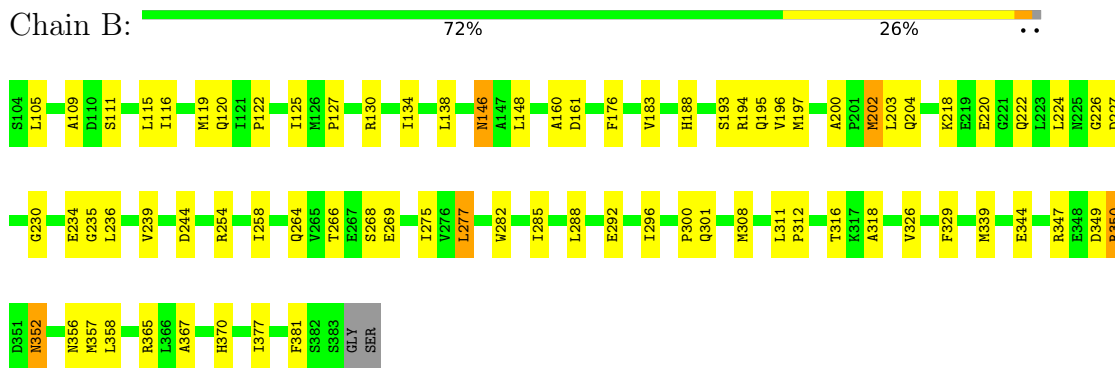
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded 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. 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.

Note EDS was not executed.

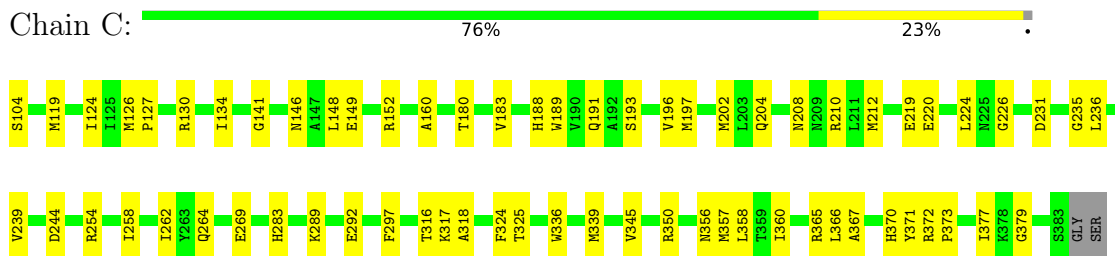
- Molecule 1: major capsid protein



- Molecule 1: major capsid protein

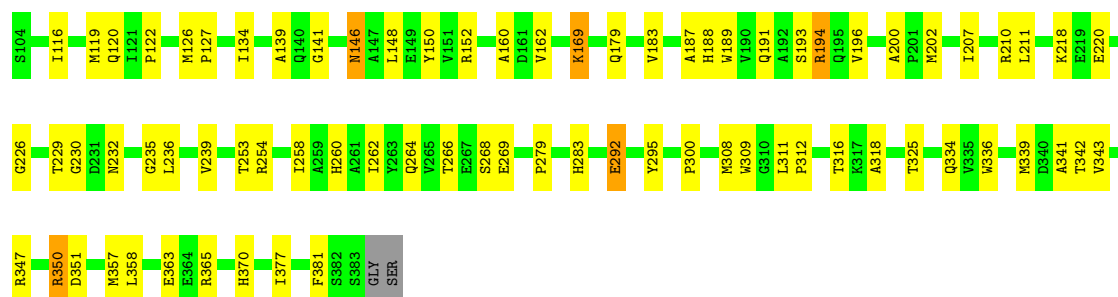


- Molecule 1: major capsid protein



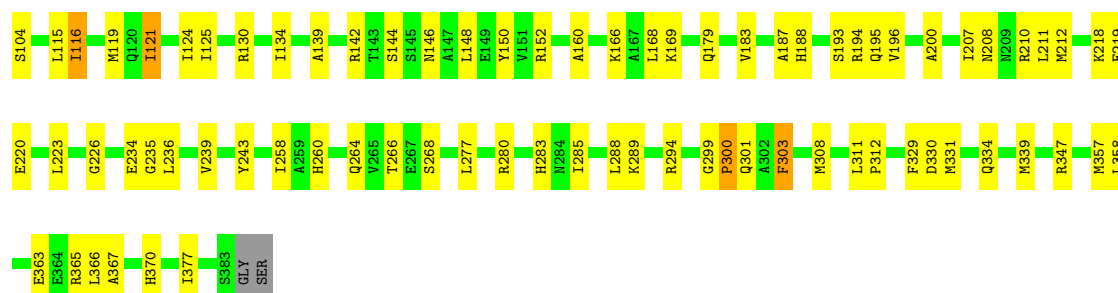
- Molecule 1: major capsid protein

Chain D:  72% 25% ..



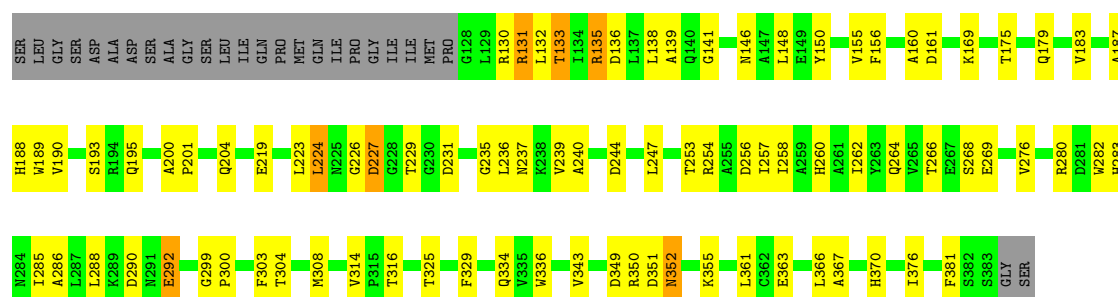
- Molecule 1: major capsid protein

Chain E:  72% 26% ..



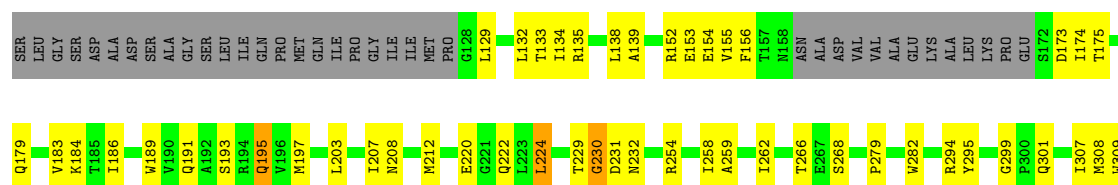
- Molecule 1: major capsid protein

Chain F:  60% 28% 9%



- Molecule 1: major capsid protein

Chain G:  58% 26% 14%





4 Data and refinement statistics

EDS was not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α , β , γ	1006.39Å 1006.39Å 728.69Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	50.00 – 3.80	Depositor
% Data completeness (in resolution range)	59.9 (50.00-3.80)	Depositor
R_{merge}	0.17	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.26 (at 3.77Å)	Xtriage
Refinement program	CNS	Depositor
R, R_{free}	0.337 , (Not available)	Depositor
Wilson B-factor (Å ²)	73.2	Xtriage
Anisotropy	0.772	Xtriage
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	14631	wwPDB-VP
Average B, all atoms (Å ²)	98.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.42% 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 ⓘ

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	0.32	1/2188 (0.0%)	0.83	3/2969 (0.1%)
1	B	0.36	1/2188 (0.0%)	0.83	3/2969 (0.1%)
1	C	0.33	1/2188 (0.0%)	0.82	3/2969 (0.1%)
1	D	0.34	1/2188 (0.0%)	0.83	3/2969 (0.1%)
1	E	0.31	0/2188	0.86	6/2969 (0.2%)
1	F	0.31	0/2020	0.86	4/2740 (0.1%)
1	G	0.32	0/1922	0.84	2/2605 (0.1%)
All	All	0.33	4/14882 (0.0%)	0.84	24/20190 (0.1%)

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	356	ASN	CG-ND2	9.38	1.52	1.33
1	D	169	LYS	CE-NZ	7.00	1.70	1.49
1	A	356	ASN	CG-ND2	5.53	1.44	1.33
1	C	356	ASN	CG-ND2	5.16	1.44	1.33

All (24) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	E	299	GLY	CA-C-N	8.77	130.81	119.84
1	E	299	GLY	C-N-CA	8.77	130.81	119.84
1	F	200	ALA	CA-C-N	8.19	127.76	119.24
1	F	200	ALA	C-N-CA	8.19	127.76	119.24
1	D	350	ARG	CB-CA-C	-6.74	108.78	116.54
1	B	350	ARG	CB-CA-C	-6.74	108.80	116.54
1	A	372	ARG	CA-C-N	6.45	126.14	119.56
1	A	372	ARG	C-N-CA	6.45	126.14	119.56
1	A	332	ALA	N-CA-C	5.89	117.78	111.36
1	D	200	ALA	CA-C-N	5.87	125.08	118.97
1	D	200	ALA	C-N-CA	5.87	125.08	118.97
1	B	200	ALA	CA-C-N	5.73	125.20	119.24
1	B	200	ALA	C-N-CA	5.73	125.20	119.24

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	372	ARG	CA-C-N	5.65	125.18	119.19
1	C	372	ARG	C-N-CA	5.65	125.18	119.19
1	G	299	GLY	CA-C-N	5.58	125.25	119.56
1	G	299	GLY	C-N-CA	5.58	125.25	119.56
1	F	299	GLY	CA-C-N	5.57	126.80	119.84
1	F	299	GLY	C-N-CA	5.57	126.80	119.84
1	E	121	ILE	CA-C-N	5.50	125.82	119.93
1	E	121	ILE	C-N-CA	5.50	125.82	119.93
1	E	200	ALA	CA-C-N	5.45	125.53	119.32
1	E	200	ALA	C-N-CA	5.45	125.53	119.32
1	C	350	ARG	CB-CA-C	-5.19	110.57	116.54

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	2151	0	2119	60	0
1	B	2151	0	2119	65	0
1	C	2151	0	2119	53	0
1	D	2151	0	2119	58	0
1	E	2151	0	2119	53	0
1	F	1986	0	1951	68	0
1	G	1890	0	1851	54	0
All	All	14631	0	14397	357	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 12.

All (357) 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:169:LYS:CE	1:D:169:LYS:NZ	1.70	1.50
1:F:224:LEU:HD11	1:F:276:VAL:HG11	1.53	0.89

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:345:VAL:HB	1:G:358:LEU:HD21	1.56	0.88
1:B:349:ASP:OD2	1:B:350:ARG:HG2	1.75	0.85
1:G:316:THR:HG22	1:G:318:ALA:H	1.41	0.85
1:G:138:LEU:HD23	1:G:329:PHE:HB3	1.56	0.84
1:G:319:GLN:HE21	1:G:323:THR:HB	1.43	0.83
1:A:218:LYS:HE2	1:B:161:ASP:OD1	1.80	0.82
1:A:130:ARG:HA	1:B:269:GLU:HG2	1.62	0.82
1:G:229:THR:HG23	1:G:230:GLY:H	1.44	0.81
1:B:218:LYS:HE3	1:B:222:GLN:NE2	1.95	0.81
1:E:130:ARG:HA	1:F:269:GLU:HG2	1.63	0.80
1:E:218:LYS:HE2	1:F:161:ASP:OD1	1.84	0.76
1:B:339:MET:HE2	1:B:365:ARG:HG3	1.66	0.76
1:E:121:ILE:HD12	1:F:150:TYR:HB3	1.69	0.75
1:G:368:LEU:HG	1:G:370:HIS:HE1	1.52	0.74
1:A:153:GLU:HA	1:A:176:PHE:HB3	1.71	0.73
1:F:133:THR:HG22	1:F:136:ASP:H	1.54	0.72
1:C:219:GLU:HG3	1:C:366:LEU:HD11	1.70	0.72
1:E:194:ARG:HH12	1:E:347:ARG:NE	1.86	0.72
1:D:316:THR:HG22	1:D:318:ALA:H	1.54	0.71
1:B:349:ASP:O	1:B:350:ARG:HG3	1.90	0.70
1:C:149:GLU:HG2	1:C:180:THR:HG22	1.72	0.70
1:C:197:MET:HE1	1:C:204:GLN:HB2	1.72	0.70
1:D:127:PRO:HD2	1:D:210:ARG:HH21	1.57	0.70
1:A:179:GLN:HE21	1:A:179:GLN:HA	1.55	0.70
1:A:347:ARG:HB3	1:A:358:LEU:HD12	1.74	0.68
1:F:236:LEU:HD23	1:F:370:HIS:HE1	1.58	0.68
1:D:254:ARG:HB3	1:D:381:PHE:HE2	1.59	0.68
1:E:119:MET:HB3	1:F:148:LEU:HD23	1.77	0.66
1:A:339:MET:HE2	1:A:365:ARG:HG3	1.78	0.66
1:B:226:GLY:H	1:B:235:GLY:HA3	1.61	0.66
1:C:339:MET:HE2	1:C:365:ARG:HG3	1.76	0.66
1:G:368:LEU:HG	1:G:370:HIS:CE1	2.31	0.65
1:A:244:ASP:HB2	1:A:264:GLN:NE2	2.11	0.65
1:C:130:ARG:HA	1:D:269:GLU:HG2	1.80	0.64
1:F:130:ARG:C	1:F:132:LEU:H	2.05	0.64
1:G:193:SER:HB2	1:G:195:GLN:NE2	2.13	0.64
1:F:133:THR:HG23	1:F:135:ARG:HB3	1.79	0.63
1:B:183:VAL:HG22	1:B:367:ALA:HB2	1.81	0.63
1:B:218:LYS:HE3	1:B:222:GLN:HE21	1.63	0.63
1:B:349:ASP:C	1:B:350:ARG:CG	2.71	0.62
1:C:189:TRP:HZ3	1:C:191:GLN:HB2	1.65	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:183:VAL:HG22	1:G:367:ALA:HB2	1.81	0.62
1:E:193:SER:HB3	1:E:196:VAL:HG23	1.81	0.61
1:A:226:GLY:H	1:A:235:GLY:HA3	1.65	0.61
1:D:239:VAL:HG21	1:D:370:HIS:CD2	2.35	0.61
1:B:349:ASP:O	1:B:350:ARG:CG	2.48	0.61
1:B:349:ASP:C	1:B:350:ARG:HG2	2.26	0.61
1:B:218:LYS:CE	1:B:222:GLN:NE2	2.64	0.60
1:F:286:ALA:HB1	1:F:304:THR:HG21	1.84	0.60
1:B:239:VAL:HG21	1:B:370:HIS:CD2	2.36	0.60
1:B:275:ILE:HG23	1:B:326:VAL:HG22	1.82	0.60
1:A:236:LEU:HD23	1:A:370:HIS:HE1	1.66	0.60
1:D:236:LEU:HD23	1:D:370:HIS:HE1	1.65	0.60
1:F:244:ASP:HB2	1:F:264:GLN:NE2	2.17	0.60
1:F:244:ASP:HB3	1:F:247:LEU:HG	1.83	0.60
1:D:229:THR:HG22	1:D:232:ASN:HD22	1.67	0.59
1:B:301:GLN:HE22	1:C:297:PHE:HA	1.67	0.59
1:G:189:TRP:CD1	1:G:189:TRP:H	2.19	0.59
1:B:316:THR:HG22	1:B:318:ALA:H	1.68	0.59
1:A:239:VAL:HG21	1:A:370:HIS:CD2	2.38	0.59
1:E:264:GLN:HB3	1:E:377:ILE:HD13	1.85	0.59
1:E:210:ARG:HB3	1:F:156:PHE:HE2	1.67	0.58
1:G:254:ARG:HB3	1:G:381:PHE:HZ	1.68	0.58
1:A:124:ILE:HD11	1:B:176:PHE:HE2	1.68	0.58
1:B:197:MET:HE1	1:B:204:GLN:HA	1.84	0.58
1:G:134:ILE:HD12	1:G:220:GLU:HG2	1.84	0.58
1:D:189:TRP:HZ3	1:D:191:GLN:HB2	1.67	0.58
1:D:339:MET:HE2	1:D:365:ARG:HG3	1.84	0.58
1:B:347:ARG:HB3	1:B:358:LEU:HD12	1.85	0.58
1:D:116:ILE:HG21	1:E:146:ASN:HB2	1.86	0.58
1:E:183:VAL:HG22	1:E:367:ALA:HB2	1.84	0.58
1:F:138:LEU:HD23	1:F:329:PHE:HB3	1.86	0.58
1:F:183:VAL:HG22	1:F:367:ALA:HB2	1.85	0.58
1:C:226:GLY:HA3	1:C:235:GLY:H	1.69	0.58
1:A:189:TRP:HZ3	1:A:191:GLN:HB2	1.68	0.57
1:A:336:TRP:HB2	1:A:367:ALA:HB3	1.86	0.57
1:D:264:GLN:HB3	1:D:377:ILE:HD13	1.85	0.57
1:F:133:THR:CG2	1:F:136:ASP:H	2.17	0.57
1:E:239:VAL:HG21	1:E:370:HIS:CD2	2.40	0.57
1:C:236:LEU:HD23	1:C:370:HIS:HE1	1.70	0.57
1:D:146:ASN:O	1:D:183:VAL:HG12	2.04	0.57
1:B:236:LEU:HD23	1:B:370:HIS:HE1	1.69	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:243:TYR:HA	1:E:264:GLN:HE22	1.70	0.56
1:D:134:ILE:HB	1:D:220:GLU:HG3	1.88	0.56
1:C:316:THR:HG22	1:C:318:ALA:H	1.69	0.56
1:E:187:ALA:HB2	1:E:363:GLU:HA	1.87	0.56
1:F:150:TYR:CE1	1:F:179:GLN:HB2	2.41	0.55
1:G:156:PHE:CD1	1:G:174:ILE:HG12	2.41	0.55
1:B:193:SER:HB3	1:B:196:VAL:HG23	1.89	0.55
1:D:139:ALA:HB3	1:D:334:GLN:HB2	1.88	0.55
1:F:239:VAL:HG21	1:F:370:HIS:CD2	2.41	0.55
1:C:141:GLY:O	1:C:336:TRP:HA	2.07	0.55
1:F:227:ASP:HB3	1:F:229:THR:HG22	1.88	0.55
1:F:350:ARG:HG3	1:F:351:ASP:H	1.72	0.55
1:B:264:GLN:HB3	1:B:377:ILE:HD13	1.90	0.54
1:A:193:SER:HB3	1:A:196:VAL:HG23	1.89	0.54
1:E:283:HIS:NE2	1:F:260:HIS:HA	2.22	0.54
1:C:183:VAL:HG22	1:C:367:ALA:HB2	1.90	0.54
1:B:244:ASP:HB2	1:B:264:GLN:NE2	2.23	0.54
1:D:339:MET:HE1	1:D:363:GLU:HG3	1.90	0.54
1:A:309:TRP:O	1:F:303:PHE:HB3	2.08	0.54
1:G:132:LEU:HD13	1:G:312:PRO:HB3	1.90	0.54
1:A:142:ARG:NH1	1:A:142:ARG:HB3	2.23	0.53
1:F:236:LEU:HD23	1:F:370:HIS:CE1	2.42	0.53
1:A:107:SER:O	1:A:113:GLY:HA3	2.07	0.53
1:B:352:ASN:HA	1:B:357:MET:HB2	1.90	0.53
1:B:218:LYS:CE	1:B:222:GLN:HE21	2.22	0.53
1:F:201:PRO:O	1:F:204:GLN:HB3	2.08	0.53
1:D:141:GLY:O	1:D:336:TRP:HA	2.08	0.53
1:F:224:LEU:HD23	1:F:237:ASN:ND2	2.23	0.53
1:D:254:ARG:HB3	1:D:381:PHE:CE2	2.43	0.53
1:C:239:VAL:HG21	1:C:370:HIS:CD2	2.44	0.52
1:E:266:THR:C	1:E:268:SER:H	2.17	0.52
1:G:254:ARG:HB3	1:G:381:PHE:CZ	2.44	0.52
1:C:134:ILE:HB	1:C:220:GLU:HG3	1.91	0.52
1:D:229:THR:CG2	1:D:232:ASN:HD22	2.22	0.52
1:C:208:ASN:O	1:C:212:MET:HG2	2.10	0.51
1:G:208:ASN:O	1:G:212:MET:HG2	2.10	0.51
1:D:226:GLY:H	1:D:235:GLY:HA3	1.75	0.51
1:C:244:ASP:HB2	1:C:264:GLN:NE2	2.25	0.51
1:C:292:GLU:HG2	1:D:292:GLU:OE2	2.10	0.51
1:A:224:LEU:HD13	1:A:237:ASN:HD22	1.76	0.51
1:E:258:ILE:HD12	1:E:308:MET:HE1	1.92	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:197:MET:HE2	1:G:360:ILE:HD11	1.92	0.51
1:E:223:LEU:O	1:E:236:LEU:HD13	2.11	0.51
1:G:154:GLU:HB2	1:G:175:THR:HB	1.92	0.51
1:F:343:VAL:HA	1:F:361:LEU:O	2.11	0.51
1:D:193:SER:HB3	1:D:196:VAL:HG23	1.93	0.50
1:E:236:LEU:HD12	1:E:370:HIS:HE1	1.76	0.50
1:A:116:ILE:HG21	1:B:146:ASN:HB3	1.94	0.50
1:A:188:HIS:ND1	1:B:160:ALA:HB2	2.27	0.50
1:D:187:ALA:HB3	1:E:169:LYS:HE2	1.93	0.50
1:F:351:ASP:HB3	1:F:355:LYS:HD3	1.93	0.50
1:B:188:HIS:HB3	1:C:160:ALA:HA	1.94	0.50
1:A:160:ALA:HB2	1:F:188:HIS:ND1	2.27	0.50
1:A:172:SER:O	1:F:190:VAL:HG22	2.12	0.50
1:A:218:LYS:O	1:A:218:LYS:HG3	2.12	0.50
1:F:282:TRP:O	1:F:285:ILE:HB	2.11	0.50
1:A:258:ILE:O	1:A:262:ILE:HG13	2.12	0.50
1:D:139:ALA:HB3	1:D:334:GLN:CB	2.41	0.50
1:F:226:GLY:H	1:F:235:GLY:HA3	1.75	0.50
1:B:349:ASP:CG	1:B:350:ARG:HG2	2.36	0.49
1:B:282:TRP:HZ3	1:B:308:MET:HE2	1.78	0.49
1:E:130:ARG:HA	1:F:269:GLU:CG	2.38	0.49
1:A:163:VAL:HG21	1:A:169:LYS:HG3	1.95	0.49
1:D:120:GLN:O	1:D:122:PRO:HD3	2.12	0.49
1:C:119:MET:HB3	1:D:148:LEU:HD23	1.93	0.49
1:C:124:ILE:N	1:C:124:ILE:HD12	2.27	0.49
1:G:191:GLN:OE1	1:G:350:ARG:NH1	2.45	0.49
1:D:150:TYR:CE1	1:D:179:GLN:HB2	2.48	0.49
1:E:168:LEU:HD23	1:E:169:LYS:N	2.27	0.49
1:E:226:GLY:H	1:E:235:GLY:HA3	1.77	0.49
1:G:133:THR:HG22	1:G:135:ARG:H	1.76	0.49
1:B:115:LEU:N	1:B:115:LEU:HD12	2.27	0.49
1:E:139:ALA:O	1:E:334:GLN:HG3	2.12	0.49
1:D:188:HIS:CE1	1:E:160:ALA:HB2	2.48	0.49
1:D:189:TRP:CZ3	1:D:191:GLN:HB2	2.48	0.49
1:B:116:ILE:HG21	1:C:146:ASN:HB2	1.95	0.49
1:D:347:ARG:HG2	1:D:358:LEU:CD1	2.43	0.49
1:C:345:VAL:HG12	1:C:360:ILE:HG12	1.94	0.49
1:F:132:LEU:HB3	1:F:314:VAL:HG12	1.94	0.49
1:A:120:GLN:O	1:A:122:PRO:HD3	2.12	0.48
1:A:194:ARG:CZ	1:A:347:ARG:NH1	2.76	0.48
1:G:139:ALA:HB3	1:G:334:GLN:CB	2.42	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:288:LEU:O	1:B:296:ILE:HG12	2.14	0.48
1:D:254:ARG:O	1:D:258:ILE:HD12	2.13	0.48
1:E:188:HIS:HB3	1:F:160:ALA:HA	1.94	0.48
1:E:219:GLU:HG3	1:E:366:LEU:HD11	1.94	0.48
1:B:188:HIS:ND1	1:C:160:ALA:HB2	2.28	0.48
1:G:186:ILE:HG21	1:G:222:GLN:HG3	1.95	0.48
1:E:124:ILE:HG22	1:E:125:ILE:N	2.28	0.48
1:A:166:LYS:HE3	1:E:104:SER:HB2	1.96	0.48
1:C:264:GLN:HB3	1:C:377:ILE:HD13	1.94	0.48
1:D:194:ARG:NH2	1:D:347:ARG:NH2	2.62	0.47
1:C:130:ARG:HD2	1:C:317:LYS:HB2	1.96	0.47
1:D:218:LYS:O	1:D:218:LYS:HG3	2.14	0.47
1:D:283:HIS:NE2	1:E:260:HIS:HA	2.29	0.47
1:E:187:ALA:HB3	1:F:169:LYS:HE2	1.96	0.47
1:G:139:ALA:HB3	1:G:334:GLN:HB2	1.96	0.47
1:B:119:MET:HB3	1:C:148:LEU:HD23	1.95	0.47
1:G:349:ASP:OD1	1:G:350:ARG:HG2	2.15	0.47
1:B:218:LYS:NZ	1:B:222:GLN:NE2	2.62	0.47
1:E:130:ARG:CA	1:F:269:GLU:HG2	2.40	0.47
1:A:310:GLY:HA3	1:F:303:PHE:HD2	1.80	0.47
1:D:350:ARG:HB3	1:D:351:ASP:H	1.44	0.46
1:E:188:HIS:ND1	1:F:160:ALA:HB2	2.31	0.46
1:F:133:THR:CG2	1:F:135:ARG:HB3	2.43	0.46
1:A:300:PRO:HG2	1:B:296:ILE:HG21	1.97	0.46
1:B:282:TRP:CZ3	1:B:308:MET:HE2	2.50	0.46
1:A:219:GLU:HG3	1:A:366:LEU:HD11	1.98	0.46
1:A:224:LEU:HD13	1:A:237:ASN:ND2	2.30	0.46
1:B:236:LEU:HD23	1:B:370:HIS:CE1	2.49	0.46
1:D:258:ILE:O	1:D:262:ILE:HG13	2.16	0.46
1:F:258:ILE:O	1:F:262:ILE:HG13	2.16	0.46
1:G:258:ILE:O	1:G:262:ILE:HG13	2.15	0.46
1:C:188:HIS:ND1	1:D:160:ALA:HB2	2.31	0.46
1:D:341:ALA:HA	1:D:363:GLU:O	2.16	0.46
1:F:139:ALA:O	1:F:334:GLN:HG3	2.16	0.46
1:G:229:THR:HG23	1:G:230:GLY:N	2.21	0.46
1:B:258:ILE:HD11	1:B:381:PHE:HZ	1.81	0.46
1:B:266:THR:C	1:B:268:SER:H	2.23	0.46
1:C:324:PHE:CZ	1:C:379:GLY:HA3	2.50	0.46
1:D:342:THR:HG22	1:D:343:VAL:N	2.30	0.46
1:G:229:THR:CG2	1:G:232:ASN:HD22	2.29	0.46
1:A:150:TYR:HE2	1:A:181:ALA:HB2	1.80	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:260:HIS:HA	1:F:283:HIS:NE2	2.31	0.46
1:F:285:ILE:O	1:F:288:LEU:HG	2.16	0.46
1:B:138:LEU:HD23	1:B:329:PHE:HB3	1.99	0.45
1:C:289:LYS:NZ	1:D:253:THR:HG23	2.31	0.45
1:G:350:ARG:HG2	1:G:350:ARG:H	1.47	0.45
1:D:236:LEU:HD23	1:D:370:HIS:CE1	2.48	0.45
1:C:188:HIS:HB3	1:D:160:ALA:HA	1.98	0.45
1:F:155:VAL:H	1:F:175:THR:HB	1.81	0.45
1:E:285:ILE:O	1:E:288:LEU:HG	2.16	0.45
1:G:155:VAL:H	1:G:175:THR:HB	1.81	0.45
1:E:234:GLU:HG2	1:E:239:VAL:CG2	2.46	0.45
1:C:325:THR:HA	1:C:377:ILE:O	2.16	0.45
1:A:119:MET:HB3	1:B:148:LEU:CD2	2.46	0.45
1:E:329:PHE:C	1:E:331:MET:H	2.24	0.45
1:F:156:PHE:CD1	1:F:156:PHE:C	2.95	0.45
1:A:154:GLU:H	1:A:176:PHE:HA	1.82	0.45
1:D:295:TYR:CE1	1:D:300:PRO:HG3	2.51	0.45
1:D:207:ILE:O	1:D:211:LEU:HD23	2.17	0.45
1:G:339:MET:HE1	1:G:363:GLU:HG3	1.99	0.45
1:C:124:ILE:HD12	1:C:124:ILE:H	1.81	0.45
1:A:156:PHE:C	1:A:156:PHE:CD1	2.94	0.44
1:B:134:ILE:HD12	1:B:220:GLU:CG	2.47	0.44
1:D:266:THR:C	1:D:268:SER:H	2.25	0.44
1:F:258:ILE:HD12	1:F:308:MET:HE1	1.99	0.44
1:A:258:ILE:HG21	1:A:275:ILE:HD13	1.98	0.44
1:B:120:GLN:O	1:B:122:PRO:HD3	2.17	0.44
1:D:229:THR:HG23	1:D:230:GLY:N	2.32	0.44
1:A:130:ARG:HA	1:B:269:GLU:CG	2.42	0.44
1:A:290:ASP:OD2	1:A:294:ARG:HB2	2.17	0.44
1:B:134:ILE:HD12	1:B:220:GLU:HG2	1.98	0.44
1:B:285:ILE:O	1:B:288:LEU:HG	2.17	0.44
1:G:282:TRP:CE3	1:G:313:VAL:HG11	2.53	0.44
1:C:226:GLY:H	1:C:235:GLY:HA3	1.81	0.44
1:C:254:ARG:O	1:C:258:ILE:HD13	2.17	0.44
1:F:193:SER:OG	1:F:195:GLN:HG2	2.18	0.44
1:F:349:ASP:O	1:F:352:ASN:HB2	2.18	0.44
1:A:347:ARG:HB3	1:A:358:LEU:CD1	2.46	0.44
1:B:234:GLU:HG2	1:B:239:VAL:CG2	2.48	0.44
1:B:275:ILE:HG22	1:B:277:LEU:HD11	1.99	0.44
1:C:191:GLN:HG2	1:C:357:MET:HE3	2.00	0.44
1:D:191:GLN:HG2	1:D:357:MET:HE3	1.99	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:194:ARG:HD2	1:B:347:ARG:NH1	2.32	0.44
1:C:104:SER:HB3	1:E:166:LYS:NZ	2.32	0.44
1:F:266:THR:C	1:F:268:SER:H	2.25	0.44
1:E:208:ASN:O	1:E:212:MET:HG2	2.18	0.43
1:E:303:PHE:HD2	1:E:303:PHE:HA	1.70	0.43
1:F:130:ARG:C	1:F:132:LEU:N	2.73	0.43
1:G:266:THR:C	1:G:268:SER:H	2.26	0.43
1:E:116:ILE:HD12	1:F:146:ASN:HB2	2.01	0.43
1:G:203:LEU:O	1:G:207:ILE:HG13	2.17	0.43
1:D:254:ARG:HH21	1:D:381:PHE:HB3	1.83	0.43
1:F:131:ARG:HH21	1:F:316:THR:HA	1.84	0.43
1:F:244:ASP:HB2	1:F:264:GLN:HE22	1.83	0.43
1:G:352:ASN:O	1:G:356:ASN:N	2.51	0.43
1:D:325:THR:HA	1:D:377:ILE:O	2.18	0.43
1:A:152:ARG:CZ	1:A:179:GLN:HG3	2.48	0.43
1:B:125:ILE:HB	1:C:152:ARG:HB2	2.00	0.43
1:E:116:ILE:H	1:E:116:ILE:HG12	1.71	0.43
1:F:187:ALA:HB2	1:F:363:GLU:HA	2.01	0.43
1:G:138:LEU:HD22	1:G:333:SER:O	2.18	0.43
1:G:279:PRO:HD3	1:G:316:THR:O	2.19	0.43
1:C:239:VAL:HG12	1:C:373:PRO:HB3	2.01	0.43
1:A:199:ASP:O	1:A:201:PRO:HD3	2.19	0.43
1:E:119:MET:HB3	1:F:148:LEU:CD2	2.47	0.43
1:A:292:GLU:HG3	1:B:292:GLU:HG2	2.00	0.43
1:B:125:ILE:HB	1:C:152:ARG:CB	2.48	0.43
1:D:264:GLN:HB3	1:D:377:ILE:CD1	2.48	0.43
1:A:342:THR:HG22	1:A:343:VAL:N	2.34	0.43
1:C:208:ASN:C	1:C:210:ARG:H	2.27	0.43
1:B:258:ILE:HD11	1:B:381:PHE:CZ	2.54	0.42
1:F:254:ARG:HB3	1:F:381:PHE:HE2	1.84	0.42
1:A:153:GLU:CA	1:A:176:PHE:HB3	2.46	0.42
1:C:189:TRP:CZ3	1:C:191:GLN:HB2	2.51	0.42
1:C:193:SER:HB3	1:C:196:VAL:HG23	2.01	0.42
1:C:258:ILE:O	1:C:262:ILE:HG13	2.19	0.42
1:C:264:GLN:HB3	1:C:377:ILE:CD1	2.49	0.42
1:A:171:GLU:HB2	1:F:189:TRP:CZ2	2.54	0.42
1:B:311:LEU:HA	1:B:312:PRO:HD3	1.89	0.42
1:F:219:GLU:HG3	1:F:366:LEU:HD11	2.01	0.42
1:G:152:ARG:HB3	1:G:153:GLU:H	1.60	0.42
1:D:295:TYR:HE1	1:D:300:PRO:HG3	1.84	0.42
1:E:264:GLN:HE21	1:E:377:ILE:HG12	1.83	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:152:ARG:NE	1:G:179:GLN:HG3	2.35	0.42
1:B:277:LEU:HD12	1:B:277:LEU:N	2.34	0.42
1:D:308:MET:HG2	1:D:309:TRP:CD1	2.54	0.42
1:E:150:TYR:CE1	1:E:179:GLN:HB2	2.55	0.42
1:F:350:ARG:HG3	1:F:351:ASP:N	2.34	0.42
1:A:159:ASN:H	1:A:172:SER:HB3	1.84	0.42
1:G:308:MET:HG2	1:G:309:TRP:CD1	2.55	0.42
1:B:254:ARG:O	1:B:258:ILE:HD13	2.19	0.42
1:C:371:TYR:CD1	1:C:371:TYR:N	2.88	0.42
1:D:311:LEU:HA	1:D:312:PRO:HD3	1.91	0.42
1:E:134:ILE:HB	1:E:220:GLU:HG3	2.02	0.42
1:G:139:ALA:O	1:G:334:GLN:HB2	2.20	0.42
1:G:224:LEU:HD21	1:G:319:GLN:OE1	2.19	0.42
1:A:162:VAL:HG11	1:F:231:ASP:O	2.20	0.42
1:A:300:PRO:HG2	1:B:296:ILE:CG2	2.49	0.42
1:G:212:MET:HE1	1:G:341:ALA:HB3	2.00	0.42
1:G:319:GLN:NE2	1:G:323:THR:HB	2.24	0.42
1:C:283:HIS:NE2	1:D:260:HIS:HA	2.35	0.41
1:A:119:MET:HB3	1:B:148:LEU:HD23	2.00	0.41
1:D:119:MET:HB3	1:E:148:LEU:HD23	2.02	0.41
1:E:339:MET:HB3	1:E:365:ARG:HG3	2.02	0.41
1:G:203:LEU:HD21	1:G:207:ILE:HD11	2.02	0.41
1:G:259:ALA:HA	1:G:262:ILE:HD12	2.02	0.41
1:G:348:GLU:H	1:G:348:GLU:HG2	1.75	0.41
1:A:203:LEU:O	1:A:207:ILE:HG13	2.20	0.41
1:A:308:MET:HG2	1:A:309:TRP:CD1	2.55	0.41
1:A:311:LEU:HA	1:A:312:PRO:HD3	1.91	0.41
1:C:197:MET:HG3	1:C:358:LEU:HD23	2.02	0.41
1:E:311:LEU:HA	1:E:312:PRO:HD3	1.92	0.41
1:C:231:ASP:O	1:D:162:VAL:HG11	2.21	0.41
1:C:371:TYR:H	1:C:371:TYR:HD1	1.69	0.41
1:F:276:VAL:HB	1:F:325:THR:HB	2.03	0.41
1:B:109:ALA:C	1:B:111:SER:H	2.29	0.41
1:C:126:MET:HA	1:C:127:PRO:HD3	1.90	0.41
1:G:135:ARG:HG3	1:G:135:ARG:HH11	1.86	0.41
1:A:281:ASP:O	1:A:285:ILE:HG13	2.20	0.41
1:A:354:VAL:O	1:A:354:VAL:HG12	2.21	0.41
1:E:207:ILE:O	1:E:211:LEU:HD13	2.21	0.41
1:E:234:GLU:HG2	1:E:239:VAL:HG22	2.01	0.41
1:F:133:THR:HG22	1:F:136:ASP:CG	2.46	0.41
1:F:223:LEU:O	1:F:236:LEU:HG	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:253:THR:OG1	1:F:256:ASP:HB2	2.21	0.41
1:G:342:THR:HG22	1:G:343:VAL:N	2.35	0.41
1:E:194:ARG:NH1	1:E:347:ARG:NE	2.63	0.41
1:F:236:LEU:HD22	1:F:376:ILE:HD13	2.03	0.41
1:E:357:MET:HG3	1:E:358:LEU:H	1.85	0.41
1:F:257:ILE:O	1:F:260:HIS:HB2	2.21	0.41
1:G:193:SER:HB2	1:G:195:GLN:HE21	1.86	0.41
1:G:294:ARG:HD3	1:G:295:TYR:H	1.86	0.41
1:G:351:ASP:O	1:G:353:PHE:N	2.54	0.41
1:A:258:ILE:N	1:A:258:ILE:HD12	2.36	0.41
1:B:130:ARG:HA	1:C:269:GLU:CG	2.51	0.41
1:D:126:MET:HA	1:D:127:PRO:HD3	1.93	0.41
1:A:147:ALA:HA	1:A:183:VAL:HG23	2.04	0.40
1:A:176:PHE:CD1	1:A:176:PHE:N	2.89	0.40
1:D:226:GLY:N	1:D:235:GLY:HA3	2.35	0.40
1:B:234:GLU:HG2	1:B:239:VAL:HG23	2.03	0.40
1:C:197:MET:CE	1:C:204:GLN:HB2	2.45	0.40
1:G:358:LEU:HD23	1:G:359:THR:N	2.36	0.40
1:A:295:TYR:HB2	1:A:299:GLY:HA2	2.03	0.40
1:B:202:MET:HG2	1:B:203:LEU:N	2.37	0.40
1:E:289:LYS:HA	1:E:294:ARG:O	2.21	0.40
1:G:184:LYS:HD3	1:G:231:ASP:C	2.46	0.40
1:G:343:VAL:HG22	1:G:362:CYS:SG	2.61	0.40
1:C:183:VAL:HG13	1:C:366:LEU:O	2.22	0.40
1:E:194:ARG:HH22	1:E:347:ARG:CZ	2.34	0.40
1:F:141:GLY:O	1:F:336:TRP:HA	2.22	0.40
1:F:290:ASP:C	1:F:292:GLU:H	2.29	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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	278/282 (99%)	249 (90%)	27 (10%)	2 (1%)	18	51
1	B	278/282 (99%)	252 (91%)	22 (8%)	4 (1%)	9	37
1	C	278/282 (99%)	258 (93%)	20 (7%)	0	100	100
1	D	278/282 (99%)	256 (92%)	22 (8%)	0	100	100
1	E	278/282 (99%)	246 (88%)	29 (10%)	3 (1%)	11	41
1	F	254/282 (90%)	229 (90%)	21 (8%)	4 (2%)	7	35
1	G	239/282 (85%)	209 (87%)	26 (11%)	4 (2%)	7	34
All	All	1883/1974 (95%)	1699 (90%)	167 (9%)	17 (1%)	14	45

All (17) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	E	300	PRO
1	F	352	ASN
1	G	352	ASN
1	E	330	ASP
1	F	131	ARG
1	G	224	LEU
1	A	201	PRO
1	B	127	PRO
1	B	230	GLY
1	G	349	ASP
1	B	352	ASN
1	E	144	SER
1	F	240	ALA
1	F	300	PRO
1	G	230	GLY
1	A	315	PRO
1	B	300	PRO

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	230/231 (100%)	218 (95%)	12 (5%)	21	46
1	B	230/231 (100%)	222 (96%)	8 (4%)	32	54
1	C	230/231 (100%)	228 (99%)	2 (1%)	70	74
1	D	230/231 (100%)	224 (97%)	6 (3%)	40	60
1	E	230/231 (100%)	220 (96%)	10 (4%)	26	50
1	F	211/231 (91%)	205 (97%)	6 (3%)	38	58
1	G	201/231 (87%)	194 (96%)	7 (4%)	32	54
All	All	1562/1617 (97%)	1511 (97%)	51 (3%)	33	56

All (51) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	115	LEU
1	A	117	GLN
1	A	148	LEU
1	A	149	GLU
1	A	169	LYS
1	A	176	PHE
1	A	179	GLN
1	A	195	GLN
1	A	202	MET
1	A	270	PHE
1	A	301	GLN
1	A	316	THR
1	B	105	LEU
1	B	146	ASN
1	B	195	GLN
1	B	202	MET
1	B	224	LEU
1	B	227	ASP
1	B	277	LEU
1	B	344	GLU
1	C	202	MET
1	C	224	LEU
1	D	146	ASN
1	D	152	ARG
1	D	194	ARG
1	D	202	MET
1	D	279	PRO
1	D	292	GLU
1	E	115	LEU

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Mol	Chain	Res	Type
1	E	116	ILE
1	E	142	ARG
1	E	152	ARG
1	E	195	GLN
1	E	277	LEU
1	E	280	ARG
1	E	300	PRO
1	E	301	GLN
1	E	303	PHE
1	F	133	THR
1	F	135	ARG
1	F	224	LEU
1	F	227	ASP
1	F	280	ARG
1	F	292	GLU
1	G	129	LEU
1	G	173	ASP
1	G	195	GLN
1	G	301	GLN
1	G	307	ILE
1	G	350	ARG
1	G	370	HIS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (45) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	140	GLN
1	A	158	ASN
1	A	179	GLN
1	A	204	GLN
1	A	225	ASN
1	A	301	GLN
1	A	334	GLN
1	A	356	ASN
1	B	158	ASN
1	B	191	GLN
1	B	222	GLN
1	B	301	GLN
1	B	334	GLN
1	B	352	ASN
1	C	140	GLN
1	C	158	ASN

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Mol	Chain	Res	Type
1	C	222	GLN
1	C	291	ASN
1	C	334	GLN
1	D	158	ASN
1	D	195	GLN
1	D	222	GLN
1	D	232	ASN
1	D	334	GLN
1	E	117	GLN
1	E	158	ASN
1	E	191	GLN
1	E	208	ASN
1	E	291	ASN
1	E	306	ASN
1	E	352	ASN
1	F	146	ASN
1	F	158	ASN
1	F	222	GLN
1	F	237	ASN
1	F	260	HIS
1	F	306	ASN
1	F	334	GLN
1	G	195	GLN
1	G	232	ASN
1	G	260	HIS
1	G	264	GLN
1	G	283	HIS
1	G	306	ASN
1	G	319	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

Mogul was not executed - this section is therefore empty.

5.5 Carbohydrates ⓘ

Mogul was not executed - this section is therefore empty.

5.6 Ligand geometry [i](#)

Mogul was not executed - this section is therefore empty.

5.7 Other polymers [i](#)

Mogul was not executed - this section is therefore empty.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

EDS was not executed - this section is therefore empty.

6.2 Non-standard residues in protein, DNA, RNA chains

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

6.4 Ligands

EDS was not executed - this section is therefore empty.

6.5 Other polymers

EDS was not executed - this section is therefore empty.