



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 10, 2018 – 02:45 pm GMT

PDB ID : 1DGS
Title : CRYSTAL STRUCTURE OF NAD⁺-DEPENDENT DNA LIGASE FROM
T. FILIFORMIS
Authors : Lee, J.Y.; Chang, C.; Song, H.K.; Kwon, S.T.; Suh, S.W.
Deposited on : 1999-11-25
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 following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.7.3 (157068), CSD as539be (2018)
Xtriage (Phenix) : 1.13
EDS : trunk30967
Percentile statistics : 20171227.v01 (using entries in the PDB archive December 27th 2017)
Refmac : 5.8.0158
CCP4 : 7.0 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : trunk30967

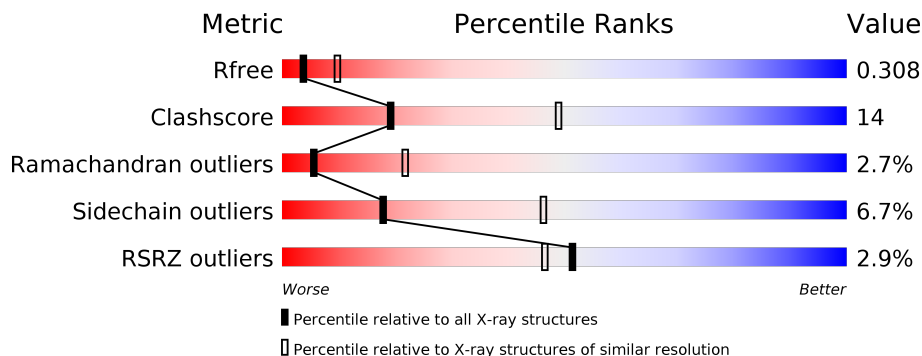
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 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}	111664	1716 (2.90-2.90)
Clashscore	122126	1924 (2.90-2.90)
Ramachandran outliers	120053	1884 (2.90-2.90)
Sidechain outliers	120020	1886 (2.90-2.90)
RSRZ outliers	108989	1669 (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 on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. 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	667	<p>2% 58% 26% 13%</p>
1	B	667	<p>3% 59% 24% 13%</p>

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 9674 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.

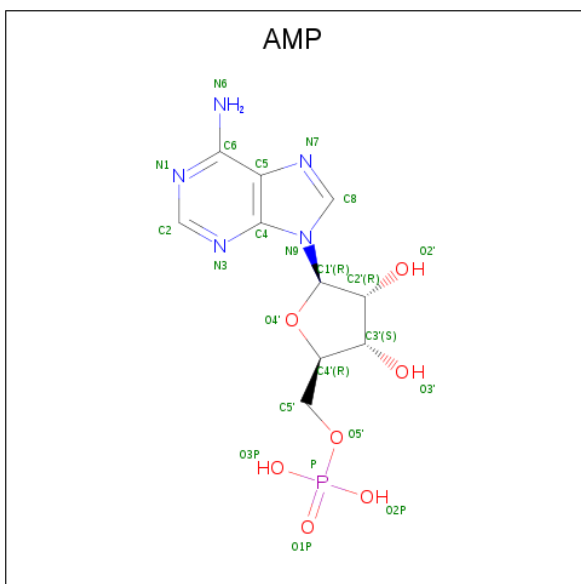
- Molecule 1 is a protein called DNA LIGASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	581	Total 4693	C 2965	N 845	O 871	S 12	0	0	0
1	B	581	Total 4693	C 2965	N 845	O 871	S 12	0	0	0

- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	B	1	Total 1	Zn 1	0	0
2	A	1	Total 1	Zn 1	0	0

- Molecule 3 is ADENOSINE MONOPHOSPHATE (three-letter code: AMP) (formula: C₁₀H₁₄N₅O₇P).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	0	0
			22	10	5	6	1		
3	B	1	Total	C	N	O	P	0	0
			22	10	5	6	1		

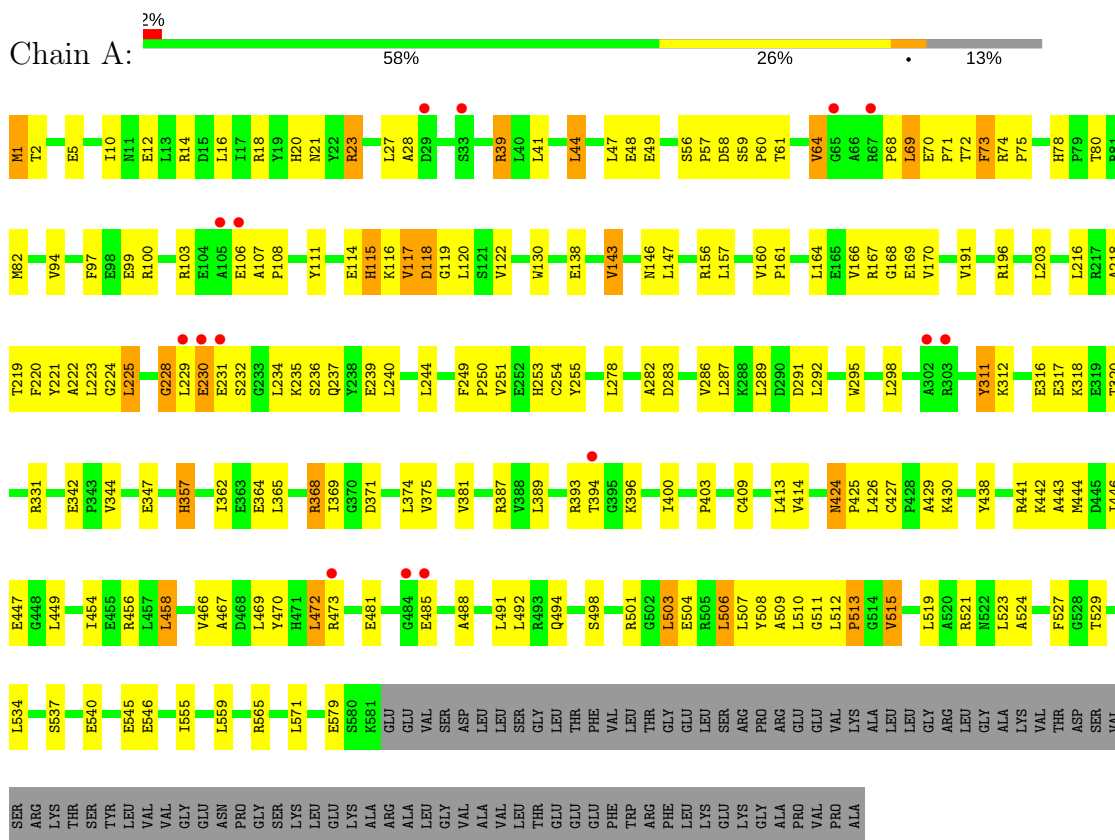
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	123	Total	O	0	0
			123	123		
4	B	119	Total	O	0	0
			119	119		

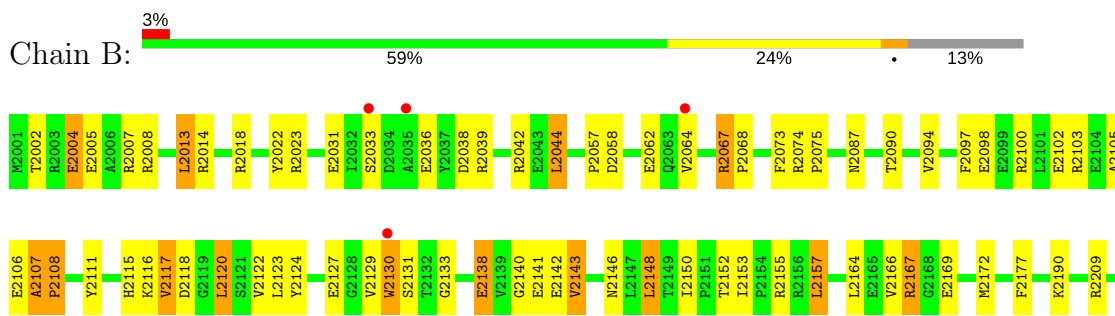
3 Residue-property plots i

These plots are drawn for all protein, RNA and DNA 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: DNA LIGASE



• Molecule 1: DNA LIGASE



LYS	R2217	LYS	R2217
THR	A2218	THR	A2218
SER	T2219	SER	T2219
TYR	F2220	TYR	F2220
LEU	Y2221	LEU	Y2221
VAL	A2222	VAL	A2222
VAL	L2223	VAL	L2223
GLY	G2224	GLY	G2224
GLU	L2225	GLU	L2225
ASN	E2226	ASN	E2226
PRO	S2227	PRO	S2227
GLY	G2228	GLY	G2228
SER	L2229	SER	L2229
LYS	E2230	LYS	E2230
LEU	E2231	LEU	E2231
GLU	S2232	GLU	S2232
LYS	Q2237	LYS	Q2237
ALA	L2241	ALA	L2241
ARG	F2249	ARG	F2249
ALA	P2250	ALA	P2250
LEU	G2254	LEU	G2254
LEU	Y2255	LEU	Y2255
THR	E2256	THR	E2256
GLU	L2259	GLU	L2259
GLU	E2266	GLU	E2266
THR	L2278	THR	L2278
PHE	A2282	PHE	A2282
LEU	L2287	LEU	L2287
LYS	F2288	LYS	F2288
LYS	L2289	LYS	L2289
GLY	D2290	GLY	D2290
PRO	D2291	PRO	D2291
PRO	Y2300	PRO	Y2300
ALA	T2301	ALA	T2301
LEU	A2302	LEU	A2302
LEU	R2303	LEU	R2303
LEU	A2304	LEU	A2304
VAL	P2305	VAL	P2305
VAL	K2312	VAL	K2312
GLY	L2322	GLY	L2322
GLY	V2325	GLY	V2325
VAL	V2329	VAL	V2329
VAL	V2340	VAL	V2340
ARG	P2343	ARG	P2343
THR	I2346	THR	I2346
SER	E2347	SER	E2347
TYR	G2348	TYR	G2348
LEU	S2349	LEU	S2349
VAL	L2356	VAL	L2356
VAL	R2357	VAL	R2357
GLY	R2358	GLY	R2358
GLU	E2359	GLU	E2359
ASN	S2360	ASN	S2360
PRO	Y2361	PRO	Y2361
GLY	G2362	GLY	G2362
SER	E2363	SER	E2363
LYS	E2364	LYS	E2364
LEU	I2367	LEU	I2367
LEU	R2368	LEU	R2368
GLU	L2369	GLU	L2369
VAL	V2375	VAL	V2375
VAL	H2376	VAL	H2376
GLY	K2377	GLY	K2377
VAL	G2380	VAL	G2380
VAL	V2381	VAL	V2381
LEU	I2382	LEU	I2382
LEU	P2383	LEU	P2383
THR	E2391	THR	E2391
GLU	T2394	GLU	T2394
GLU	G2395	GLU	G2395
THR	K2396	THR	K2396
PHE	E2397	PHE	E2397
LEU	R2401	LEU	R2401
LEU	V2402	LEU	V2402
LEU	C2406	LEU	C2406
VAL	L2413	VAL	L2413
VAL	K2414	VAL	K2414
VAL	E2415	VAL	E2415
VAL	E2416	VAL	E2416
VAL	G2417	VAL	G2417
VAL	K2418	VAL	K2418
VAL	V2419	VAL	V2419
VAL	H2420	VAL	H2420
VAL	R2421	VAL	R2421
VAL	C2422	VAL	C2422
VAL	P2423	VAL	P2423
VAL	N2424	VAL	N2424
VAL	P2425	VAL	P2425
VAL	L2426	VAL	L2426
VAL	C2427	VAL	C2427
VAL	P2428	VAL	P2428
VAL	A2429	VAL	A2429
VAL	K2430	VAL	K2430
VAL	R2431	VAL	R2431
LYS	A2524	LYS	A2524
THR	G2528	THR	G2528
SER	T2529	SER	T2529
LEU	M2530	LEU	M2530
VAL	V2547	VAL	V2547
VAL	K2442	VAL	K2442
GLY	A2443	GLY	A2443
GLY	R2441	GLY	R2441
GLY	M2444	GLY	M2444
GLY	D2445	GLY	D2445
GLY	L2446	GLY	L2446
GLY	E2447	GLY	E2447
GLY	G2448	GLY	G2448
GLY	L2449	GLY	L2449
GLY	G2450	GLY	G2450
GLY	E2451	GLY	E2451
GLY	E2455	GLY	E2455
GLY	R2456	GLY	R2456
GLY	R2464	GLY	R2464
GLY	D2465	GLY	D2465
GLY	V2466	GLY	V2466
GLY	L2469	GLY	L2469
GLY	L2472	GLY	L2472
GLY	D2476	GLY	D2476
GLY	E2481	GLY	E2481
GLY	R2482	GLY	R2482
GLY	R2483	GLY	R2483
GLY	G2484	GLY	G2484
GLY	E2485	GLY	E2485
GLY	R2493	GLY	R2493
GLY	Q2494	GLY	Q2494
GLY	L2495	GLY	L2495
GLY	E2496	GLY	E2496
GLY	E2497	GLY	E2497
GLY	S2498	GLY	S2498
GLY	R2501	GLY	R2501
GLY	G2502	GLY	G2502
GLY	L2503	GLY	L2503
GLY	E2504	GLY	E2504
GLY	A2509	GLY	A2509
GLY	L2510	GLY	L2510
GLY	G2511	GLY	G2511
GLY	L2512	GLY	L2512
GLY	V2515	GLY	V2515
GLY	G2516	GLY	G2516
GLY	E2517	GLY	E2517
GLY	V2518	GLY	V2518
GLY	L2519	GLY	L2519
GLY	L2523	GLY	L2523

4 Data and refinement statistics i

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	89.21Å 117.33Å 97.48Å 90.00° 115.09° 90.00°	Depositor
Resolution (Å)	20.00 – 2.90 24.75 – 2.88	Depositor EDS
% Data completeness (in resolution range)	89.5 (20.00-2.90) 94.4 (24.75-2.88)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.48 (at 2.89Å)	Xtrriage
Refinement program	CNS 0.5	Depositor
R, R_{free}	0.228 , 0.298 0.242 , 0.308	Depositor DCC
R_{free} test set	3869 reflections (9.94%)	wwPDB-VP
Wilson B-factor (Å ²)	53.4	Xtrriage
Anisotropy	0.238	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 52.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	0.022 for h,-k,-h-l	Xtrriage
F_o, F_c correlation	0.90	EDS
Total number of atoms	9674	wwPDB-VP
Average B, all atoms (Å ²)	49.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.58% 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 [i](#)

5.1 Standard geometry [i](#)

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

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	0.38	0/4782	0.65	2/6451 (0.0%)
1	B	0.37	0/4782	0.65	0/6451
All	All	0.37	0/9564	0.65	2/12902 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	224	GLY	N-CA-C	-5.08	100.39	113.10
1	A	64	VAL	N-CA-C	5.00	124.51	111.00

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	4693	0	4732	134	0
1	B	4693	0	4727	129	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
3	A	22	0	12	0	0
3	B	22	0	12	1	0
4	A	123	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	B	119	0	0	0	0
All	All	9674	0	9483	263	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 14.

All (263) 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:A:115:HIS:ND1	1:A:254:CYS:SG	2.39	0.94
1:A:316:GLU:HG2	1:A:347:GLU:HG3	1.52	0.91
1:A:534:LEU:HD22	1:A:565:ARG:HE	1.40	0.86
1:B:2039:ARG:HG3	1:B:2042:ARG:HH21	1.40	0.85
1:B:2004:GLU:HG3	1:B:2007:ARG:HH21	1.44	0.82
1:B:2107:ALA:HB3	1:B:2108:PRO:HD3	1.62	0.81
1:B:2359:GLU:HG3	1:B:2418:LYS:O	1.82	0.80
1:A:10:ILE:HG23	1:A:14:ARG:NH1	1.95	0.80
1:A:449:LEU:HD12	1:A:454:ILE:HG12	1.62	0.79
1:A:20:HIS:HA	1:A:23:ARG:HB2	1.67	0.77
1:B:2115:HIS:CG	1:B:2254:CYS:SG	2.78	0.77
1:A:424:ASN:HD22	1:A:426:LEU:H	1.36	0.74
1:B:2120:LEU:H	1:B:2120:LEU:HD12	1.52	0.74
1:B:2381:VAL:HG13	1:B:2382:ILE:H	1.51	0.74
1:A:234:LEU:HD13	1:A:240:LEU:HD12	1.71	0.72
1:B:2067:ARG:HG2	1:B:2068:PRO:HD2	1.72	0.72
1:B:2039:ARG:HG3	1:B:2042:ARG:NH2	2.06	0.71
1:A:228:GLY:HA2	1:A:232:SER:O	1.92	0.70
1:B:2120:LEU:HA	1:B:2169:GLU:HG2	1.74	0.70
1:B:2117:VAL:HG12	1:B:2118:ASP:H	1.56	0.69
1:A:424:ASN:ND2	1:A:426:LEU:H	1.91	0.69
1:B:2023:ARG:HH11	1:B:2031:GLU:HG3	1.57	0.68
1:B:2115:HIS:ND1	1:B:2254:CYS:SG	2.66	0.68
1:A:166:VAL:HG21	1:A:249:PHE:CE1	2.28	0.68
1:A:115:HIS:HD1	1:A:254:CYS:HG	1.42	0.67
1:B:2167:ARG:HG2	1:B:2167:ARG:HH21	1.58	0.67
1:A:442:LYS:HB3	1:A:508:TYR:HE2	1.60	0.66
1:B:2427:CYS:HB3	1:B:2430:LYS:HG2	1.79	0.65
1:A:115:HIS:HB2	1:A:254:CYS:SG	2.38	0.63
1:B:2406:CYS:HB2	1:B:2413:LEU:HD21	1.79	0.63
1:B:2100:ARG:O	1:B:2103:ARG:HG2	1.98	0.63
1:B:2368:ARG:HB3	1:B:2397:GLU:HB3	1.80	0.63

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:219:THR:HA	1:A:250:PRO:O	1.98	0.63
1:A:537:SER:OG	1:A:540:GLU:HG3	1.99	0.63
1:B:2530:MET:HG2	1:B:2568:VAL:HG21	1.82	0.62
1:A:236:SER:HB3	1:A:239:GLU:HG2	1.80	0.62
1:A:223:LEU:HG	1:A:240:LEU:HD11	1.81	0.61
1:B:2217:ARG:HH21	1:B:2217:ARG:HG2	1.66	0.61
1:A:365:LEU:HD12	1:A:387:ARG:HA	1.84	0.60
1:B:2498:SER:O	1:B:2501:ARG:HG2	2.01	0.60
1:A:424:ASN:HD22	1:A:426:LEU:N	1.98	0.60
1:B:2115:HIS:CE1	1:B:2254:CYS:SG	2.94	0.60
1:B:2157:LEU:HD21	1:B:2249:PHE:CE2	2.37	0.60
1:A:78:HIS:ND1	1:A:122:VAL:HG11	2.16	0.60
1:B:2431:ARG:O	1:B:2435:ILE:HG12	2.02	0.60
1:A:16:LEU:HD11	1:A:156:ARG:HH22	1.66	0.60
1:B:2014:ARG:HD3	1:B:2018:ARG:HH21	1.67	0.59
1:A:442:LYS:HB3	1:A:508:TYR:CE2	2.38	0.59
1:B:2008:ARG:HG3	1:B:2127:GLU:HG3	1.83	0.59
1:A:143:VAL:HG22	1:A:146:ASN:HB2	1.84	0.58
1:A:21:ASN:CG	1:A:69:LEU:HB2	2.24	0.58
1:B:2130:TRP:CZ3	1:B:2148:LEU:HD13	2.39	0.58
1:A:14:ARG:O	1:A:18:ARG:HG3	2.04	0.57
1:B:2217:ARG:NH2	1:B:2217:ARG:HG2	2.18	0.57
1:A:230:GLU:O	1:A:231:GLU:HG3	2.04	0.57
1:A:529:THR:HG22	1:A:579:GLU:HG2	1.87	0.56
1:A:515:VAL:HG13	1:A:515:VAL:O	2.05	0.56
1:B:2038:ASP:O	1:B:2042:ARG:HG3	2.06	0.56
1:B:2143:VAL:HG22	1:B:2146:ASN:HB2	1.87	0.56
1:A:234:LEU:CD1	1:A:240:LEU:HD12	2.35	0.56
1:B:2190:LYS:HE3	1:B:2361:TYR:CD1	2.41	0.55
1:B:2117:VAL:HB	1:B:2169:GLU:OE2	2.06	0.55
1:B:2116:LYS:O	1:B:2282:ALA:HA	2.06	0.55
1:A:320:THR:OG1	1:A:342:GLU:HB3	2.07	0.55
1:B:2157:LEU:HD21	1:B:2249:PHE:HE2	1.69	0.55
1:A:519:LEU:O	1:A:523:LEU:HB2	2.07	0.55
1:A:16:LEU:HD11	1:A:156:ARG:NH2	2.22	0.55
1:B:2217:ARG:HH21	1:B:2217:ARG:CG	2.19	0.55
1:A:534:LEU:HD22	1:A:565:ARG:NE	2.18	0.55
1:B:2123:LEU:HG	1:B:2130:TRP:CZ2	2.42	0.55
1:B:2442:LYS:HD3	1:B:2517:GLU:OE1	2.07	0.54
1:A:147:LEU:HD23	1:A:203:LEU:HD11	1.89	0.54
1:A:57:PRO:HG2	1:A:74:ARG:HD3	1.89	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:2172:MET:HG2	1:B:2177:PHE:HB2	1.90	0.54
1:B:2241:LEU:HD23	1:B:2255:TYR:CD1	2.43	0.54
1:A:444:MET:CE	1:A:506:LEU:HD23	2.38	0.54
1:B:2152:THR:O	1:B:2250:PRO:HD3	2.08	0.53
1:A:119:GLY:N	1:A:196:ARG:HD2	2.23	0.53
1:B:2448:GLY:H	1:B:2494:GLN:NE2	2.07	0.53
1:A:498:SER:O	1:A:501:ARG:HG2	2.08	0.52
1:A:427:CYS:HB3	1:A:430:LYS:HD3	1.92	0.52
1:A:10:ILE:HG23	1:A:14:ARG:HH11	1.75	0.52
1:A:119:GLY:H	1:A:196:ARG:HD2	1.74	0.52
1:B:2287:LEU:H	1:B:2287:LEU:HD23	1.75	0.52
1:B:2300:TYR:CD2	1:B:2305:PRO:HB3	2.44	0.52
1:A:120:LEU:HA	1:A:169:GLU:HG2	1.92	0.52
1:B:2058:ASP:OD2	1:B:2142:GLU:HG3	2.09	0.52
1:A:251:VAL:HG23	1:A:253:HIS:CE1	2.44	0.52
1:B:2130:TRP:HZ3	1:B:2148:LEU:HD13	1.74	0.52
1:B:2222:ALA:O	1:B:2223:LEU:HD23	2.10	0.52
1:B:2226:GLY:O	1:B:2232:SER:HB3	2.10	0.52
1:A:161:PRO:HG3	1:A:231:GLU:HB2	1.93	0.51
1:B:2493:ARG:O	1:B:2497:GLU:HG3	2.10	0.51
1:A:82:MET:CE	1:A:122:VAL:HB	2.41	0.51
1:B:2346:ILE:HD11	1:B:2375:VAL:HG13	1.93	0.51
1:A:12:GLU:O	1:A:16:LEU:HD13	2.10	0.51
1:B:2014:ARG:HG2	1:B:2044:LEU:HD11	1.93	0.51
1:A:485:GLU:HA	1:A:488:ALA:HB3	1.92	0.51
1:A:16:LEU:CD1	1:A:156:ARG:HH22	2.24	0.50
1:A:317:GLU:C	1:A:318:LYS:HD2	2.31	0.50
1:A:235:LYS:O	1:A:292:LEU:HB2	2.10	0.50
1:B:2087:ASN:HD22	1:B:2312:LYS:HG3	1.76	0.50
1:B:2122:VAL:O	1:B:2133:GLY:HA2	2.11	0.50
1:B:2014:ARG:O	1:B:2018:ARG:HG3	2.11	0.50
1:B:2515:VAL:HG23	1:B:2519:LEU:HB3	1.92	0.50
1:A:438:TYR:CD1	1:A:509:ALA:HB1	2.46	0.50
1:B:2225:LEU:HA	1:B:2229:LEU:HD11	1.93	0.50
1:A:512:LEU:HB2	1:A:515:VAL:CG1	2.42	0.50
1:A:555:ILE:O	1:A:559:LEU:HG	2.12	0.50
1:B:2377:LYS:HA	1:B:2383:PRO:HA	1.94	0.50
1:B:2422:CYS:SG	1:B:2424:ASN:HB3	2.52	0.50
1:B:2123:LEU:HG	1:B:2130:TRP:HZ2	1.75	0.49
1:A:504:GLU:HG2	1:A:521:ARG:HG3	1.94	0.49
1:A:80:THR:HG23	1:A:225:LEU:HD23	1.93	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:316:GLU:CG	1:A:347:GLU:HG3	2.36	0.49
1:B:2152:THR:HB	1:B:2250:PRO:HB3	1.95	0.49
1:A:170:VAL:HG22	1:A:218:ALA:HB2	1.94	0.49
1:A:143:VAL:O	1:A:143:VAL:HG22	2.13	0.49
1:A:545:GLU:O	1:A:546:GLU:HB2	2.12	0.49
1:B:2002:THR:HG22	1:B:2005:GLU:HG3	1.94	0.49
1:A:168:GLY:HA3	1:A:220:PHE:HA	1.95	0.49
1:A:71:PRO:HG2	1:A:73:PHE:CE2	2.48	0.49
1:B:2512:LEU:O	1:B:2515:VAL:HG12	2.13	0.48
1:B:2515:VAL:O	1:B:2515:VAL:HG13	2.13	0.48
1:A:115:HIS:CE1	1:A:278:LEU:HD11	2.49	0.48
1:B:2444:MET:HG2	1:B:2509:ALA:CB	2.42	0.48
1:A:44:LEU:HD11	1:A:60:PRO:HD2	1.96	0.48
1:B:2166:VAL:HG21	1:B:2249:PHE:CZ	2.49	0.48
1:B:2097:PHE:HA	1:B:2100:ARG:NH2	2.29	0.47
1:A:470:TYR:O	1:A:473:ARG:HG3	2.15	0.47
1:A:244:LEU:O	1:A:249:PHE:HB2	2.14	0.47
1:B:2033:SER:OG	1:B:2036:GLU:HG3	2.14	0.47
1:B:2115:HIS:CE1	1:B:2278:LEU:HD11	2.49	0.47
1:A:116:LYS:NZ	1:A:312:LYS:HD3	2.30	0.47
1:B:2503:LEU:HB3	1:B:2524:ALA:HB1	1.97	0.47
1:A:512:LEU:HB3	1:A:513:PRO:HD2	1.95	0.47
1:B:2226:GLY:HA2	1:B:2230:GLU:HB2	1.96	0.47
1:B:2150:ILE:HB	1:B:2153:ILE:HD12	1.95	0.47
1:B:2120:LEU:HD21	3:B:2700:AMP:O2'	2.14	0.47
1:B:2167:ARG:NH2	1:B:2167:ARG:HG2	2.23	0.47
1:A:82:MET:HE3	1:A:167:ARG:HG3	1.96	0.47
1:A:116:LYS:O	1:A:282:ALA:HA	2.15	0.47
1:B:2166:VAL:HG12	1:B:2220:PHE:HD1	1.80	0.47
1:B:2394:THR:HG23	1:B:2396:LYS:H	1.79	0.47
1:B:2519:LEU:HD11	1:B:2547:VAL:HG22	1.97	0.47
1:A:449:LEU:HD22	1:A:491:LEU:HD11	1.97	0.46
1:A:94:VAL:HG21	1:A:311:TYR:CD1	2.50	0.46
1:A:14:ARG:NH2	1:A:59:SER:HB2	2.30	0.46
1:B:2023:ARG:NH1	1:B:2031:GLU:HG3	2.29	0.46
1:B:2220:PHE:CD2	1:B:2220:PHE:N	2.83	0.46
1:B:2014:ARG:HD3	1:B:2018:ARG:NH2	2.30	0.46
1:B:2148:LEU:HD11	1:B:2155:ARG:HG2	1.97	0.46
1:B:2402:TRP:CG	1:B:2420:HIS:ND1	2.84	0.46
1:A:295:TRP:O	1:A:298:LEU:O	2.34	0.46
1:A:44:LEU:HD13	1:A:61:THR:HG23	1.98	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:2255:TYR:O	1:B:2256:GLU:HB3	2.16	0.46
1:A:438:TYR:CE1	1:A:466:VAL:HG11	2.51	0.46
1:A:56:SER:C	1:A:58:ASP:H	2.19	0.46
1:B:2143:VAL:HG22	1:B:2143:VAL:O	2.16	0.46
1:A:504:GLU:HG3	1:A:524:ALA:HB3	1.98	0.46
1:A:94:VAL:HG21	1:A:311:TYR:CE1	2.51	0.45
1:B:2013:LEU:HB3	1:B:2044:LEU:HG	1.98	0.45
1:A:117:VAL:HG12	1:A:118:ASP:H	1.81	0.45
1:A:519:LEU:O	1:A:519:LEU:HD13	2.16	0.45
1:B:2111:TYR:HD2	1:B:2289:LEU:HA	1.81	0.45
1:B:2555:ILE:O	1:B:2559:LEU:HG	2.16	0.45
1:A:107:ALA:HB3	1:A:108:PRO:HD3	1.98	0.45
1:A:116:LYS:CG	1:A:286:VAL:HG23	2.47	0.45
1:A:456:ARG:HG3	1:A:481:GLU:HG2	1.99	0.45
1:B:2226:GLY:N	1:B:2230:GLU:HB2	2.32	0.45
1:A:80:THR:HG23	1:A:225:LEU:CD2	2.46	0.45
1:A:114:GLU:HB3	1:A:255:TYR:HB3	1.99	0.45
1:A:369:ILE:O	1:A:371:ASP:N	2.50	0.45
1:A:394:THR:HG23	1:A:396:LYS:H	1.80	0.45
1:A:446:ILE:HG21	1:A:449:LEU:HD23	1.99	0.45
1:A:467:ALA:HB2	1:A:571:LEU:HG	1.98	0.44
1:B:2362:ILE:HG23	1:B:2367:ILE:HB	1.98	0.44
1:A:221:TYR:CD2	1:A:222:ALA:N	2.86	0.44
1:B:2120:LEU:CD1	1:B:2120:LEU:H	2.25	0.44
1:B:2073:PHE:HD2	1:B:2141:GLU:HG2	1.82	0.44
1:A:157:LEU:HD23	1:A:160:VAL:HG11	1.99	0.44
1:A:27:LEU:O	1:A:28:ALA:HB3	2.18	0.44
1:A:2:THR:HG23	1:A:5:GLU:H	1.83	0.44
1:B:2115:HIS:CD2	1:B:2254:CYS:SG	3.10	0.44
1:B:2300:TYR:CE2	1:B:2305:PRO:HB3	2.53	0.44
1:B:2424:ASN:ND2	1:B:2426:LEU:H	2.15	0.44
1:B:2469:LEU:O	1:B:2472:LEU:HB2	2.18	0.44
1:A:44:LEU:O	1:A:48:GLU:HB2	2.18	0.44
1:B:2057:PRO:HG2	1:B:2074:ARG:NE	2.33	0.44
1:B:2529:THR:HG22	1:B:2530:MET:N	2.32	0.44
1:B:2446:ILE:HD13	1:B:2495:ILE:HG12	2.00	0.44
1:A:289:LEU:HD23	1:A:291:ASP:H	1.83	0.44
1:B:2004:GLU:O	1:B:2008:ARG:HB2	2.18	0.44
1:B:2097:PHE:HD1	1:B:2100:ARG:NH2	2.15	0.44
1:A:161:PRO:HB3	1:A:231:GLU:HB2	2.00	0.43
1:A:115:HIS:CG	1:A:254:CYS:SG	3.11	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:456:ARG:CG	1:A:481:GLU:HG2	2.46	0.43
1:B:2075:PRO:HA	1:B:2140:GLY:O	2.18	0.43
1:B:2129:VAL:HG12	1:B:2130:TRP:N	2.33	0.43
1:A:424:ASN:HA	1:A:425:PRO:HD3	1.84	0.43
1:A:503:LEU:HD22	1:A:507:LEU:HG	2.00	0.43
1:A:94:VAL:O	1:A:97:PHE:HB3	2.18	0.43
1:A:228:GLY:O	1:A:230:GLU:N	2.52	0.43
1:A:68:PRO:O	1:A:70:GLU:HG3	2.18	0.43
1:A:442:LYS:CB	1:A:508:TYR:HE2	2.30	0.43
1:B:2002:THR:HG23	1:B:2005:GLU:H	1.84	0.43
1:A:100:ARG:O	1:A:103:ARG:HG2	2.18	0.43
1:A:523:LEU:O	1:A:527:PHE:HD1	2.02	0.43
1:B:2226:GLY:H	1:B:2230:GLU:HB2	1.83	0.43
1:A:164:LEU:HA	1:A:225:LEU:O	2.18	0.43
1:B:2381:VAL:HG13	1:B:2382:ILE:N	2.28	0.43
1:A:292:LEU:O	1:A:295:TRP:HB2	2.19	0.42
1:A:444:MET:HA	1:A:501:ARG:HG3	2.01	0.42
1:A:446:ILE:CG2	1:A:449:LEU:HD23	2.49	0.42
1:A:512:LEU:HB2	1:A:515:VAL:HG11	2.00	0.42
1:B:2002:THR:HG22	1:B:2005:GLU:CG	2.49	0.42
1:B:2098:GLU:O	1:B:2102:GLU:HG3	2.18	0.42
1:B:2451:GLU:O	1:B:2455:GLU:HG2	2.19	0.42
1:A:221:TYR:HD2	1:A:222:ALA:N	2.18	0.42
1:B:2057:PRO:HA	1:B:2062:GLU:HG3	2.01	0.42
1:B:2223:LEU:HB2	1:B:2227:LEU:HD13	2.01	0.42
1:A:368:ARG:HD3	1:A:393:ARG:NH1	2.33	0.42
1:A:447:GLU:HB2	1:A:494:GLN:HE22	1.84	0.42
1:A:454:ILE:O	1:A:458:LEU:HD23	2.18	0.42
1:B:2456:ARG:HD2	1:B:2456:ARG:HA	1.85	0.42
1:A:565:ARG:HA	1:A:565:ARG:HD3	1.87	0.42
1:A:427:CYS:SG	1:A:429:ALA:HB3	2.60	0.42
1:A:191:VAL:HG21	1:A:357:HIS:CE1	2.55	0.42
1:A:1:MET:SD	1:A:47:LEU:HD21	2.60	0.42
1:B:2329:VAL:HG22	1:B:2429:ALA:CB	2.50	0.42
1:B:2503:LEU:HB3	1:B:2524:ALA:CB	2.50	0.42
1:A:116:LYS:HE2	1:A:116:LYS:HB3	1.82	0.41
1:A:14:ARG:NH1	1:A:44:LEU:HD21	2.36	0.41
1:A:469:LEU:O	1:A:472:LEU:HB2	2.21	0.41
1:A:362:ILE:HD13	1:A:400:ILE:HG21	2.03	0.41
1:B:2090:THR:O	1:B:2094:VAL:HG23	2.20	0.41
1:B:2498:SER:HA	1:B:2501:ARG:HE	1.86	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:161:PRO:CB	1:A:231:GLU:HB2	2.51	0.41
1:A:515:VAL:HA	1:A:519:LEU:HD12	2.03	0.41
1:B:2124:TYR:HD2	1:B:2131:SER:HB2	1.85	0.41
1:B:2322:LEU:HD12	1:B:2340:VAL:O	2.20	0.41
1:B:2466:VAL:HG23	1:B:2571:LEU:HD21	2.02	0.41
1:B:2401:ARG:HB3	1:B:2401:ARG:HH21	1.85	0.41
1:A:39:ARG:HA	1:A:39:ARG:HE	1.85	0.40
1:B:2164:LEU:HD12	1:B:2225:LEU:O	2.21	0.40
1:A:103:ARG:HD3	1:A:103:ARG:HA	1.89	0.40
1:B:2322:LEU:O	1:B:2369:ILE:O	2.39	0.40
1:B:2518:VAL:HG13	1:B:2519:LEU:N	2.37	0.40
1:B:2466:VAL:HG22	1:B:2567:LEU:HD11	2.03	0.40
1:A:130:TRP:HH2	1:A:147:LEU:HB2	1.87	0.40
1:A:369:ILE:C	1:A:371:ASP:H	2.25	0.40
1:B:2123:LEU:HD22	1:B:2220:PHE:CZ	2.56	0.40
1:B:2356:LEU:HD22	1:B:2367:ILE:HD12	2.02	0.40
1:B:2414:VAL:HG22	1:B:2415:LYS:N	2.36	0.40
1:B:2431:ARG:HG2	1:B:2464:ARG:O	2.20	0.40
1:B:2439:ALA:HB2	1:B:2449:LEU:HD23	2.03	0.40
1:A:111:TYR:HD2	1:A:289:LEU:HA	1.86	0.40
1:A:506:LEU:O	1:A:510:LEU:HD13	2.21	0.40
1:A:74:ARG:HA	1:A:75:PRO:HD3	1.93	0.40
1:B:2219:THR:O	1:B:2219:THR:HG23	2.22	0.40
1:B:2241:LEU:HD23	1:B:2255:TYR:CG	2.57	0.40
1:A:403:PRO:O	1:A:413:LEU:HD12	2.21	0.40
1:B:2097:PHE:HD1	1:B:2100:ARG:HH21	1.70	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	579/667 (87%)	508 (88%)	56 (10%)	15 (3%)	6	23
1	B	579/667 (87%)	504 (87%)	59 (10%)	16 (3%)	5	21
All	All	1158/1334 (87%)	1012 (87%)	115 (10%)	31 (3%)	5	22

All (31) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	64	VAL
1	A	106	GLU
1	A	216	LEU
1	B	2064	VAL
1	B	2106	GLU
1	B	2138	GLU
1	B	2343	PRO
1	A	69	LEU
1	A	228	GLY
1	A	229	LEU
1	B	2105	ALA
1	B	2443	ALA
1	A	357	HIS
1	A	381	VAL
1	A	409	CYS
1	B	2357	HIS
1	B	2440	SER
1	B	2485	GLU
1	A	73	PHE
1	A	515	VAL
1	B	2107	ALA
1	B	2108	PRO
1	A	443	ALA
1	B	2302	ALA
1	A	143	VAL
1	B	2325	VAL
1	A	513	PRO
1	A	511	GLY
1	B	2528	GLY
1	B	2117	VAL
1	B	2143	VAL

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	495/566 (88%)	462 (93%)	33 (7%)	18	46
1	B	495/566 (88%)	462 (93%)	33 (7%)	18	46
All	All	990/1132 (88%)	924 (93%)	66 (7%)	18	46

All (66) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1	MET
1	A	23	ARG
1	A	39	ARG
1	A	41	LEU
1	A	44	LEU
1	A	49	GLU
1	A	72	THR
1	A	99	GLU
1	A	115	HIS
1	A	117	VAL
1	A	118	ASP
1	A	138	GLU
1	A	225	LEU
1	A	230	GLU
1	A	237	GLN
1	A	283	ASP
1	A	287	LEU
1	A	311	TYR
1	A	331	ARG
1	A	344	VAL
1	A	364	GLU
1	A	368	ARG
1	A	374	LEU
1	A	375	VAL
1	A	389	LEU
1	A	414	VAL
1	A	424	ASN

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Mol	Chain	Res	Type
1	A	441	ARG
1	A	458	LEU
1	A	472	LEU
1	A	492	LEU
1	A	503	LEU
1	A	506	LEU
1	B	2004	GLU
1	B	2013	LEU
1	B	2022	TYR
1	B	2044	LEU
1	B	2067	ARG
1	B	2120	LEU
1	B	2130	TRP
1	B	2138	GLU
1	B	2148	LEU
1	B	2157	LEU
1	B	2167	ARG
1	B	2209	ARG
1	B	2217	ARG
1	B	2221	TYR
1	B	2237	GLN
1	B	2254	CYS
1	B	2266	GLU
1	B	2291	ASP
1	B	2329	VAL
1	B	2364	GLU
1	B	2376	HIS
1	B	2391	GLU
1	B	2406	CYS
1	B	2416	GLU
1	B	2424	ASN
1	B	2440	SER
1	B	2472	LEU
1	B	2493	ARG
1	B	2496	GLU
1	B	2504	GLU
1	B	2510	LEU
1	B	2519	LEU
1	B	2523	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	87	ASN
1	A	197	ASN
1	A	276	HIS
1	A	424	ASN
1	B	2087	ASN
1	B	2145	GLN
1	B	2146	ASN
1	B	2197	ASN
1	B	2205	GLN
1	B	2237	GLN
1	B	2424	ASN
1	B	2494	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 carbohydrates in this entry.

5.6 Ligand geometry [i](#)

Of 4 ligands modelled in this entry, 2 are monoatomic - leaving 2 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	AMP	A	700	1	18,24,25	1.00	2 (11%)	16,35,38	2.96	3 (18%)
3	AMP	B	2700	1	18,24,25	1.11	3 (16%)	16,35,38	2.95	2 (12%)

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
3	AMP	A	700	1	-	0/3/25/26	0/3/3/3
3	AMP	B	2700	1	-	0/3/25/26	0/3/3/3

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	2700	AMP	C5-N7	-2.36	1.31	1.39
3	A	700	AMP	C5-N7	-2.35	1.31	1.39
3	A	700	AMP	C8-N9	-2.22	1.34	1.36
3	B	2700	AMP	C8-N9	-2.21	1.34	1.36
3	B	2700	AMP	O4'-C1'	2.75	1.45	1.41

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	2700	AMP	N3-C2-N1	-11.19	119.28	128.86
3	A	700	AMP	N3-C2-N1	-11.03	119.42	128.86
3	A	700	AMP	C4-C5-N7	-2.47	107.02	109.41
3	B	2700	AMP	C4-C5-N7	-2.44	107.05	109.41
3	A	700	AMP	C2'-C3'-C4'	2.17	106.78	102.62

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	2700	AMP	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

6.1 Protein, DNA and RNA chains

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	581/667 (87%)	-0.18	15 (2%) 56 52	11, 43, 87, 101	0
1	B	581/667 (87%)	-0.07	19 (3%) 46 40	11, 47, 89, 101	0
All	All	1162/1334 (87%)	-0.13	34 (2%) 51 46	11, 45, 89, 101	0

All (34) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	2348	GLY	5.1
1	B	2303	ARG	4.8
1	A	230	GLU	4.0
1	B	2035	ALA	3.9
1	A	106	GLU	3.8
1	A	302	ALA	3.7
1	A	65	GLY	3.6
1	B	2482	ARG	3.5
1	A	484	GLY	3.5
1	B	2302	ALA	3.4
1	A	229	LEU	3.1
1	A	394	THR	3.0
1	B	2484	GLY	2.9
1	B	2301	THR	2.9
1	A	303	ARG	2.8
1	A	33	SER	2.8
1	A	473	ARG	2.8
1	A	485	GLU	2.8
1	A	29	ASP	2.7
1	B	2033	SER	2.7
1	B	2231	GLU	2.7
1	B	2481	GLU	2.6
1	B	2441	ARG	2.5
1	B	2064	VAL	2.5

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Mol	Chain	Res	Type	RSRZ
1	B	2381	VAL	2.5
1	A	105	ALA	2.3
1	B	2391	GLU	2.3
1	B	2349	SER	2.3
1	B	2259	LEU	2.1
1	A	67	ARG	2.1
1	B	2380	GLY	2.1
1	A	231	GLU	2.1
1	B	2476	ASP	2.1
1	B	2130	TRP	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 carbohydrates in this entry.

6.4 Ligands [i](#)

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(Å ²)	Q<0.9
3	AMP	B	2700	22/23	0.91	0.18	75,84,92,94	0
3	AMP	A	700	22/23	0.95	0.12	36,43,52,62	0
2	ZN	B	2701	1/1	0.97	0.14	33,33,33,33	0
2	ZN	A	701	1/1	0.99	0.10	20,20,20,20	0

6.5 Other polymers [i](#)

There are no such residues in this entry.