Full wwPDB X-ray Structure Validation Report (i)

Jun 17, 2024 – 10:54 AM EDT

PDB ID	:	8FJ7
Title	:	LSD1-CoREST in complex with T108 and SNAG peptide
Authors	:	Caroli, J.; Mattevi, A.
Deposited on	:	2022-12-19
Resolution	:	2.80 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 (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 (i)) were used in the production of this report:

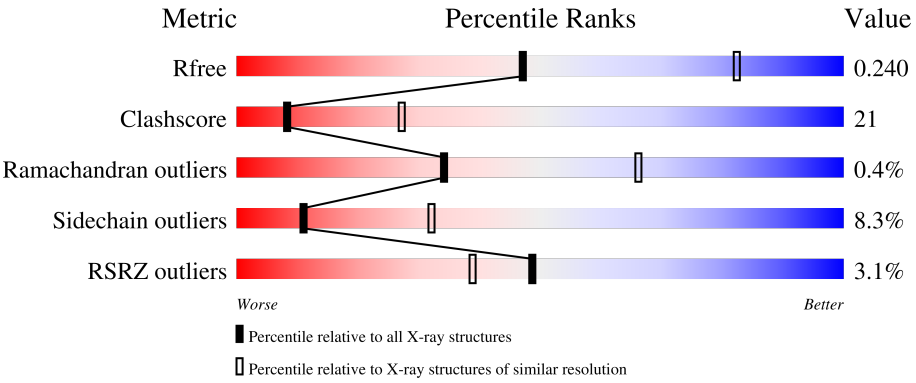
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.37.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & 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 2.80 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))
R_{free}	130704	3140 (2.80-2.80)
Clashscore	141614	3569 (2.80-2.80)
Ramachandran outliers	138981	3498 (2.80-2.80)
Sidechain outliers	138945	3500 (2.80-2.80)
RSRZ outliers	127900	3078 (2.80-2.80)

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	871	2% 56% 18% 24%
2	B	144	7% 55% 27% 10% 8%
3	C	9	11% 11% 11% 22% 56%

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 6400 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 Lysine-specific histone demethylase 1A.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	666	Total	C	N	O	S	0	0	0
			5217	3324	906	967	20			

There are 19 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-18	GLY	-	expression tag	UNP O60341
A	-17	SER	-	expression tag	UNP O60341
A	-16	SER	-	expression tag	UNP O60341
A	-15	HIS	-	expression tag	UNP O60341
A	-14	HIS	-	expression tag	UNP O60341
A	-13	HIS	-	expression tag	UNP O60341
A	-12	HIS	-	expression tag	UNP O60341
A	-11	HIS	-	expression tag	UNP O60341
A	-10	HIS	-	expression tag	UNP O60341
A	-9	SER	-	expression tag	UNP O60341
A	-8	SER	-	expression tag	UNP O60341
A	-7	GLY	-	expression tag	UNP O60341
A	-6	LEU	-	expression tag	UNP O60341
A	-5	VAL	-	expression tag	UNP O60341
A	-4	PRO	-	expression tag	UNP O60341
A	-3	ARG	-	expression tag	UNP O60341
A	-2	GLY	-	expression tag	UNP O60341
A	-1	SER	-	expression tag	UNP O60341
A	0	HIS	-	expression tag	UNP O60341

- Molecule 2 is a protein called REST corepressor 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	133	Total	C	N	O	S	0	0	0
			1076	676	194	203	3			

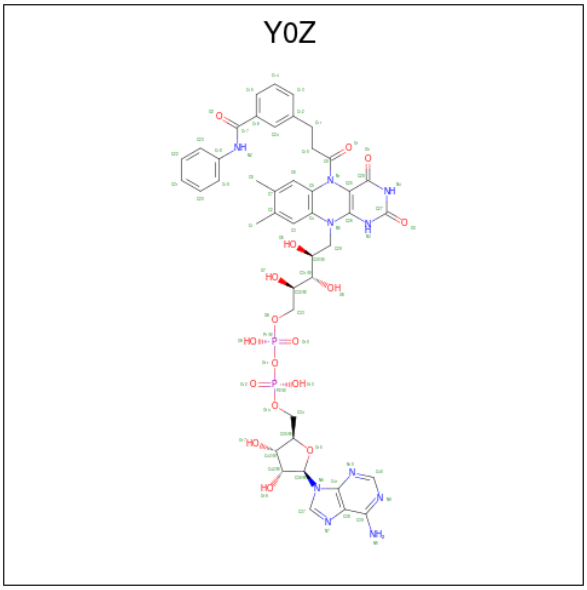
There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	297	GLY	-	expression tag	UNP Q9UKL0
B	298	PRO	-	expression tag	UNP Q9UKL0
B	299	LEU	-	expression tag	UNP Q9UKL0
B	300	GLY	-	expression tag	UNP Q9UKL0
B	301	SER	-	expression tag	UNP Q9UKL0
B	302	PRO	-	expression tag	UNP Q9UKL0
B	303	GLU	-	expression tag	UNP Q9UKL0
B	304	PHE	-	expression tag	UNP Q9UKL0

- Molecule 3 is a protein called Zinc finger protein SNAI1.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	C	4	Total	C	N	O	0	0	0
			35	23	7	5			

- Molecule 4 is [(2R,3S,4R,5R)-5-(6-amino-9H-purin-9-yl)-3,4-dihydroxyoxolan-2-yl]methyl (2R,3S,4S)-5-[7,8-dimethyl-2,4-dioxo-5-{3-[3-(phenylcarbamoyl)phenyl]propanoyl}-1,3,4,5-tetrahydrobenzo[g]pteridin-10(2H)-yl]-2,3,4-trihydroxypentyl dihydrogen diphosphate (three-letter code: Y0Z) (formula: $C_{43}H_{48}N_{10}O_{17}P_2$) (labeled as "Ligand of Interest" by depositor).



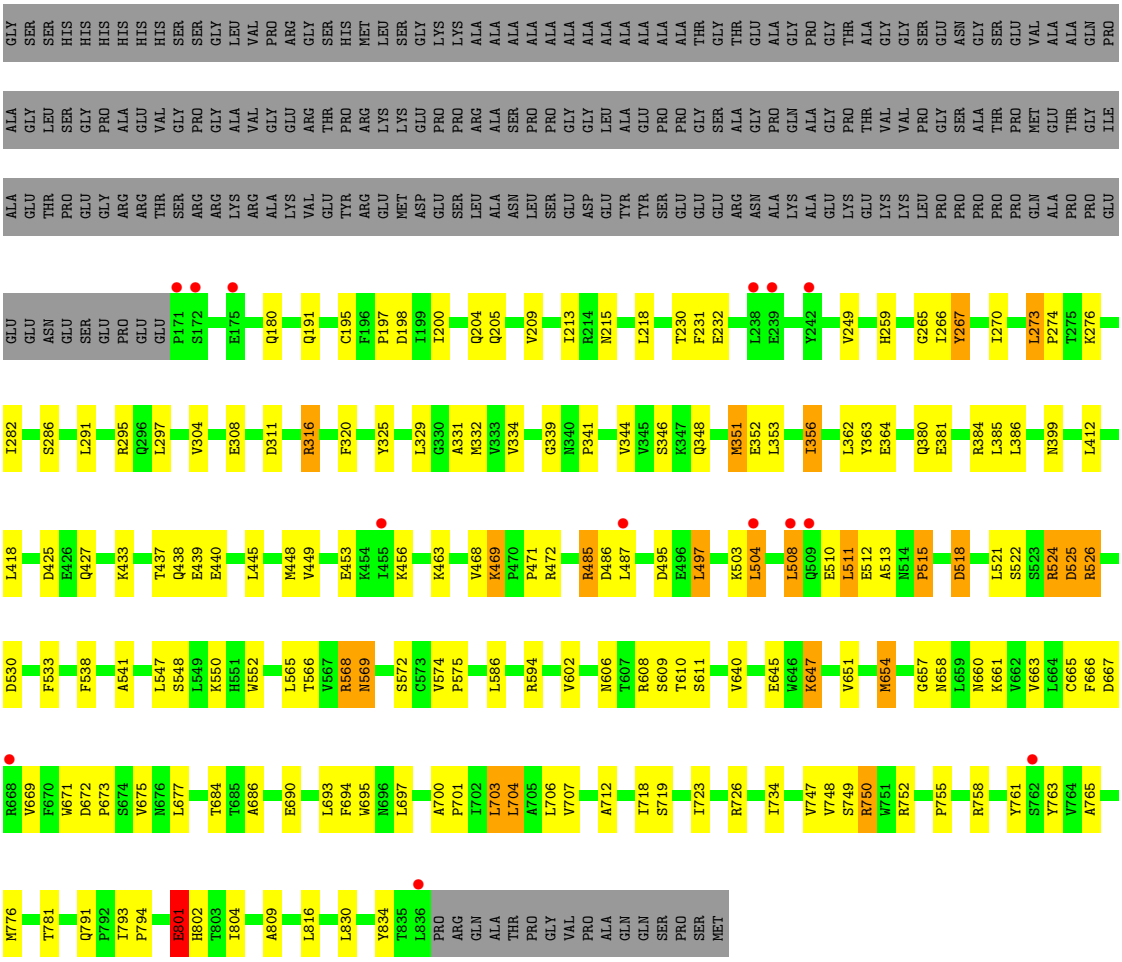
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total	C	N	O	P	0	0
			72	43	10	17	2		

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.

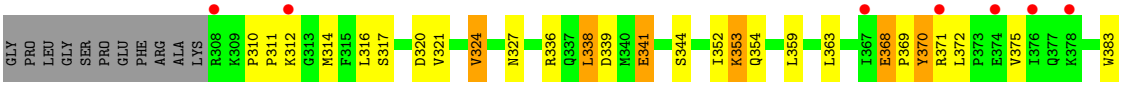
• Molecule 1: Lysine-specific histone demethylase 1A

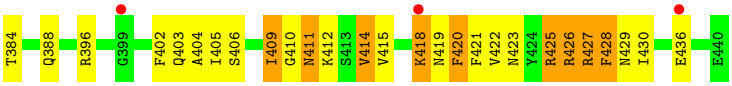
Chain A:



• Molecule 2: REST corepressor 1

Chain B:





• Molecule 3: Zinc finger protein SNAI1

4 Data and refinement statistics (i)

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants a, b, c, α, β, γ	119.54Å 179.04Å 234.24Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.58 – 2.80 48.58 – 2.80	Depositor EDS
% Data completeness (in resolution range)	99.4 (48.58-2.80) 99.4 (48.58-2.80)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.07 (at 2.81Å)	Xtriage
Refinement program	PHENIX 1.18.2	Depositor
R, R_{free}	0.222 , 0.243 0.224 , 0.240	Depositor DCC
R_{free} test set	1993 reflections (3.23%)	wwPDB-VP
Wilson B-factor (Å^2)	93.2	Xtriage
Anisotropy	0.414	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.33 , 75.9	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	6400	wwPDB-VP
Average B, all atoms (Å^2)	104.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.07% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: Y0Z

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	0.66	2/5331 (0.0%)	0.77	2/7232 (0.0%)
2	B	0.61	0/1091	0.80	1/1471 (0.1%)
3	C	0.69	0/36	1.51	0/46
All	All	0.66	2/6458 (0.0%)	0.78	3/8749 (0.0%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	801	GLU	CD-OE1	-5.80	1.19	1.25
1	A	801	GLU	CD-OE2	-5.76	1.19	1.25

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	419	ASN	CB-CA-C	6.72	123.84	110.40
1	A	750	ARG	CG-CD-NE	-6.04	99.11	111.80
1	A	316	ARG	CG-CD-NE	5.21	122.74	111.80

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	5217	0	5252	199	0
2	B	1076	0	1091	84	0
3	C	35	0	34	11	0
4	A	72	0	0	3	0
All	All	6400	0	6377	268	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 21.

All (268) 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:671:TRP:CE3	1:A:703:LEU:HD11	1.48	1.45
1:A:671:TRP:CZ3	1:A:703:LEU:HD12	1.57	1.40
1:A:671:TRP:CE3	1:A:703:LEU:CD1	2.12	1.30
1:A:671:TRP:CZ3	1:A:703:LEU:CD1	2.14	1.30
1:A:363:TYR:CD2	1:A:734:ILE:HD12	1.73	1.24
1:A:671:TRP:CD2	1:A:703:LEU:HD11	1.76	1.20
1:A:346:SER:HA	1:A:351:MET:CE	1.78	1.14
2:B:383:TRP:CD2	2:B:412:LYS:HE2	1.85	1.12
1:A:437:THR:OG1	1:A:508:LEU:HD21	1.56	1.06
2:B:383:TRP:CZ2	2:B:420:PHE:HD1	1.73	1.06
3:C:67:ARG:HG3	3:C:67:ARG:HH11	1.16	1.06
1:A:363:TYR:HD2	1:A:734:ILE:HD12	0.90	1.04
1:A:793:ILE:HD12	1:A:793:ILE:H	1.23	1.00
1:A:363:TYR:CE2	1:A:734:ILE:HG23	1.98	0.98
2:B:383:TRP:CH2	2:B:420:PHE:CD1	2.52	0.98
2:B:383:TRP:CZ2	2:B:420:PHE:CD1	2.54	0.96
1:A:427:GLN:NE2	1:A:518:ASP:HA	1.81	0.95
1:A:364:GLU:OE2	1:A:524:ARG:NH2	2.00	0.95
1:A:438:GLN:OE1	1:A:508:LEU:HD12	1.65	0.95
1:A:456:LYS:HA	2:B:370:TYR:CE2	2.02	0.94
1:A:438:GLN:OE1	1:A:508:LEU:CD1	2.16	0.94
1:A:346:SER:HA	1:A:351:MET:HE2	1.51	0.90
2:B:425:ARG:HA	2:B:430:ILE:HD12	1.54	0.89
2:B:383:TRP:CD2	2:B:412:LYS:CE	2.55	0.89
2:B:383:TRP:CE2	2:B:412:LYS:CE	2.56	0.88
2:B:383:TRP:CE2	2:B:420:PHE:HD1	1.91	0.88
2:B:383:TRP:CE3	2:B:412:LYS:HE2	2.08	0.87
1:A:801:GLU:HG3	1:A:809:ALA:HA	1.55	0.86
1:A:671:TRP:CH2	1:A:703:LEU:HD12	2.09	0.86
1:A:346:SER:CA	1:A:351:MET:CE	2.53	0.85

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:427:GLN:HE21	1:A:518:ASP:HA	1.42	0.85
1:A:363:TYR:HE2	1:A:734:ILE:HG23	1.40	0.85
2:B:383:TRP:CZ3	2:B:420:PHE:CE1	2.66	0.84
1:A:438:GLN:HG2	1:A:508:LEU:HD11	1.58	0.84
1:A:660:ASN:OD1	1:A:749:SER:OG	1.95	0.83
1:A:518:ASP:OD2	1:A:518:ASP:N	2.07	0.83
1:A:380:GLN:O	1:A:384:ARG:HG3	1.79	0.82
2:B:311:PRO:HG2	2:B:314:MET:HG3	1.64	0.80
2:B:383:TRP:CZ2	2:B:412:LYS:CD	2.65	0.80
2:B:383:TRP:CZ2	2:B:412:LYS:HD3	2.17	0.80
1:A:363:TYR:HD2	1:A:734:ILE:CD1	1.85	0.80
1:A:273:LEU:O	1:A:273:LEU:HD23	1.80	0.79
2:B:383:TRP:CH2	2:B:412:LYS:HD2	2.18	0.78
2:B:421:PHE:O	2:B:425:ARG:HB2	1.83	0.77
1:A:456:LYS:CB	2:B:370:TYR:HE2	1.97	0.77
2:B:383:TRP:CE2	2:B:412:LYS:HE3	2.21	0.75
3:C:67:ARG:HG3	3:C:67:ARG:NH1	1.93	0.74
1:A:497:LEU:N	1:A:497:LEU:HD23	2.01	0.73
1:A:363:TYR:CD2	1:A:734:ILE:HG23	2.24	0.73
1:A:456:LYS:CA	2:B:370:TYR:CE2	2.71	0.73
2:B:368:GLU:HA	2:B:368:GLU:OE1	1.88	0.72
1:A:195:CYS:HG	1:A:834:TYR:HE2	1.37	0.72
1:A:384:ARG:NH2	2:B:312:LYS:O	2.22	0.72
1:A:526:ARG:HH11	1:A:526:ARG:CG	2.02	0.72
2:B:383:TRP:CE3	2:B:420:PHE:HE1	2.09	0.71
1:A:344:VAL:O	1:A:348:GLN:HG3	1.88	0.71
1:A:363:TYR:CE2	1:A:734:ILE:CG2	2.72	0.71
1:A:346:SER:HA	1:A:351:MET:HE1	1.72	0.71
1:A:346:SER:CA	1:A:351:MET:HE1	2.22	0.70
1:A:569:ASN:OD1	1:A:569:ASN:N	2.26	0.69
1:A:437:THR:OG1	1:A:508:LEU:CD2	2.37	0.69
1:A:456:LYS:CA	2:B:370:TYR:HE2	2.06	0.68
1:A:341:PRO:HG3	1:A:816:LEU:CD1	2.23	0.68
1:A:793:ILE:H	1:A:793:ILE:CD1	1.97	0.68
2:B:383:TRP:CE3	2:B:420:PHE:CE1	2.81	0.68
1:A:438:GLN:OE1	1:A:508:LEU:HD11	1.93	0.68
1:A:755:PRO:HA	1:A:758:ARG:HE	1.59	0.68
2:B:383:TRP:CZ3	2:B:420:PHE:CD1	2.82	0.68
1:A:750:ARG:HG2	1:A:750:ARG:NH2	2.07	0.67
2:B:426:ARG:HD3	2:B:427:ARG:HG2	1.76	0.67
1:A:418:LEU:CD1	2:B:321:VAL:HG12	2.25	0.66

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:418:LEU:HD11	2:B:321:VAL:HG12	1.76	0.66
1:A:671:TRP:O	1:A:673:PRO:HD3	1.96	0.66
1:A:332:MET:CE	1:A:661:LYS:NZ	2.59	0.65
1:A:356:ILE:HD11	1:A:566:THR:CG2	2.26	0.65
2:B:396:ARG:HH11	2:B:436:GLU:HB3	1.62	0.65
2:B:383:TRP:CE2	2:B:420:PHE:CD1	2.82	0.64
1:A:525:ASP:N	1:A:525:ASP:OD1	2.31	0.63
1:A:511:LEU:N	1:A:511:LEU:HD23	2.14	0.63
1:A:671:TRP:CH2	1:A:703:LEU:CD1	2.75	0.63
2:B:383:TRP:CH2	2:B:412:LYS:CD	2.80	0.62
1:A:671:TRP:CZ3	1:A:703:LEU:HD11	2.02	0.62
1:A:456:LYS:HA	2:B:370:TYR:CD2	2.34	0.62
1:A:793:ILE:HG22	1:A:794:PRO:CD	2.30	0.61
1:A:231:PHE:HE2	1:A:249:VAL:HG12	1.66	0.61
2:B:396:ARG:NH1	2:B:436:GLU:HB3	2.15	0.61
2:B:427:ARG:C	2:B:429:ASN:H	2.04	0.61
1:A:438:GLN:CG	1:A:508:LEU:HD11	2.29	0.60
1:A:195:CYS:SG	1:A:834:TYR:HE2	2.23	0.60
1:A:526:ARG:HH11	1:A:526:ARG:HG3	1.66	0.60
1:A:346:SER:CB	1:A:351:MET:CE	2.80	0.60
1:A:661:LYS:HD3	1:A:704:LEU:HD21	1.83	0.60
1:A:793:ILE:HD12	1:A:793:ILE:N	2.05	0.59
1:A:456:LYS:HB2	2:B:370:TYR:HE2	1.65	0.59
1:A:325:TYR:CE2	1:A:665:CYS:HB3	2.37	0.59
2:B:370:TYR:N	2:B:370:TYR:HD1	2.01	0.59
1:A:363:TYR:HE2	1:A:734:ILE:CG2	2.12	0.59
1:A:495:ASP:OD2	2:B:371:ARG:NH1	2.36	0.59
1:A:718:ILE:HG22	1:A:723:ILE:HG13	1.84	0.59
1:A:332:MET:HE2	1:A:661:LYS:HZ1	1.67	0.59
2:B:402:PHE:HB2	2:B:414:VAL:CG1	2.34	0.58
1:A:750:ARG:HG2	1:A:750:ARG:HH21	1.68	0.58
1:A:793:ILE:HG22	1:A:794:PRO:HD2	1.85	0.58
1:A:456:LYS:HE2	2:B:370:TYR:OH	2.04	0.58
2:B:370:TYR:N	2:B:370:TYR:CD1	2.71	0.58
1:A:804:ILE:HG23	1:A:804:ILE:O	2.03	0.58
1:A:346:SER:CB	1:A:351:MET:HE3	2.33	0.58
1:A:468:VAL:HG12	1:A:468:VAL:O	2.02	0.58
1:A:198:ASP:OD1	1:A:198:ASP:N	2.37	0.57
2:B:341:GLU:HG3	2:B:341:GLU:O	2.02	0.57
2:B:427:ARG:C	2:B:429:ASN:N	2.58	0.57
1:A:510:GLU:O	1:A:513:ALA:N	2.38	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:700:ALA:HB1	1:A:701:PRO:HD2	1.85	0.57
2:B:403:GLN:OE1	2:B:403:GLN:HA	2.03	0.57
1:A:456:LYS:HG3	2:B:370:TYR:OH	2.04	0.56
3:C:67:ARG:HH11	3:C:67:ARG:CG	2.02	0.56
3:C:69:PHE:HD2	3:C:69:PHE:O	1.88	0.56
1:A:487:LEU:HD23	2:B:372:LEU:HG	1.87	0.56
1:A:594:ARG:HG2	1:A:640:VAL:HB	1.89	0.55
2:B:427:ARG:O	2:B:429:ASN:N	2.40	0.55
1:A:801:GLU:HG3	1:A:809:ALA:CA	2.32	0.55
1:A:663:VAL:CG1	1:A:747:VAL:HB	2.37	0.55
1:A:215:ASN:HA	1:A:218:LEU:HD12	1.89	0.54
2:B:426:ARG:H	2:B:426:ARG:HD2	1.72	0.54
3:C:67:ARG:CD	3:C:67:ARG:H	2.19	0.54
1:A:209:VAL:O	1:A:213:ILE:HG13	2.07	0.53
1:A:230:THR:HG23	1:A:270:ILE:HD12	1.91	0.53
1:A:316:ARG:NH2	1:A:801:GLU:OE2	2.40	0.53
2:B:336:ARG:HA	2:B:339:ASP:HB2	1.91	0.53
1:A:273:LEU:N	1:A:273:LEU:CD2	2.71	0.53
2:B:324:VAL:HG23	2:B:324:VAL:O	2.09	0.53
1:A:231:PHE:CE2	1:A:249:VAL:HG12	2.43	0.53
1:A:440:GLU:HG3	1:A:504:LEU:CD1	2.38	0.53
1:A:449:VAL:HA	2:B:363:LEU:HD11	1.91	0.53
1:A:511:LEU:N	1:A:511:LEU:CD2	2.73	0.52
1:A:332:MET:HE2	1:A:661:LYS:NZ	2.23	0.52
1:A:332:MET:HE1	1:A:661:LYS:HE2	1.89	0.52
1:A:282:ILE:HG21	1:A:602:VAL:HG21	1.92	0.52
2:B:369:PRO:HB2	2:B:370:TYR:HD1	1.74	0.52
1:A:654:MET:HE1	1:A:776:MET:CG	2.40	0.52
2:B:369:PRO:HB2	2:B:370:TYR:CD1	2.44	0.52
3:C:69:PHE:C	3:C:69:PHE:CD2	2.83	0.52
1:A:526:ARG:NH1	1:A:530:ASP:OD1	2.40	0.52
1:A:311:ASP:OD1	1:A:311:ASP:N	2.41	0.51
1:A:332:MET:CE	1:A:661:LYS:HZ3	2.22	0.51
1:A:755:PRO:HB3	1:A:758:ARG:HH21	1.75	0.51
1:A:341:PRO:HG3	1:A:816:LEU:HD13	1.90	0.51
1:A:266:ILE:N	1:A:348:GLN:OE1	2.28	0.51
1:A:308:GLU:HG2	1:A:586:LEU:CD2	2.40	0.51
1:A:320:PHE:HB2	1:A:329:LEU:HD11	1.93	0.51
1:A:755:PRO:HA	1:A:758:ARG:NE	2.23	0.51
3:C:69:PHE:HD2	3:C:69:PHE:C	2.13	0.51
1:A:439:GLU:HG2	2:B:352:ILE:HD13	1.93	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:693:LEU:HD12	1:A:694:PHE:H	1.75	0.51
1:A:332:MET:HE1	1:A:661:LYS:NZ	2.25	0.51
1:A:701:PRO:HG2	1:A:701:PRO:O	2.11	0.51
2:B:425:ARG:HA	2:B:430:ILE:CD1	2.35	0.51
1:A:352:GLU:HB2	1:A:568:ARG:HB2	1.91	0.50
1:A:761:TYR:CD1	1:A:809:ALA:HB1	2.45	0.50
2:B:405:ILE:O	2:B:409:ILE:HG12	2.11	0.50
2:B:406:SER:O	2:B:410:GLY:N	2.44	0.50
1:A:456:LYS:CB	2:B:370:TYR:CE2	2.87	0.50
2:B:420:PHE:CD2	2:B:420:PHE:C	2.85	0.50
1:A:485:ARG:HD3	1:A:485:ARG:C	2.31	0.50
1:A:485:ARG:NH1	2:B:404:ALA:HB2	2.27	0.50
1:A:504:LEU:N	1:A:504:LEU:HD23	2.26	0.50
1:A:356:ILE:HG22	1:A:356:ILE:O	2.11	0.50
1:A:663:VAL:HG12	1:A:747:VAL:HB	1.93	0.50
1:A:793:ILE:CD1	1:A:793:ILE:N	2.72	0.50
1:A:801:GLU:HG2	1:A:809:ALA:H	1.77	0.50
1:A:265:GLY:O	1:A:295:ARG:HD3	2.11	0.50
2:B:384:THR:O	2:B:388:GLN:HG3	2.12	0.50
2:B:310:PRO:HB3	2:B:316:LEU:HD12	1.93	0.49
1:A:521:LEU:HD22	1:A:525:ASP:HB3	1.95	0.49
1:A:690:GLU:OE2	1:A:726:ARG:NH1	2.41	0.49
2:B:405:ILE:O	2:B:409:ILE:CG1	2.61	0.49
1:A:331:ALA:HA	4:A:901:Y0Z:N1	2.27	0.49
1:A:763:TYR:HE1	1:A:765:ALA:HA	1.77	0.49
1:A:448:MET:HB3	2:B:363:LEU:HD21	1.95	0.49
1:A:541:ALA:O	1:A:657:GLY:HA3	2.13	0.49
1:A:802:HIS:ND1	1:A:802:HIS:N	2.60	0.48
2:B:383:TRP:CE2	2:B:412:LYS:CD	2.93	0.48
1:A:677:LEU:HD11	3:C:69:PHE:CE1	2.48	0.48
2:B:426:ARG:H	2:B:426:ARG:CD	2.25	0.48
3:C:67:ARG:CD	3:C:67:ARG:N	2.76	0.48
1:A:332:MET:HE1	1:A:661:LYS:CE	2.43	0.48
1:A:205:GLN:OE1	1:A:205:GLN:HA	2.13	0.48
1:A:353:LEU:HD13	1:A:565:LEU:HG	1.96	0.48
1:A:521:LEU:HD22	1:A:525:ASP:CB	2.43	0.48
2:B:388:GLN:HB3	2:B:428:PHE:HE2	1.78	0.48
2:B:427:ARG:HG2	2:B:427:ARG:H	1.43	0.48
1:A:267:TYR:CD1	1:A:267:TYR:N	2.82	0.48
1:A:654:MET:HE1	1:A:776:MET:HG2	1.95	0.47
1:A:684:THR:HG22	1:A:686:ALA:H	1.78	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:341:PRO:HG3	1:A:816:LEU:HD11	1.94	0.47
1:A:763:TYR:CE1	1:A:765:ALA:HA	2.50	0.47
2:B:418:LYS:HD2	2:B:418:LYS:HA	1.51	0.47
1:A:273:LEU:HD22	1:A:273:LEU:H	1.80	0.47
1:A:707:VAL:HG12	1:A:712:ALA:HA	1.97	0.47
1:A:308:GLU:HG2	1:A:586:LEU:HD23	1.96	0.47
1:A:331:ALA:HA	4:A:901:Y0Z:C5	2.44	0.47
1:A:334:VAL:HB	1:A:565:LEU:HB2	1.97	0.47
1:A:456:LYS:HG3	2:B:370:TYR:CE2	2.50	0.47
1:A:425:ASP:OD1	2:B:338:LEU:CD1	2.63	0.47
1:A:606:ASN:ND2	1:A:608:ARG:HB2	2.30	0.47
1:A:609:SER:O	1:A:609:SER:OG	2.22	0.47
1:A:511:LEU:HD23	1:A:511:LEU:H	1.80	0.47
1:A:695:TRP:CE3	1:A:697:LEU:HD11	2.50	0.47
1:A:666:PHE:O	1:A:701:PRO:HG2	2.15	0.46
1:A:548:SER:O	1:A:552:TRP:HB3	2.15	0.46
1:A:331:ALA:CB	4:A:901:Y0Z:C25	2.94	0.46
1:A:658:ASN:ND2	1:A:752:ARG:HB2	2.31	0.46
1:A:456:LYS:HG3	2:B:370:TYR:CZ	2.51	0.46
1:A:386:LEU:HD23	1:A:386:LEU:HA	1.77	0.45
2:B:423:ASN:O	2:B:426:ARG:NH1	2.50	0.45
1:A:346:SER:HB3	1:A:351:MET:CE	2.46	0.45
1:A:433:LYS:HE2	1:A:433:LYS:HB3	1.65	0.45
2:B:383:TRP:CZ3	2:B:412:LYS:HD2	2.51	0.45
1:A:471:PRO:HD2	1:A:471:PRO:O	2.16	0.45
1:A:572:SER:O	1:A:575:PRO:HD2	2.17	0.45
1:A:449:VAL:O	1:A:453:GLU:HG2	2.17	0.45
1:A:793:ILE:CG2	1:A:794:PRO:CD	2.95	0.44
1:A:439:GLU:HG2	2:B:352:ILE:CD1	2.47	0.44
1:A:547:LEU:HD22	1:A:552:TRP:HB2	1.99	0.44
1:A:654:MET:HE2	1:A:654:MET:HB2	1.57	0.44
2:B:410:GLY:C	2:B:412:LYS:H	2.20	0.44
3:C:69:PHE:O	3:C:69:PHE:CD2	2.70	0.44
1:A:526:ARG:HH11	1:A:526:ARG:HG2	1.81	0.44
1:A:438:GLN:HE22	2:B:353:LYS:HG3	1.82	0.43
3:C:67:ARG:H	3:C:67:ARG:HD3	1.83	0.43
2:B:368:GLU:N	2:B:369:PRO:CD	2.81	0.43
1:A:191:GLN:NE2	1:A:259:HIS:CD2	2.85	0.43
1:A:718:ILE:CG2	1:A:723:ILE:HG13	2.48	0.43
1:A:180:GLN:HA	1:A:339:GLY:HA2	2.00	0.43
1:A:647:LYS:O	1:A:651:VAL:HG23	2.18	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:669:VAL:HG13	1:A:671:TRP:CE2	2.53	0.43
2:B:383:TRP:NE1	2:B:412:LYS:HE3	2.33	0.43
1:A:362:LEU:N	1:A:362:LEU:CD1	2.81	0.43
1:A:654:MET:HE1	1:A:776:MET:SD	2.59	0.43
2:B:320:ASP:O	2:B:324:VAL:HG13	2.19	0.43
1:A:325:TYR:CD2	1:A:665:CYS:HB3	2.54	0.43
1:A:566:THR:HG21	1:A:697:LEU:HD13	2.00	0.43
1:A:758:ARG:HD3	1:A:758:ARG:HA	1.87	0.43
1:A:438:GLN:CD	1:A:508:LEU:HD11	2.39	0.42
1:A:286:SER:HB2	1:A:291:LEU:HD11	2.00	0.42
1:A:297:LEU:HB2	1:A:304:VAL:HG11	2.02	0.42
1:A:273:LEU:HA	1:A:274:PRO:HD3	1.90	0.42
1:A:399:ASN:ND2	1:A:550:LYS:HE3	2.34	0.42
1:A:445:LEU:HD23	2:B:359:LEU:HB2	2.02	0.42
2:B:402:PHE:HB2	2:B:414:VAL:HG12	2.00	0.42
1:A:276:LYS:HD3	1:A:276:LYS:HA	1.95	0.42
1:A:412:LEU:HD13	1:A:533:PHE:CE1	2.54	0.42
1:A:830:LEU:N	1:A:830:LEU:HD23	2.34	0.42
1:A:485:ARG:HD2	1:A:486:ASP:OD1	2.20	0.41
1:A:574:VAL:HB	1:A:575:PRO:HD3	2.02	0.41
2:B:426:ARG:CD	2:B:426:ARG:N	2.83	0.41
1:A:381:GLU:HG3	1:A:385:LEU:CD2	2.50	0.41
1:A:362:LEU:N	1:A:362:LEU:HD12	2.35	0.41
1:A:672:ASP:O	1:A:675:VAL:HG22	2.21	0.41
2:B:338:LEU:N	2:B:338:LEU:HD23	2.36	0.41
1:A:232:GLU:OE2	1:A:232:GLU:N	2.50	0.41
1:A:781:THR:HA	1:A:794:PRO:HA	2.03	0.41
1:A:495:ASP:CG	2:B:371:ARG:HH12	2.24	0.40
1:A:197:PRO:HA	1:A:200:ILE:HG22	2.02	0.40
1:A:469:LYS:HD2	1:A:469:LYS:HA	1.63	0.40
1:A:538:PHE:CD1	1:A:706:LEU:HD13	2.57	0.40
1:A:515:PRO:O	1:A:515:PRO:CG	2.70	0.40
1:A:667:ASP:N	1:A:667:ASP:OD1	2.44	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	664/871 (76%)	642 (97%)	21 (3%)	1 (0%)	47 78
2	B	131/144 (91%)	120 (92%)	9 (7%)	2 (2%)	10 33
3	C	2/9 (22%)	2 (100%)	0	0	100 100
All	All	797/1024 (78%)	764 (96%)	30 (4%)	3 (0%)	34 66

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	411	ASN
2	B	428	PHE
1	A	515	PRO

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	566/715 (79%)	533 (94%)	33 (6%)	20 50
2	B	117/125 (94%)	96 (82%)	21 (18%)	2 5
3	C	4/9 (44%)	1 (25%)	3 (75%)	0 0
All	All	687/849 (81%)	630 (92%)	57 (8%)	11 32

All (57) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	204	GLN
1	A	267	TYR
1	A	273	LEU
1	A	351	MET
1	A	356	ILE
1	A	463	LYS
1	A	469	LYS
1	A	472	ARG
1	A	485	ARG
1	A	497	LEU
1	A	503	LYS
1	A	504	LEU
1	A	508	LEU
1	A	511	LEU
1	A	512	GLU
1	A	518	ASP
1	A	522	SER
1	A	524	ARG
1	A	525	ASP
1	A	526	ARG
1	A	568	ARG
1	A	569	ASN
1	A	610	THR
1	A	611	SER
1	A	645	GLU
1	A	647	LYS
1	A	654	MET
1	A	703	LEU
1	A	704	LEU
1	A	719	SER
1	A	748	VAL
1	A	791	GLN
1	A	801	GLU
2	B	317	SER
2	B	324	VAL
2	B	327	ASN
2	B	338	LEU
2	B	341	GLU
2	B	344	SER
2	B	353	LYS
2	B	354	GLN
2	B	368	GLU
2	B	370	TYR

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Mol	Chain	Res	Type
2	B	375	VAL
2	B	409	ILE
2	B	411	ASN
2	B	414	VAL
2	B	415	VAL
2	B	418	LYS
2	B	420	PHE
2	B	422	VAL
2	B	425	ARG
2	B	426	ARG
2	B	427	ARG
3	C	66	PRO
3	C	67	ARG
3	C	69	PHE

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

Mol	Chain	Res	Type
1	A	191	GLN
1	A	204	GLN
1	A	380	GLN
1	A	680	HIS
1	A	806	ASN
2	B	318	GLN
2	B	356	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)

1 ligand is modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
4	Y0Z	A	901	-	73,79,79	1.64	9 (12%)	88,118,118	1.11	10 (11%)

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	Y0Z	A	901	-	-	17/47/67/67	0/8/8/8

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	901	Y0Z	C5-N1	-8.84	1.31	1.42
4	A	901	Y0Z	C25-C28	-4.50	1.31	1.43
4	A	901	Y0Z	O5-C30	-3.26	1.36	1.43
4	A	901	Y0Z	C5-C4	-2.85	1.36	1.40
4	A	901	Y0Z	C9-N1	-2.66	1.35	1.40
4	A	901	Y0Z	C29-C30	-2.60	1.49	1.52
4	A	901	Y0Z	O6-C31	-2.53	1.37	1.43
4	A	901	Y0Z	C6-C7	-2.52	1.35	1.39
4	A	901	Y0Z	C37-N7	-2.40	1.30	1.34

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	A	901	Y0Z	C25-C28-N4	3.53	117.21	110.99
4	A	901	Y0Z	C5-N1-C9	-3.25	113.49	121.83
4	A	901	Y0Z	O15-C36-C42	-2.78	102.86	106.93
4	A	901	Y0Z	C43-C42-C36	-2.74	96.86	100.98

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	A	901	Y0Z	C6-C5-N1	-2.48	118.78	122.83
4	A	901	Y0Z	C38-C39-N8	2.38	123.97	120.35
4	A	901	Y0Z	O1-C9-N1	2.33	122.96	120.31
4	A	901	Y0Z	O13-P2-O12	2.25	123.36	112.24
4	A	901	Y0Z	C28-N4-C27	-2.03	123.41	126.34
4	A	901	Y0Z	O4-C28-C25	-2.02	122.58	127.54

There are no chirality outliers.

All (17) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	901	Y0Z	C10-C9-N1-C5
4	A	901	Y0Z	C10-C9-N1-C25
4	A	901	Y0Z	O1-C9-N1-C5
4	A	901	Y0Z	O1-C9-N1-C25
4	A	901	Y0Z	O7-C32-C33-O8
4	A	901	Y0Z	C34-O14-P2-O12
4	A	901	Y0Z	C33-O8-P1-O10
4	A	901	Y0Z	C31-C32-C33-O8
4	A	901	Y0Z	P2-O11-P1-O8
4	A	901	Y0Z	C33-O8-P1-O11
4	A	901	Y0Z	O14-C34-C35-O15
4	A	901	Y0Z	C33-O8-P1-O9
4	A	901	Y0Z	P1-O11-P2-O12
4	A	901	Y0Z	O5-C30-C31-C32
4	A	901	Y0Z	O14-C34-C35-C43
4	A	901	Y0Z	C34-O14-P2-O11
4	A	901	Y0Z	P1-O11-P2-O13

There are no ring outliers.

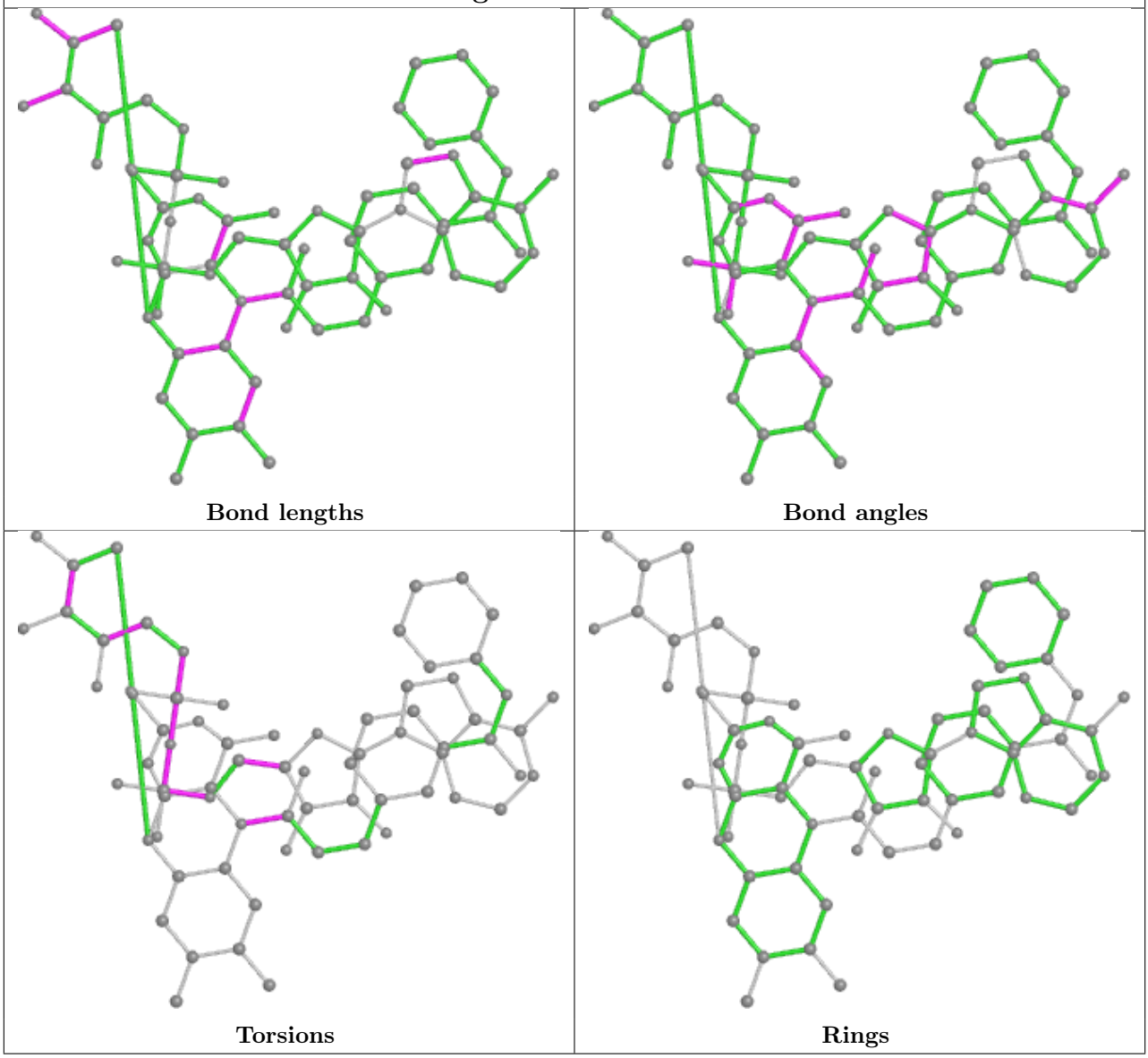
1 monomer is involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	901	Y0Z	3	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring

in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

Ligand Y0Z A 901



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, 95^{th} 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	666/871 (76%)	0.28	14 (2%) 63 54	65, 98, 129, 148	0
2	B	133/144 (92%)	0.45	10 (7%) 14 8	93, 127, 146, 166	0
3	C	4/9 (44%)	1.45	1 (25%) 0 0	129, 130, 134, 137	0
All	All	803/1024 (78%)	0.31	25 (3%) 49 39	65, 103, 137, 166	0

All (25) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	171	PRO	6.8
1	A	172	SER	4.6
2	B	436	GLU	4.2
2	B	376	ILE	3.9
2	B	374	GLU	3.4
3	C	66	PRO	3.1
2	B	312	LYS	2.9
2	B	367	ILE	2.8
1	A	836	LEU	2.6
2	B	378	LYS	2.5
2	B	399	GLY	2.3
1	A	455	ILE	2.3
1	A	238	LEU	2.3
1	A	762	SER	2.3
2	B	418	LYS	2.3
2	B	371	ARG	2.2
2	B	308	ARG	2.2
1	A	239	GLU	2.2
1	A	175	GLU	2.2
1	A	509	GLN	2.2
1	A	508	LEU	2.1
1	A	504	LEU	2.1
1	A	487	LEU	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	668	ARG	2.0
1	A	242	TYR	2.0

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

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

6.3 Carbohydrates (i)

There are no monosaccharides in this entry.

6.4 Ligands (i)

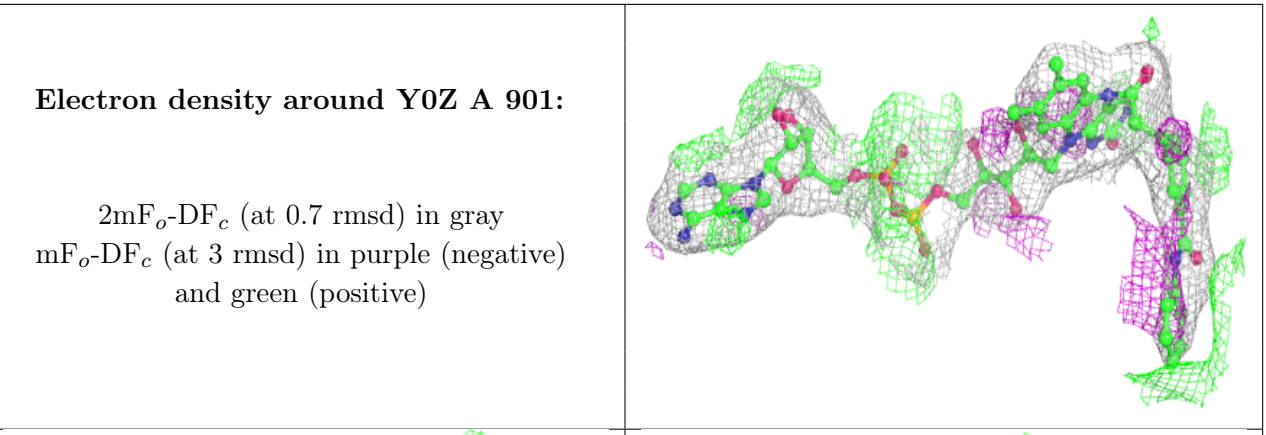
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9'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

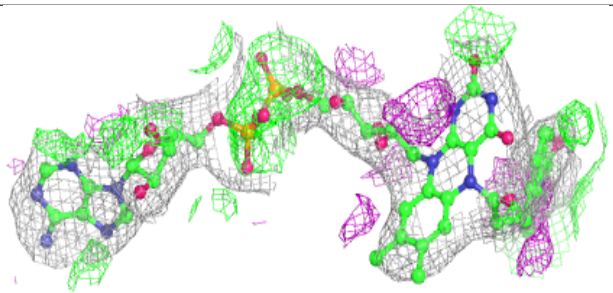
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
4	Y0Z	A	901	72/72	0.96	0.23	57,83,107,116	0

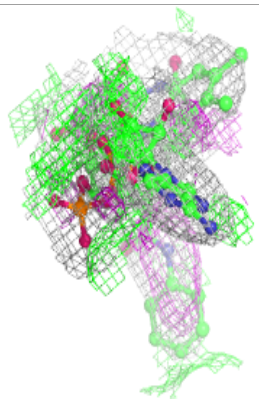
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around Y0Z A 901:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)







6.5 Other polymers

There are no such residues in this entry.