Full wwPDB X-ray Structure Validation Report (i)

Jun 29, 2026 – 12:18 PM EDT

PDB ID	:	12LP / pdb_000012lp
Title	:	LSD1-CoREST in complex with GSK-LSD1 and peptide PRCALVKSK
Authors	:	Caroli, J.; Mattevi, A.
Deposited on	:	2026-04-12
Resolution	:	2.78 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:

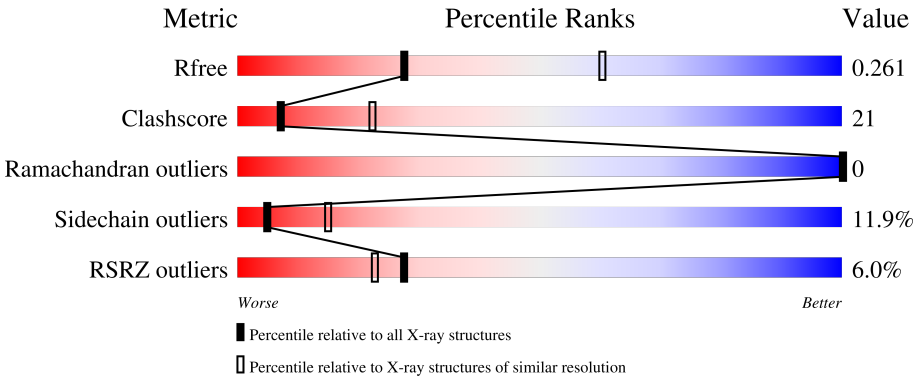
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.015 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.50

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 2.78 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	5248 (2.80-2.76)
Clashscore	190562	5693 (2.80-2.76)
Ramachandran outliers	187476	5590 (2.80-2.76)
Sidechain outliers	187428	5592 (2.80-2.76)
RSRZ outliers	180081	5251 (2.80-2.76)

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	3% 51% 20% 5% 24%
2	B	144	12% 51% 35% 6% 8%
3	C	9	33% 11% 56% 11% 22%

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 6409 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			

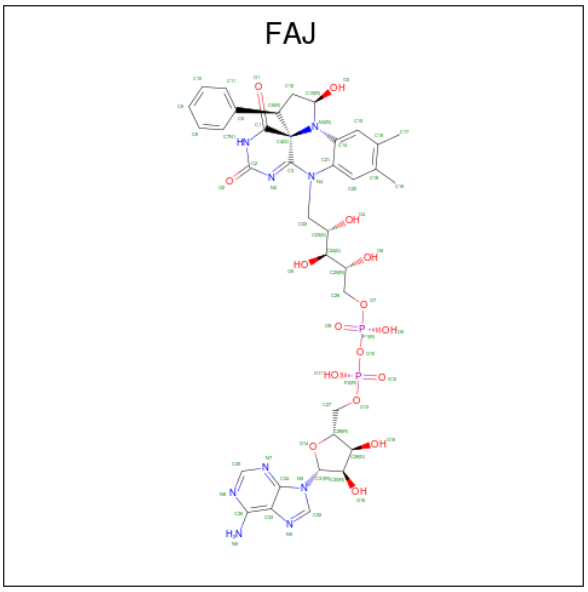
There are 8 discrepancies between the modelled and reference sequences:

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 SNAG peptide.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	C	7	Total	C	N	O	S	0	0	0
			53	34	11	7	1			

- Molecule 4 is FAD-trans-2-Phenylcyclopropylamine Adduct (CCD ID: FAJ) (formula: $C_{36}H_{43}N_9O_{16}P_2$) (labeled as "Ligand of Interest" by depositor).



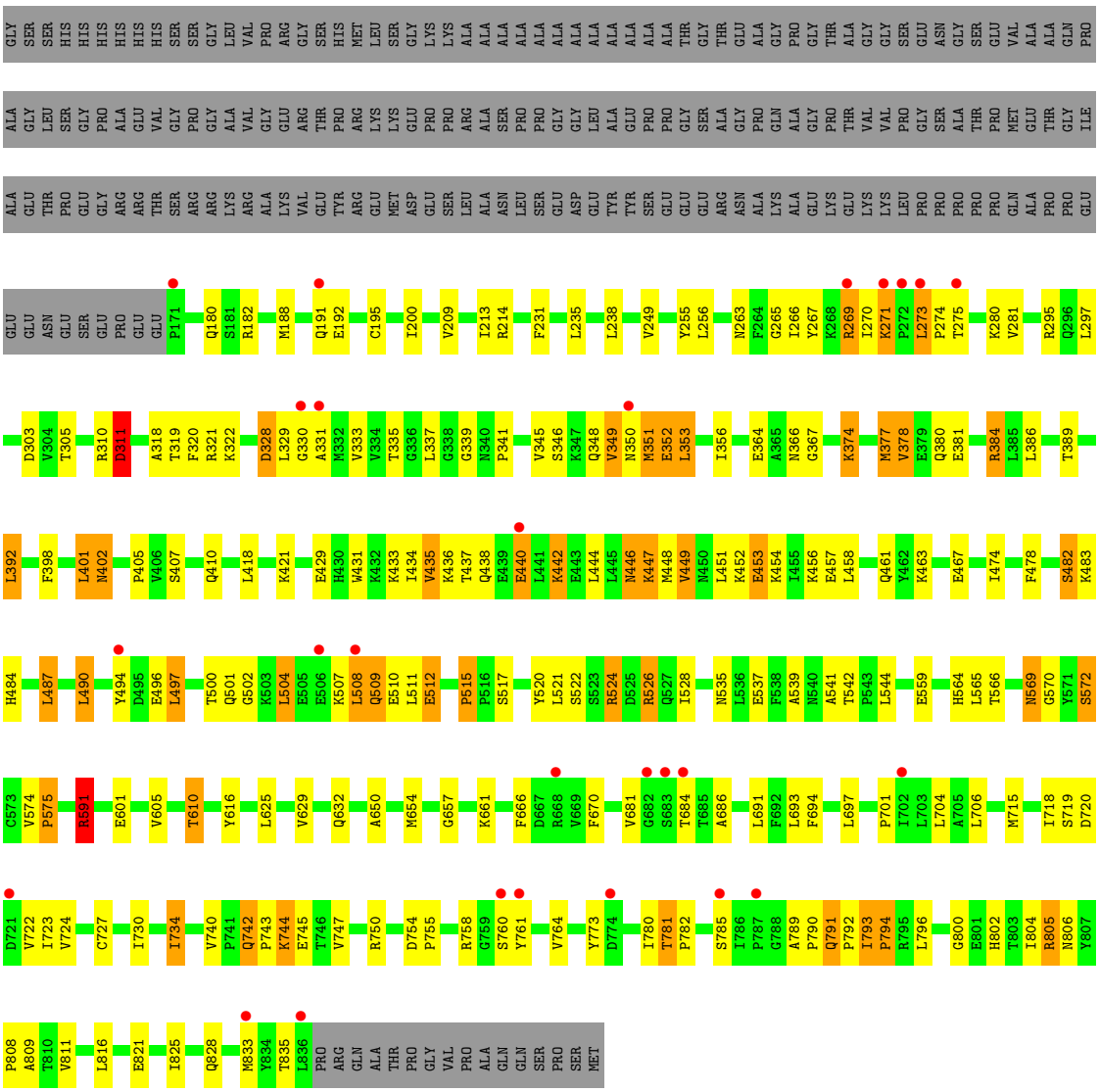
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total	C	N	O	P	0	0
			63	36	9	16	2		

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.

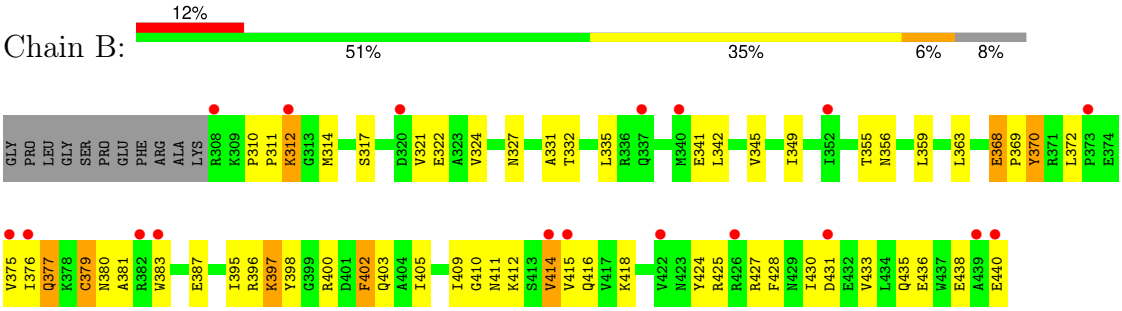
• Molecule 1: Lysine-specific histone demethylase 1A

Chain A:



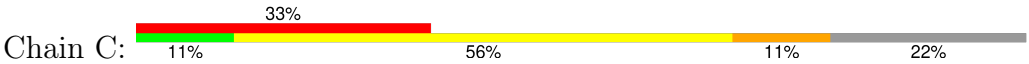
• Molecule 2: REST corepressor 1

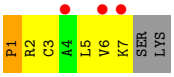
Chain B:



• Molecule 3: SNAG peptide

Chain C:





4 Data and refinement statistics (i)

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants a, b, c, α, β, γ	119.29Å 181.65Å 233.85Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	49.16 – 2.78 49.16 – 2.78	Depositor EDS
% Data completeness (in resolution range)	98.0 (49.16-2.78) 97.9 (49.16-2.78)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.59 (at 2.77Å)	Xtriage
Refinement program	PHENIX 1.18.2_3874	Depositor
R, R_{free}	0.215 , 0.242 0.245 , 0.261	Depositor DCC
R_{free} test set	2000 reflections (3.13%)	wwPDB-VP
Wilson B-factor (Å^2)	86.1	Xtriage
Anisotropy	0.480	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 83.9	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	6409	wwPDB-VP
Average B, all atoms (Å^2)	100.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.92% 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: FAJ

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	0.89	6/5331 (0.1%)	1.06	6/7232 (0.1%)
2	B	0.78	1/1091 (0.1%)	1.14	1/1471 (0.1%)
3	C	1.00	0/53	1.49	1/69 (1.4%)
All	All	0.87	7/6475 (0.1%)	1.08	8/8772 (0.1%)

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	808	PRO	C-O	-7.05	1.15	1.23
1	A	782	PRO	C-O	-5.81	1.16	1.23
1	A	405	PRO	C-O	-5.72	1.16	1.23
2	B	310	PRO	C-O	-5.64	1.18	1.24
1	A	575	PRO	C-O	-5.39	1.17	1.24
1	A	794	PRO	C-O	-5.22	1.18	1.23
1	A	515	PRO	C-O	-5.07	1.18	1.24

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	310	PRO	CB-CA-C	-6.67	102.78	110.92
1	A	591	ARG	CB-CG-CD	-6.08	97.31	111.30
1	A	389	THR	CA-CB-OG1	-6.03	100.56	109.60
1	A	515	PRO	CB-CA-C	-5.52	104.19	110.92
1	A	800	GLY	CA-C-O	-5.51	118.48	122.45
3	C	1	PRO	CA-N-CD	-5.48	104.33	112.00
1	A	311	ASP	N-CA-C	-5.41	106.87	112.93
1	A	274	PRO	CB-CA-C	-5.39	104.51	111.46

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	5217	0	5252	212	0
2	B	1076	0	1091	76	0
3	C	53	0	65	6	0
4	A	63	0	41	5	0
All	All	6409	0	6449	267	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 (267) 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:351:MET:HA	1:A:569:ASN:HD21	1.09	1.13
1:A:458:LEU:HD23	1:A:487:LEU:HD12	1.12	1.05
1:A:351:MET:HA	1:A:569:ASN:ND2	1.77	1.00
1:A:351:MET:CA	1:A:569:ASN:HD21	1.75	0.97
1:A:384:ARG:HH21	1:A:384:ARG:HG3	1.29	0.97
1:A:458:LEU:HD23	1:A:487:LEU:CD1	1.99	0.92
1:A:377:MET:HE2	1:A:377:MET:O	1.74	0.87
1:A:447:LYS:HB2	1:A:447:LYS:NZ	1.90	0.87
1:A:402:ASN:O	1:A:402:ASN:ND2	2.07	0.86
1:A:591:ARG:HD2	1:A:605:VAL:HG13	1.57	0.85
2:B:377:GLN:NE2	2:B:411:ASN:HB3	1.91	0.85
1:A:535:ASN:OD1	3:C:5:LEU:CD2	2.25	0.84
2:B:377:GLN:HG3	2:B:410:GLY:O	1.78	0.84
2:B:377:GLN:HE21	2:B:411:ASN:HB3	1.41	0.83
1:A:526:ARG:HH11	1:A:526:ARG:HG3	1.44	0.83
1:A:730:ILE:O	1:A:734:ILE:HD13	1.79	0.82
1:A:447:LYS:HG2	1:A:497:LEU:HD21	1.61	0.82
1:A:569:ASN:OD1	1:A:569:ASN:N	2.12	0.81
1:A:448:MET:HG2	1:A:497:LEU:HD23	1.64	0.80
1:A:458:LEU:CD2	1:A:487:LEU:HD12	2.05	0.80
1:A:449:VAL:HG23	2:B:363:LEU:CD1	2.13	0.79
1:A:535:ASN:OD1	3:C:5:LEU:HD23	1.83	0.79
1:A:320:PHE:CD1	1:A:747:VAL:HG21	2.19	0.78

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:345:VAL:O	1:A:349:VAL:HG23	1.83	0.78
1:A:509:GLN:OE1	1:A:509:GLN:HA	1.83	0.78
1:A:504:LEU:N	1:A:504:LEU:HD23	2.00	0.76
1:A:451:LEU:HD23	1:A:494:TYR:HB2	1.68	0.76
1:A:793:ILE:HG22	1:A:794:PRO:HD2	1.68	0.76
2:B:400:ARG:O	2:B:402:PHE:CD2	2.39	0.75
1:A:438:GLN:HG2	1:A:508:LEU:HD21	1.68	0.75
4:A:901:FAJ:O1	4:A:901:FAJ:O3	2.04	0.73
1:A:273:LEU:HD12	1:A:273:LEU:N	2.04	0.73
2:B:377:GLN:OE1	2:B:377:GLN:HA	1.88	0.73
2:B:380:ASN:OD1	2:B:381:ALA:N	2.22	0.73
2:B:425:ARG:HA	2:B:430:ILE:HD13	1.69	0.73
1:A:311:ASP:OD1	1:A:311:ASP:N	2.10	0.73
2:B:402:PHE:CE1	2:B:418:LYS:HG3	2.23	0.72
2:B:403:GLN:HE21	2:B:403:GLN:C	1.98	0.71
2:B:431:ASP:O	2:B:435:GLN:HG3	1.89	0.71
1:A:591:ARG:HD2	1:A:605:VAL:CG1	2.21	0.71
1:A:539:ALA:O	3:C:1:PRO:HD2	1.90	0.70
2:B:377:GLN:HG3	2:B:410:GLY:C	2.15	0.70
1:A:793:ILE:HG23	1:A:828:GLN:OE1	1.91	0.70
1:A:526:ARG:HH11	1:A:526:ARG:CG	2.04	0.70
1:A:793:ILE:HG22	1:A:794:PRO:CD	2.21	0.70
2:B:397:LYS:HG2	2:B:397:LYS:O	1.91	0.70
1:A:320:PHE:CE1	1:A:747:VAL:HG21	2.26	0.70
1:A:435:VAL:HG12	2:B:349:ILE:CG1	2.22	0.69
1:A:684:THR:HG22	1:A:686:ALA:H	1.57	0.69
1:A:353:LEU:HB3	1:A:565:LEU:HD23	1.73	0.68
1:A:418:LEU:HD11	2:B:321:VAL:HG12	1.74	0.68
1:A:402:ASN:C	1:A:402:ASN:HD22	1.97	0.68
1:A:384:ARG:HH21	1:A:384:ARG:CG	2.05	0.67
1:A:447:LYS:HB2	1:A:447:LYS:HZ3	1.60	0.67
1:A:353:LEU:HD13	1:A:565:LEU:CD2	2.23	0.67
2:B:396:ARG:HD2	2:B:396:ARG:O	1.95	0.67
2:B:436:GLU:HA	2:B:436:GLU:OE2	1.94	0.67
1:A:742:GLN:HE21	1:A:742:GLN:CA	2.08	0.67
1:A:352:GLU:H	1:A:569:ASN:CG	2.03	0.67
1:A:319:THR:CB	1:A:572:SER:HB3	2.25	0.67
1:A:793:ILE:CG2	1:A:828:GLN:OE1	2.43	0.67
1:A:442:LYS:HE2	2:B:355:THR:HG21	1.75	0.66
1:A:319:THR:HB	1:A:572:SER:HB3	1.77	0.66
1:A:755:PRO:HA	1:A:758:ARG:NH1	2.11	0.66

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:384:ARG:HG3	1:A:384:ARG:NH2	1.96	0.65
1:A:449:VAL:CG2	2:B:363:LEU:CD1	2.74	0.65
1:A:661:LYS:HD3	1:A:704:LEU:HD21	1.79	0.64
1:A:401:LEU:C	1:A:401:LEU:HD12	2.23	0.64
1:A:449:VAL:HG23	2:B:363:LEU:HD11	1.78	0.64
2:B:395:ILE:HG22	2:B:433:VAL:HG12	1.79	0.63
1:A:353:LEU:HD13	1:A:565:LEU:HD22	1.79	0.63
1:A:559:GLU:HG3	3:C:3:CYS:HB3	1.79	0.63
1:A:691:LEU:CD2	1:A:727:CYS:SG	2.87	0.63
1:A:271:LYS:HG3	1:A:271:LYS:O	1.97	0.62
1:A:501:GLN:O	1:A:501:GLN:HG2	2.00	0.62
1:A:740:VAL:HG23	1:A:740:VAL:O	2.00	0.61
1:A:734:ILE:HD12	1:A:734:ILE:N	2.15	0.61
1:A:435:VAL:HG12	2:B:349:ILE:HG12	1.82	0.61
2:B:381:ALA:HA	2:B:416:GLN:NE2	2.14	0.61
1:A:188:MET:HE1	1:A:200:ILE:HA	1.82	0.61
1:A:437:THR:HG21	1:A:507:LYS:HD3	1.83	0.61
1:A:449:VAL:HG23	2:B:363:LEU:HD13	1.83	0.61
1:A:691:LEU:HD22	1:A:727:CYS:SG	2.41	0.60
1:A:266:ILE:N	1:A:348:GLN:OE1	2.29	0.60
2:B:376:ILE:HG22	2:B:376:ILE:O	2.01	0.60
2:B:402:PHE:HE1	2:B:418:LYS:HG3	1.65	0.60
1:A:715:MET:HE3	1:A:723:ILE:HG12	1.83	0.59
1:A:321:ARG:NH2	1:A:569:ASN:O	2.35	0.59
1:A:461:GLN:OE1	1:A:483:LYS:HE3	2.03	0.59
1:A:490:LEU:N	1:A:490:LEU:HD23	2.17	0.59
1:A:804:ILE:HG23	1:A:804:ILE:O	2.02	0.59
2:B:428:PHE:HB2	2:B:430:ILE:HD11	1.84	0.58
2:B:370:TYR:N	2:B:370:TYR:CD2	2.72	0.58
1:A:392:LEU:HD22	1:A:398:PHE:HB3	1.85	0.58
1:A:500:THR:C	1:A:502:GLY:N	2.61	0.58
1:A:591:ARG:HH11	1:A:591:ARG:CG	2.16	0.58
1:A:566:THR:HG21	1:A:697:LEU:HD22	1.86	0.58
1:A:280:LYS:HD3	1:A:303:ASP:HB3	1.86	0.58
1:A:463:LYS:O	1:A:467:GLU:HG2	2.04	0.58
2:B:403:GLN:O	2:B:403:GLN:NE2	2.31	0.57
1:A:350:ASN:O	1:A:569:ASN:ND2	2.38	0.57
1:A:500:THR:C	1:A:502:GLY:H	2.13	0.57
1:A:319:THR:OG1	1:A:572:SER:HB3	2.04	0.57
1:A:341:PRO:HG3	1:A:816:LEU:CD2	2.35	0.56
1:A:789:ALA:HB1	1:A:790:PRO:HD2	1.87	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:535:ASN:HD21	3:C:6:VAL:HB	1.69	0.56
1:A:192:GLU:OE1	1:A:214:ARG:NH1	2.38	0.56
1:A:764:VAL:HG22	1:A:773:TYR:HE1	1.71	0.56
1:A:670:PHE:CZ	1:A:740:VAL:HG12	2.41	0.55
1:A:341:PRO:HG3	1:A:816:LEU:HD21	1.86	0.55
4:A:901:FAJ:C7	4:A:901:FAJ:C1	2.84	0.55
1:A:366:ASN:OD1	1:A:367:GLY:N	2.39	0.55
1:A:377:MET:HE2	1:A:377:MET:C	2.31	0.55
1:A:381:GLU:OE2	1:A:520:TYR:OH	2.11	0.55
1:A:435:VAL:HG12	2:B:349:ILE:HG13	1.88	0.55
1:A:591:ARG:NH1	1:A:591:ARG:HG2	2.21	0.55
1:A:448:MET:HB2	2:B:363:LEU:HD21	1.90	0.54
1:A:231:PHE:HE1	1:A:249:VAL:HG12	1.71	0.54
2:B:402:PHE:CD2	2:B:402:PHE:N	2.72	0.54
2:B:387:GLU:OE1	2:B:412:LYS:NZ	2.41	0.54
1:A:320:PHE:CE1	1:A:747:VAL:CG2	2.90	0.54
1:A:691:LEU:HD21	1:A:727:CYS:SG	2.47	0.54
1:A:632:GLN:NE2	1:A:758:ARG:HH21	2.05	0.53
1:A:322:LYS:NZ	1:A:745:GLU:OE1	2.40	0.53
2:B:381:ALA:HA	2:B:416:GLN:HE21	1.72	0.53
2:B:402:PHE:CB	2:B:414:VAL:HG12	2.39	0.53
2:B:402:PHE:HB3	2:B:414:VAL:HG12	1.90	0.53
1:A:235:LEU:HA	1:A:238:LEU:HD13	1.90	0.53
1:A:182:ARG:NH1	1:A:341:PRO:HD3	2.23	0.53
1:A:352:GLU:H	1:A:569:ASN:ND2	2.07	0.52
1:A:364:GLU:HA	1:A:681:VAL:HB	1.92	0.52
1:A:657:GLY:O	1:A:760:SER:N	2.24	0.52
1:A:720:ASP:O	1:A:724:VAL:HG23	2.09	0.52
1:A:351:MET:C	1:A:569:ASN:HD21	2.17	0.52
1:A:431:TRP:HD1	2:B:342:LEU:HD11	1.74	0.52
2:B:397:LYS:HD3	2:B:398:TYR:CZ	2.45	0.52
2:B:403:GLN:NE2	2:B:403:GLN:CA	2.73	0.52
1:A:337:LEU:HD23	1:A:337:LEU:N	2.23	0.52
1:A:535:ASN:ND2	3:C:6:VAL:HB	2.24	0.52
2:B:387:GLU:OE2	2:B:411:ASN:ND2	2.42	0.52
1:A:734:ILE:N	1:A:734:ILE:CD1	2.73	0.52
1:A:449:VAL:CG2	2:B:363:LEU:HD11	2.37	0.51
1:A:281:VAL:HG21	1:A:297:LEU:HD13	1.92	0.51
2:B:377:GLN:CG	2:B:410:GLY:O	2.55	0.51
1:A:180:GLN:HA	1:A:339:GLY:HA2	1.92	0.51
2:B:383:TRP:CH2	2:B:412:LYS:HG3	2.46	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:761:TYR:CD2	1:A:809:ALA:HB1	2.46	0.51
1:A:440:GLU:OE2	1:A:440:GLU:N	2.44	0.50
1:A:591:ARG:CG	1:A:591:ARG:NH1	2.73	0.50
1:A:448:MET:CG	1:A:497:LEU:HD23	2.37	0.50
1:A:418:LEU:CD1	2:B:321:VAL:HG12	2.40	0.50
1:A:353:LEU:HD13	1:A:565:LEU:HD23	1.92	0.50
1:A:263:ASN:C	1:A:267:TYR:CE1	2.90	0.50
1:A:320:PHE:HB2	1:A:329:LEU:HD11	1.92	0.50
1:A:188:MET:HE1	1:A:200:ILE:CA	2.42	0.50
1:A:335:THR:O	1:A:335:THR:OG1	2.22	0.50
1:A:478:PHE:O	1:A:482:SER:HB3	2.12	0.49
1:A:352:GLU:N	1:A:569:ASN:HD21	2.09	0.49
1:A:520:TYR:CD1	1:A:520:TYR:C	2.86	0.49
1:A:448:MET:HE3	2:B:363:LEU:HD23	1.92	0.49
1:A:718:ILE:O	1:A:750:ARG:NH2	2.46	0.49
1:A:231:PHE:CE1	1:A:249:VAL:HG12	2.47	0.49
1:A:265:GLY:O	1:A:295:ARG:HD2	2.12	0.49
1:A:356:ILE:HD11	1:A:566:THR:HG23	1.95	0.49
1:A:742:GLN:CA	1:A:742:GLN:NE2	2.72	0.48
1:A:625:LEU:HD22	1:A:629:VAL:HG11	1.95	0.48
1:A:333:VAL:HA	1:A:565:LEU:O	2.14	0.48
1:A:719:SER:OG	1:A:722:VAL:HG23	2.14	0.48
1:A:742:GLN:NE2	1:A:742:GLN:HA	2.29	0.48
1:A:670:PHE:CE2	1:A:740:VAL:HG12	2.49	0.48
1:A:515:PRO:HG2	1:A:515:PRO:O	2.14	0.48
1:A:330:GLY:O	4:A:901:FAJ:C15	2.62	0.47
2:B:402:PHE:CB	2:B:414:VAL:CG1	2.92	0.47
2:B:424:TYR:CE1	2:B:427:ARG:NH2	2.82	0.47
2:B:368:GLU:N	2:B:369:PRO:CD	2.77	0.47
1:A:802:HIS:ND1	1:A:802:HIS:N	2.60	0.47
1:A:407:SER:OG	1:A:410:GLN:HG3	2.15	0.47
2:B:400:ARG:O	2:B:402:PHE:CE2	2.68	0.47
1:A:526:ARG:CG	1:A:526:ARG:NH1	2.72	0.47
1:A:610:THR:O	1:A:610:THR:OG1	2.23	0.46
2:B:369:PRO:HB2	2:B:370:TYR:CD2	2.51	0.46
1:A:448:MET:HE3	2:B:363:LEU:CD2	2.45	0.46
1:A:322:LYS:NZ	1:A:745:GLU:CD	2.73	0.46
2:B:368:GLU:HB2	2:B:369:PRO:HD3	1.97	0.46
1:A:456:LYS:HA	2:B:370:TYR:CE1	2.50	0.46
1:A:273:LEU:HD12	1:A:273:LEU:H	1.80	0.46
2:B:387:GLU:CD	2:B:411:ASN:HD21	2.23	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:403:GLN:NE2	2:B:403:GLN:HA	2.29	0.46
1:A:310:ARG:NH2	1:A:754:ASP:OD2	2.35	0.46
1:A:666:PHE:O	1:A:701:PRO:HG2	2.16	0.46
2:B:402:PHE:N	2:B:402:PHE:HD2	2.13	0.46
2:B:402:PHE:HB2	2:B:414:VAL:CG1	2.47	0.45
1:A:564:HIS:C	1:A:565:LEU:HD12	2.42	0.45
1:A:821:GLU:O	1:A:825:ILE:HG12	2.16	0.45
1:A:421:LYS:HB2	2:B:335:LEU:HD21	1.99	0.45
1:A:833:MET:HA	1:A:833:MET:HE3	1.97	0.45
1:A:191:GLN:HG2	1:A:255:TYR:OH	2.16	0.45
1:A:352:GLU:N	1:A:569:ASN:ND2	2.64	0.45
1:A:591:ARG:HH11	1:A:591:ARG:HG2	1.79	0.45
2:B:311:PRO:HD2	2:B:314:MET:HB2	1.98	0.45
1:A:431:TRP:CE3	1:A:434:ILE:HD12	2.52	0.45
1:A:512:GLU:CD	1:A:512:GLU:C	2.84	0.45
1:A:318:ALA:O	1:A:328:ASP:OD1	2.35	0.44
1:A:435:VAL:CG1	2:B:349:ILE:HG13	2.47	0.44
1:A:484:HIS:CD2	2:B:372:LEU:HD13	2.52	0.44
1:A:780:ILE:HB	1:A:796:LEU:HB3	1.99	0.44
1:A:271:LYS:HZ2	1:A:271:LYS:HB3	1.82	0.44
1:A:401:LEU:HD12	1:A:402:ASN:N	2.31	0.44
1:A:601:GLU:HA	1:A:616:TYR:O	2.18	0.44
1:A:269:ARG:H	1:A:269:ARG:HG2	1.32	0.43
2:B:400:ARG:HB3	2:B:402:PHE:HE2	1.83	0.43
2:B:312:LYS:HA	2:B:312:LYS:HD2	1.71	0.43
4:A:901:FAJ:H12	4:A:901:FAJ:H14	1.64	0.43
2:B:369:PRO:HB2	2:B:370:TYR:CE2	2.53	0.43
1:A:322:LYS:HZ3	1:A:745:GLU:CD	2.26	0.43
1:A:446:ASN:OD1	2:B:359:LEU:HD21	2.19	0.43
1:A:791:GLN:HA	1:A:792:PRO:HD3	1.81	0.43
1:A:511:LEU:HD23	1:A:511:LEU:HA	1.80	0.43
1:A:442:LYS:HG3	2:B:356:ASN:OD1	2.19	0.43
1:A:693:LEU:HD12	1:A:694:PHE:H	1.82	0.43
1:A:781:THR:O	1:A:781:THR:HG22	2.19	0.43
1:A:364:GLU:CD	1:A:524:ARG:HE	2.27	0.42
1:A:374:LYS:O	1:A:378:VAL:HG23	2.19	0.42
1:A:444:LEU:HA	1:A:444:LEU:HD12	1.67	0.42
1:A:537:GLU:HG3	1:A:544:LEU:CD2	2.49	0.42
1:A:448:MET:SD	1:A:497:LEU:HB3	2.60	0.42
1:A:487:LEU:HD21	2:B:370:TYR:O	2.19	0.42
2:B:341:GLU:O	2:B:345:VAL:HG23	2.19	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:209:VAL:O	1:A:213:ILE:HG13	2.20	0.42
1:A:356:ILE:HD13	1:A:356:ILE:HA	1.69	0.42
1:A:500:THR:O	1:A:502:GLY:N	2.53	0.42
2:B:402:PHE:HB3	2:B:414:VAL:CG1	2.50	0.42
1:A:346:SER:O	1:A:349:VAL:O	2.38	0.42
1:A:744:LYS:HA	1:A:744:LYS:HD2	1.90	0.42
1:A:398:PHE:CG	1:A:398:PHE:O	2.70	0.42
1:A:331:ALA:HA	4:A:901:FAJ:N3	2.34	0.42
1:A:386:LEU:HA	1:A:386:LEU:HD23	1.78	0.42
2:B:379:CYS:SG	2:B:380:ASN:N	2.91	0.42
1:A:474:ILE:HD12	1:A:474:ILE:HA	1.93	0.42
1:A:805:ARG:HG2	1:A:806:ASN:ND2	2.35	0.42
1:A:453:GLU:OE1	1:A:453:GLU:HA	2.18	0.42
1:A:537:GLU:HG2	1:A:542:THR:O	2.19	0.42
1:A:691:LEU:HA	1:A:706:LEU:O	2.19	0.42
1:A:255:TYR:CD2	1:A:256:LEU:HD23	2.55	0.41
1:A:438:GLN:CG	1:A:508:LEU:HD21	2.46	0.41
1:A:456:LYS:HA	2:B:370:TYR:CD1	2.55	0.41
1:A:271:LYS:HB3	1:A:271:LYS:NZ	2.35	0.41
1:A:263:ASN:O	1:A:267:TYR:OH	2.33	0.41
1:A:453:GLU:OE1	1:A:453:GLU:CA	2.69	0.41
1:A:541:ALA:O	1:A:657:GLY:HA3	2.21	0.41
2:B:400:ARG:O	2:B:402:PHE:N	2.54	0.41
1:A:666:PHE:CE1	1:A:743:PRO:HG3	2.56	0.41
2:B:377:GLN:HB3	2:B:410:GLY:O	2.21	0.41
1:A:384:ARG:HB3	2:B:314:MET:HE3	2.02	0.41
1:A:742:GLN:HE21	1:A:742:GLN:N	2.18	0.41
2:B:324:VAL:HG13	2:B:331:ALA:HB2	2.02	0.41
1:A:195:CYS:HA	1:A:835:THR:HG22	2.03	0.40
1:A:570:GLY:C	1:A:572:SER:H	2.28	0.40
1:A:458:LEU:HD23	1:A:487:LEU:CG	2.50	0.40
1:A:574:VAL:N	1:A:575:PRO:HD2	2.35	0.40
1:A:273:LEU:O	1:A:273:LEU:CD1	2.70	0.40
1:A:377:MET:HE3	1:A:377:MET:HB2	1.77	0.40
1:A:431:TRP:CZ3	1:A:434:ILE:HD12	2.56	0.40
1:A:650:ALA:O	1:A:654:MET:HG3	2.20	0.40
1:A:755:PRO:HA	1:A:758:ARG:HH12	1.83	0.40
1:A:266:ILE:H	1:A:348:GLN:CD	2.24	0.40
2:B:397:LYS:HD3	2:B:398:TYR:CE2	2.56	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%)	637 (96%)	27 (4%)	0	100	100
2	B	131/144 (91%)	122 (93%)	9 (7%)	0	100	100
3	C	5/9 (56%)	5 (100%)	0	0	100	100
All	All	800/1024 (78%)	764 (96%)	36 (4%)	0	100	100

There are no Ramachandran outliers to report.

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%)	504 (89%)	62 (11%)	6	18
2	B	117/125 (94%)	99 (85%)	18 (15%)	2	8
3	C	6/8 (75%)	4 (67%)	2 (33%)	0	0
All	All	689/848 (81%)	607 (88%)	82 (12%)	5	15

All (82) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	269	ARG
1	A	270	ILE
1	A	271	LYS
1	A	273	LEU
1	A	275	THR

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Mol	Chain	Res	Type
1	A	305	THR
1	A	311	ASP
1	A	328	ASP
1	A	349	VAL
1	A	351	MET
1	A	352	GLU
1	A	353	LEU
1	A	374	LYS
1	A	377	MET
1	A	378	VAL
1	A	380	GLN
1	A	384	ARG
1	A	392	LEU
1	A	401	LEU
1	A	402	ASN
1	A	429	GLU
1	A	433	LYS
1	A	435	VAL
1	A	436	LYS
1	A	440	GLU
1	A	442	LYS
1	A	446	ASN
1	A	447	LYS
1	A	449	VAL
1	A	452	LYS
1	A	453	GLU
1	A	454	LYS
1	A	457	GLU
1	A	482	SER
1	A	487	LEU
1	A	490	LEU
1	A	496	GLU
1	A	497	LEU
1	A	504	LEU
1	A	508	LEU
1	A	509	GLN
1	A	510	GLU
1	A	512	GLU
1	A	517	SER
1	A	521	LEU
1	A	522	SER
1	A	524	ARG

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Mol	Chain	Res	Type
1	A	526	ARG
1	A	528	ILE
1	A	569	ASN
1	A	572	SER
1	A	591	ARG
1	A	610	THR
1	A	734	ILE
1	A	742	GLN
1	A	744	LYS
1	A	781	THR
1	A	785	SER
1	A	791	GLN
1	A	793	ILE
1	A	805	ARG
1	A	811	VAL
2	B	312	LYS
2	B	317	SER
2	B	322	GLU
2	B	327	ASN
2	B	332	THR
2	B	368	GLU
2	B	370	TYR
2	B	375	VAL
2	B	377	GLN
2	B	379	CYS
2	B	397	LYS
2	B	402	PHE
2	B	405	ILE
2	B	409	ILE
2	B	414	VAL
2	B	415	VAL
2	B	438	GLU
2	B	440	GLU
3	C	2	ARG
3	C	7	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (18) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	205	GLN
1	A	298	GLN
1	A	358	GLN

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Mol	Chain	Res	Type
1	A	402	ASN
1	A	417	GLN
1	A	419	GLN
1	A	422	HIS
1	A	438	GLN
1	A	532	HIS
1	A	540	ASN
1	A	606	ASN
1	A	632	GLN
1	A	638	GLN
1	A	742	GLN
1	A	806	ASN
2	B	318	GLN
2	B	403	GLN
2	B	435	GLN

5.3.3 RNA

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates

There are no oligosaccharides in this entry.

5.6 Ligand geometry

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	FAJ	A	901	-	67,70,70	1.60	12 (17%)	91,109,109	1.18	6 (6%)

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	FAJ	A	901	-	-	7/38/106/106	0/7/8/8

All (12) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	901	FAJ	P2-O10	-4.94	1.54	1.59
4	A	901	FAJ	P1-O10	-4.38	1.54	1.59
4	A	901	FAJ	C1-N1	-3.84	1.31	1.37
4	A	901	FAJ	C14-N3	-3.38	1.35	1.41
4	A	901	FAJ	C2-N2	-3.23	1.29	1.36
4	A	901	FAJ	O4-C23	-3.07	1.36	1.43
4	A	901	FAJ	C15-C16	-2.86	1.35	1.39
4	A	901	FAJ	O2-C2	-2.52	1.19	1.24
4	A	901	FAJ	C3-N4	-2.27	1.32	1.38
4	A	901	FAJ	P2-O11	-2.09	1.45	1.55
4	A	901	FAJ	P1-O9	-2.07	1.45	1.55
4	A	901	FAJ	C21-C14	-2.05	1.37	1.41

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	A	901	FAJ	C14-N3-C13	-5.00	112.44	123.92
4	A	901	FAJ	C4-C5-C6	-4.09	109.74	116.08
4	A	901	FAJ	C1-C4-C3	-3.58	107.04	113.40
4	A	901	FAJ	C1-N1-C2	-3.37	120.34	125.42
4	A	901	FAJ	C4-N3-C13	-2.99	106.49	109.50
4	A	901	FAJ	O11-P2-O12	2.21	122.74	112.44

There are no chirality outliers.

All (7) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	901	FAJ	P2-O10-P1-O7

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Mol	Chain	Res	Type	Atoms
4	A	901	FAJ	C27-O13-P2-O11
4	A	901	FAJ	O4-C23-C24-C25
4	A	901	FAJ	O4-C23-C24-O5
4	A	901	FAJ	O13-C27-C28-O14
4	A	901	FAJ	C22-C23-C24-O5
4	A	901	FAJ	O6-C25-C26-O7

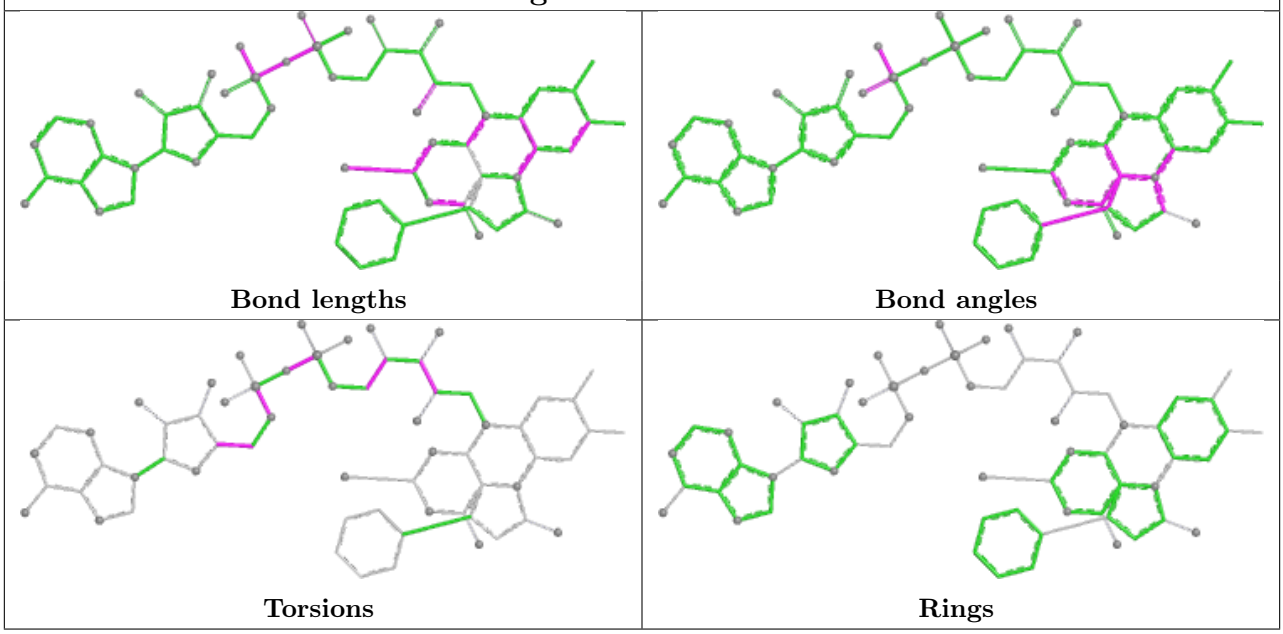
There are no ring outliers.

1 monomer is involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	901	FAJ	5	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 FAJ 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%)	0.58	27 (4%) 41 35	63, 95, 125, 146	0
2	B	133/144 (92%)	1.02	18 (13%) 7 5	88, 123, 145, 159	0
3	C	7/9 (77%)	2.41	3 (42%) 0 0	91, 103, 112, 122	0
All	All	806/1024 (78%)	0.67	48 (5%) 27 23	63, 101, 135, 159	0

All (48) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	836	LEU	9.0
3	C	7	LYS	5.6
2	B	376	ILE	5.3
1	A	760	SER	4.7
2	B	375	VAL	4.6
1	A	331	ALA	4.4
1	A	785	SER	3.8
1	A	272	PRO	3.8
1	A	171	PRO	3.6
3	C	6	VAL	3.6
1	A	275	THR	3.4
1	A	833	MET	3.2
2	B	414	VAL	3.1
1	A	761	TYR	3.1
1	A	506	GLU	2.9
1	A	273	LEU	2.8
1	A	508	LEU	2.8
2	B	439	ALA	2.7
2	B	440	GLU	2.7
1	A	683	SER	2.6
2	B	422	VAL	2.5
1	A	668	ARG	2.4
1	A	682	GLY	2.4

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Mol	Chain	Res	Type	RSRZ
2	B	431	ASP	2.4
1	A	269	ARG	2.4
1	A	684	THR	2.3
1	A	350	ASN	2.3
1	A	271	LYS	2.3
1	A	774	ASP	2.3
1	A	494	TYR	2.3
2	B	340	MET	2.2
2	B	320	ASP	2.2
3	C	4	ALA	2.2
2	B	337	GLN	2.2
1	A	702	ILE	2.2
2	B	415	VAL	2.2
1	A	440	GLU	2.1
2	B	308	ARG	2.1
1	A	721	ASP	2.1
2	B	383	TRP	2.1
2	B	426	ARG	2.1
1	A	330	GLY	2.1
2	B	352	ILE	2.1
2	B	312	LYS	2.1
2	B	382	ARG	2.0
1	A	787	PRO	2.0
1	A	191	GLN	2.0
2	B	373	PRO	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)

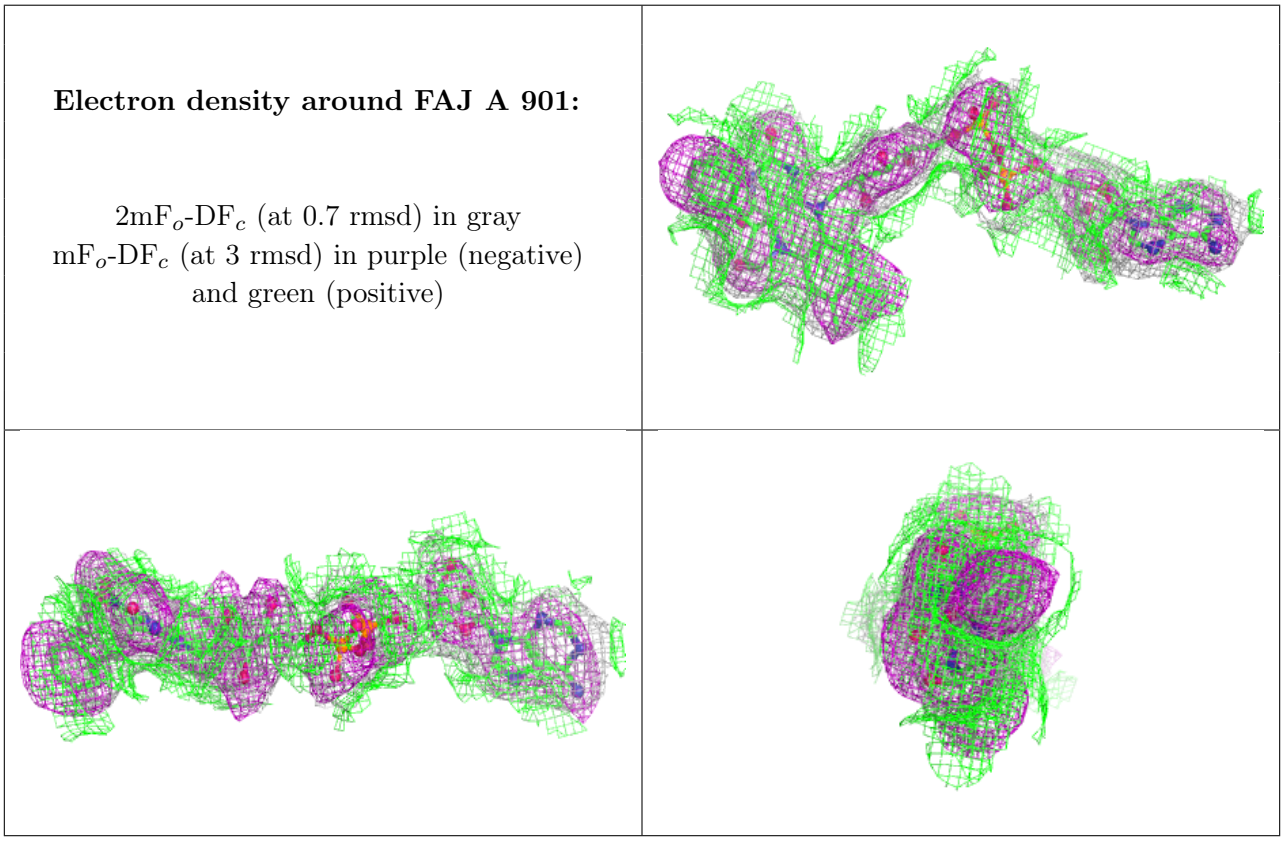
There are no oligosaccharides in this entry.

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	FAJ	A	901	63/63	0.86	0.14	20,20,20,20	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.



6.5 Other polymers (i)

There are no such residues in this entry.