Full wwPDB X-ray Structure Validation Report ⓘ

Jan 2, 2024 – 03:31 pm GMT

PDB ID	:	4UXN
Title	:	LSD1(KDM1A)-CoREST in complex with Z-Pro derivative of MC2580
Authors	:	Rodriguez, V.; Valente, S.; Stazi, G.; Lucidi, A.; Mercurio, C.; Vianello, P.; Ciossani, G.; Mattevi, A.; Botrugno, O.A.; Dessanti, P.; Minucci, S.; Varasi, M.; Mai, A.
Deposited on	:	2014-08-27
Resolution	:	2.85 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

The following versions of software and data (see references ⓘ) were used in the production of this report:

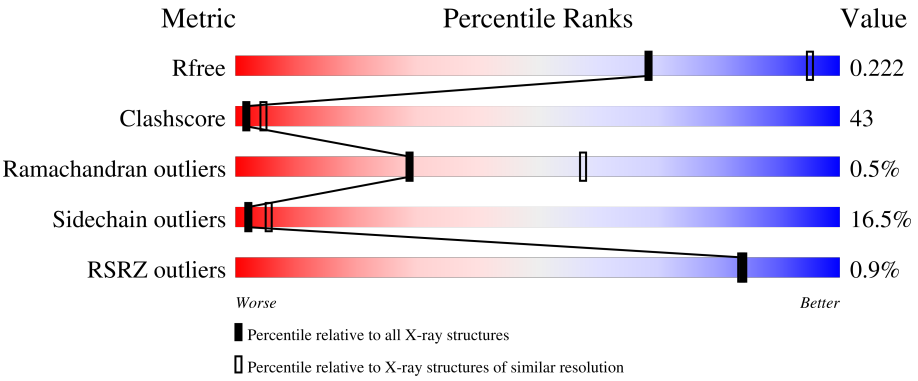
MolProbity	:	4.02b-467
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

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 2.85 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	3168 (2.90-2.82)
Clashscore	141614	3438 (2.90-2.82)
Ramachandran outliers	138981	3348 (2.90-2.82)
Sidechain outliers	138945	3351 (2.90-2.82)
RSRZ outliers	127900	3103 (2.90-2.82)

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	852	37% 33% 8% 22%
2	B	482	% 9% 15% · 72%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	M8A	A	901	-	-	X	-

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 6374 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.

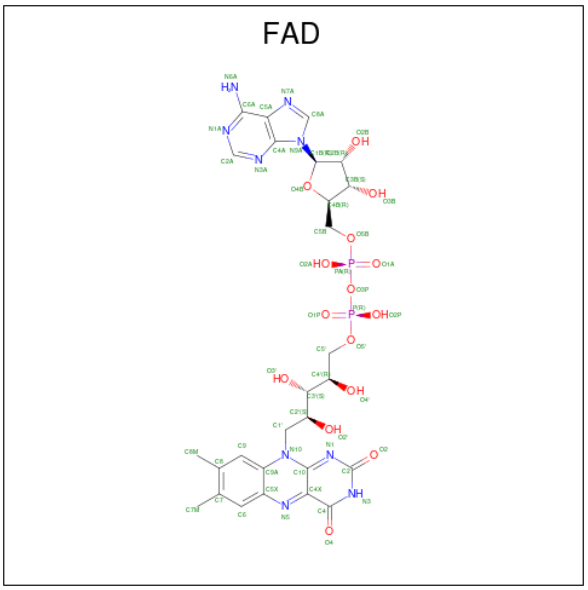
- Molecule 1 is a protein called LYSINE-SPECIFIC HISTONE DEMETHYLASE 1A.

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

- 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			

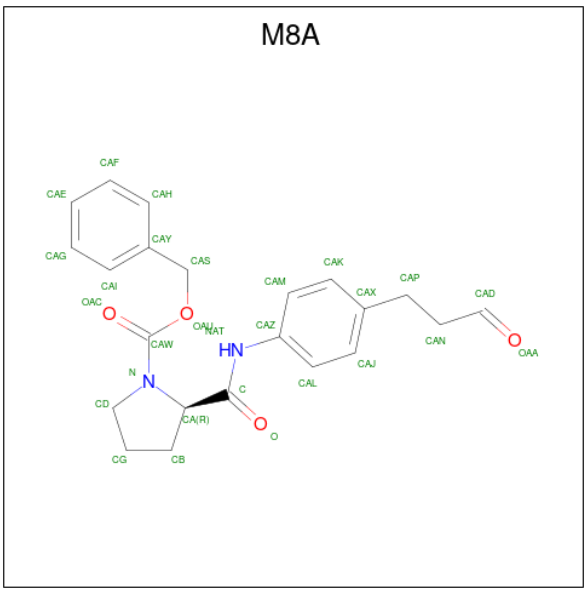
- Molecule 3 is FLAVIN-ADENINE DINUCLEOTIDE (three-letter code: FAD) (formula: $C_{27}H_{33}N_9O_{15}P_2$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	0	0
			53	27	9	15	2		

- Molecule 4 is benzyl (2R)-2-{[4-(3-oxopropyl)phenyl]carbamoyl}pyrrolidine-1-carboxylate

(three-letter code: M8A) (formula: $C_{22}H_{24}N_2O_4$).



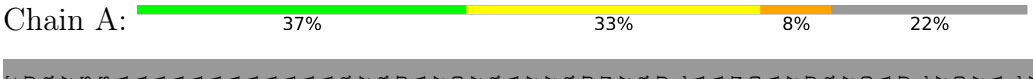
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
4	A	1	28	22	2	4	0	0

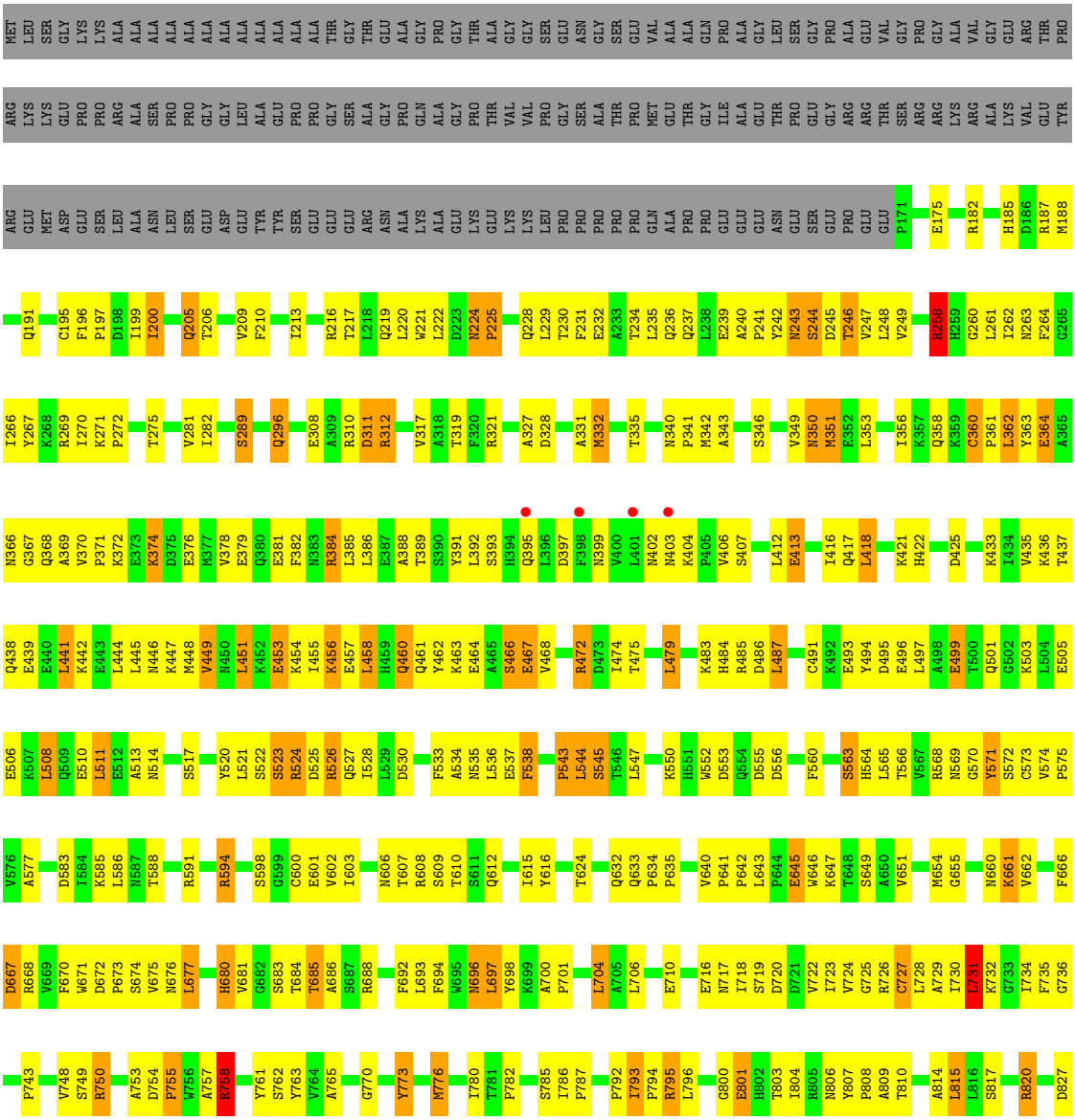
3 Residue-property plots (i)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density (RSRZ > 2). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

- Molecule 1: LYSINE-SPECIFIC HISTONE DEMETHYLASE 1A

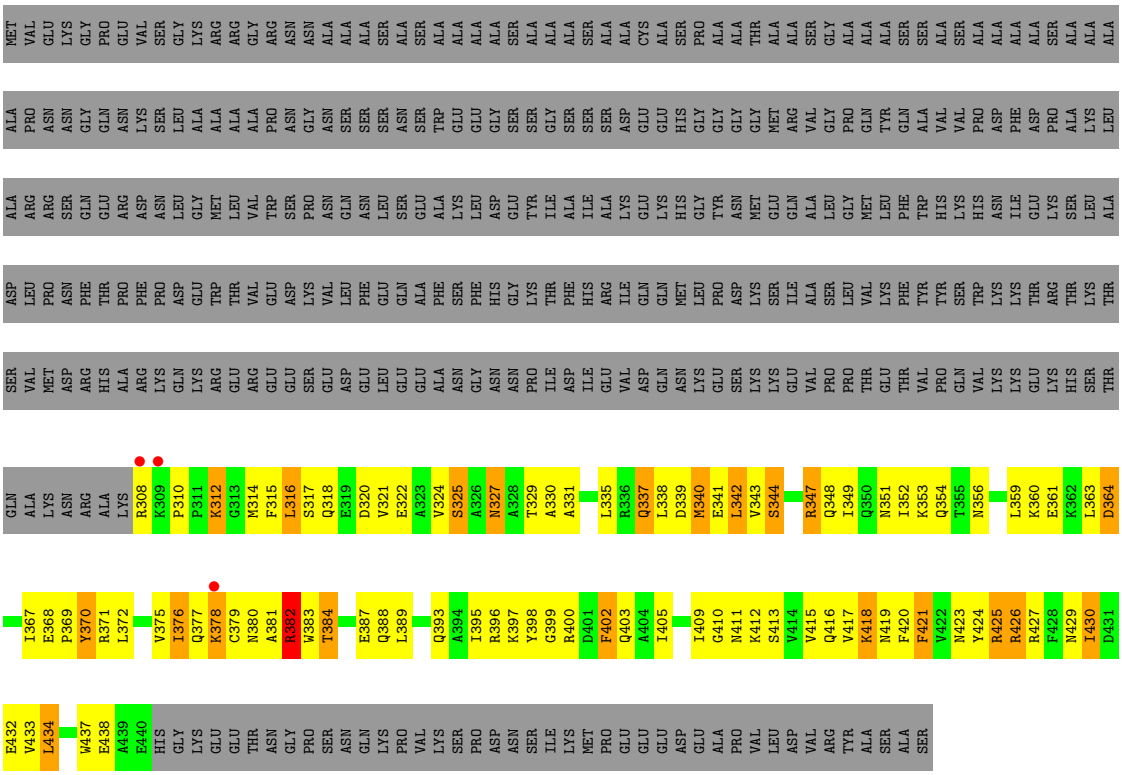
Chain A:





• Molecule 2: REST COREPRESSOR 1

Chain B:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants a, b, c, α, β, γ	118.98Å 177.76Å 233.72Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	141.49 – 2.85 98.88 – 2.85	Depositor EDS
% Data completeness (in resolution range)	98.9 (141.49-2.85) 98.9 (98.88-2.85)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.87 (at 2.86Å)	Xtriage
Refinement program	REFMAC 5.8.0073	Depositor
R, R_{free}	0.206 , 0.215 0.215 , 0.222	Depositor DCC
R_{free} test set	1103 reflections (1.92%)	wwPDB-VP
Wilson B-factor (Å^2)	74.5	Xtriage
Anisotropy	0.099	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 64.5	EDS
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	6374	wwPDB-VP
Average B, all atoms (Å^2)	79.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.06% 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: M8A, FAD

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	1.06	3/5331 (0.1%)	1.10	17/7232 (0.2%)
2	B	0.82	0/1091	1.00	2/1471 (0.1%)
All	All	1.02	3/6422 (0.0%)	1.08	19/8703 (0.2%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand.A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	661	LYS	CE-NZ	7.08	1.66	1.49
1	A	773	TYR	CG-CD1	-5.68	1.31	1.39
1	A	646	TRP	CB-CG	-5.32	1.40	1.50

All (19) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	661	LYS	CD-CE-NZ	10.24	135.26	111.70
1	A	815	LEU	CA-CB-CG	9.95	138.19	115.30
1	A	795	ARG	NE-CZ-NH1	9.47	125.04	120.30
1	A	312	ARG	NE-CZ-NH1	-8.08	116.26	120.30
1	A	731	LEU	CB-CG-CD2	-7.13	98.89	111.00
2	B	382	ARG	NE-CZ-NH1	6.69	123.64	120.30
1	A	258	ARG	NE-CZ-NH2	-6.68	116.96	120.30
1	A	384	ARG	NE-CZ-NH2	-6.55	117.03	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	332	MET	CG-SD-CE	-6.36	90.02	100.20
1	A	795	ARG	NE-CZ-NH2	-6.23	117.18	120.30
1	A	281	VAL	CB-CA-C	-6.05	99.90	111.40
1	A	451	LEU	CA-CB-CG	-5.86	101.81	115.30
1	A	758	ARG	NE-CZ-NH1	5.67	123.13	120.30
2	B	434	LEU	CA-CB-CG	-5.62	102.37	115.30
1	A	360	CYS	C-N-CD	-5.46	108.58	120.60
1	A	594	ARG	NE-CZ-NH2	-5.43	117.59	120.30
1	A	586	LEU	CB-CG-CD1	5.17	119.78	111.00
1	A	224	ASN	C-N-CD	-5.13	109.32	120.60
1	A	820	ARG	NE-CZ-NH1	5.07	122.84	120.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	792	PRO	Peptide

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	5250	415	0
2	B	1076	0	1089	155	0
3	A	53	0	31	18	0
4	A	28	0	23	17	0
All	All	6374	0	6393	550	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 43.

All (550) 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:363:TYR:CD2	1:A:734:ILE:HG23	1.55	1.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:240:ALA:N	1:A:243:ASN:OD1	1.60	1.33
1:A:755:PRO:HA	1:A:758:ARG:NH1	1.42	1.32
3:A:900:FAD:C10	4:A:901:M8A:HAP1	1.59	1.30
1:A:216:ARG:O	1:A:220:LEU:HD12	1.35	1.25
1:A:437:THR:HG22	1:A:508:LEU:CD2	1.70	1.21
1:A:216:ARG:O	1:A:220:LEU:CD1	1.86	1.20
1:A:437:THR:CG2	1:A:508:LEU:HD21	1.70	1.20
2:B:317:SER:O	2:B:321:VAL:HG23	1.37	1.18
1:A:437:THR:CG2	1:A:508:LEU:CD2	2.21	1.17
1:A:363:TYR:CD2	1:A:734:ILE:CG2	2.29	1.16
1:A:491:CYS:O	1:A:495:ASP:OD1	1.61	1.16
1:A:755:PRO:CA	1:A:758:ARG:HH12	1.58	1.16
1:A:537:GLU:HG2	1:A:544:LEU:HD21	1.32	1.12
1:A:343:ALA:O	1:A:346:SER:OG	1.68	1.10
1:A:720:ASP:O	1:A:724:VAL:HG23	1.51	1.10
2:B:416:GLN:O	2:B:419:ASN:HB3	1.48	1.10
1:A:437:THR:HG21	1:A:508:LEU:HD23	1.33	1.09
1:A:366:ASN:OD1	1:A:368:GLN:N	1.84	1.09
2:B:425:ARG:HA	2:B:430:ILE:HG13	1.32	1.09
1:A:731:LEU:HA	1:A:734:ILE:HD13	1.32	1.07
3:A:900:FAD:C4X	4:A:901:M8A:HAP1	1.82	1.07
1:A:384:ARG:NH2	2:B:312:LYS:O	1.87	1.07
2:B:340:MET:O	2:B:343:VAL:HG12	1.54	1.06
1:A:240:ALA:CA	1:A:243:ASN:OD1	2.03	1.05
1:A:716:GLU:HG2	1:A:750:ARG:HB3	1.38	1.05
1:A:526:ARG:NH2	1:A:530:ASP:OD1	1.89	1.04
1:A:239:GLU:C	1:A:243:ASN:OD1	1.97	1.03
3:A:900:FAD:C10	4:A:901:M8A:CAP	2.37	1.01
1:A:537:GLU:HG2	1:A:544:LEU:CD2	1.89	1.01
1:A:564:HIS:C	1:A:565:LEU:HD12	1.82	0.99
1:A:786:ILE:HG22	1:A:787:PRO:HD2	1.43	0.99
1:A:441:LEU:HD23	2:B:356:ASN:HD22	1.26	0.99
1:A:754:ASP:OD1	1:A:755:PRO:HD2	1.60	0.99
2:B:416:GLN:C	2:B:419:ASN:HB3	1.81	0.99
1:A:232:GLU:N	1:A:232:GLU:OE1	1.94	0.99
1:A:755:PRO:HA	1:A:758:ARG:HH12	0.82	0.99
2:B:411:ASN:O	2:B:412:LYS:NZ	1.96	0.99
1:A:289:SER:OG	3:A:900:FAD:O2P	1.80	0.98
1:A:566:THR:HG21	1:A:697:LEU:HD22	1.45	0.97
1:A:693:LEU:HD12	1:A:694:PHE:H	1.26	0.97
2:B:413:SER:N	2:B:416:GLN:OE1	1.97	0.97

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:308:GLU:OE2	3:A:900:FAD:O2B	1.83	0.97
2:B:416:GLN:O	2:B:420:PHE:N	1.98	0.96
1:A:758:ARG:HG2	1:A:758:ARG:HH11	1.31	0.96
3:A:900:FAD:C4	4:A:901:M8A:HAP1	1.96	0.95
1:A:220:LEU:HD12	1:A:220:LEU:H	1.30	0.95
2:B:416:GLN:CA	2:B:419:ASN:HB3	1.98	0.94
2:B:416:GLN:HA	2:B:419:ASN:CB	1.98	0.94
1:A:363:TYR:CE2	1:A:734:ILE:CG2	2.51	0.94
1:A:241:PRO:O	1:A:244:SER:HB3	1.68	0.93
1:A:386:LEU:O	1:A:389:THR:OG1	1.85	0.93
1:A:693:LEU:HD12	1:A:694:PHE:N	1.83	0.93
1:A:332:MET:HE1	1:A:704:LEU:HD22	1.48	0.92
1:A:719:SER:OG	1:A:722:VAL:HG23	1.69	0.92
2:B:321:VAL:O	2:B:325:SER:OG	1.86	0.92
1:A:363:TYR:HD2	1:A:734:ILE:HG23	0.85	0.92
1:A:731:LEU:HD12	1:A:731:LEU:H	1.35	0.92
1:A:660:ASN:OD1	1:A:749:SER:OG	1.86	0.91
1:A:437:THR:HG22	1:A:508:LEU:HD21	0.91	0.91
1:A:734:ILE:HD12	1:A:734:ILE:H	1.32	0.91
1:A:537:GLU:CG	1:A:544:LEU:HD21	2.00	0.91
2:B:377:GLN:CB	2:B:410:GLY:O	2.19	0.91
1:A:331:ALA:HA	3:A:900:FAD:C4X	2.00	0.91
1:A:530:ASP:OD2	1:A:685:THR:OG1	1.89	0.89
1:A:362:LEU:C	1:A:363:TYR:HD1	1.77	0.88
1:A:441:LEU:HD23	2:B:356:ASN:ND2	1.89	0.88
2:B:368:GLU:N	2:B:369:PRO:HD2	1.88	0.88
2:B:340:MET:HE3	2:B:341:GLU:HA	1.56	0.86
2:B:415:VAL:O	2:B:419:ASN:HB2	1.72	0.86
2:B:317:SER:O	2:B:321:VAL:CG2	2.24	0.85
2:B:318:GLN:O	2:B:322:GLU:HG3	1.75	0.85
1:A:496:GLU:O	1:A:499:GLU:HB3	1.77	0.85
2:B:411:ASN:OD1	2:B:412:LYS:NZ	2.09	0.85
1:A:263:ASN:C	1:A:267:TYR:CE2	2.50	0.84
1:A:645:GLU:OE1	1:A:649:SER:OG	1.93	0.84
1:A:263:ASN:O	1:A:267:TYR:OH	1.95	0.84
2:B:416:GLN:HA	2:B:419:ASN:HB3	1.59	0.83
1:A:726:ARG:O	1:A:730:ILE:HG13	1.79	0.83
1:A:755:PRO:CA	1:A:758:ARG:NH1	2.29	0.82
1:A:363:TYR:CE2	1:A:734:ILE:HG23	2.11	0.81
1:A:716:GLU:CG	1:A:750:ARG:HB3	2.11	0.81
2:B:416:GLN:CA	2:B:419:ASN:CB	2.59	0.81

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:684:THR:HG22	1:A:686:ALA:H	1.47	0.80
1:A:533:PHE:CB	1:A:688:ARG:NH1	2.44	0.80
1:A:363:TYR:HD2	1:A:734:ILE:CG2	1.73	0.80
2:B:429:ASN:HB3	2:B:432:GLU:OE1	1.81	0.80
1:A:332:MET:CE	1:A:704:LEU:HD22	2.11	0.80
2:B:347:ARG:HG3	2:B:348:GLN:N	1.95	0.79
2:B:379:CYS:SG	2:B:413:SER:N	2.54	0.79
1:A:801:GLU:HG3	1:A:809:ALA:HA	1.64	0.79
1:A:209:VAL:O	1:A:213:ILE:HG13	1.83	0.79
1:A:526:ARG:HH21	1:A:530:ASP:CG	1.84	0.79
1:A:213:ILE:O	1:A:217:THR:OG1	2.00	0.79
1:A:235:LEU:HD21	1:A:246:THR:HG22	1.65	0.78
1:A:216:ARG:O	1:A:220:LEU:HD11	1.83	0.78
1:A:728:LEU:HA	1:A:731:LEU:HD13	1.65	0.78
1:A:606:ASN:HD21	1:A:608:ARG:HB2	1.48	0.78
1:A:402:ASN:O	1:A:403:ASN:HB2	1.84	0.77
2:B:377:GLN:HB3	2:B:410:GLY:O	1.84	0.76
1:A:421:LYS:NZ	2:B:320:ASP:OD1	2.18	0.76
1:A:814:ALA:O	1:A:817:SER:OG	2.02	0.76
3:A:900:FAD:N3	4:A:901:M8A:HAJ	2.01	0.75
1:A:666:PHE:O	1:A:701:PRO:CG	2.34	0.75
2:B:317:SER:HB3	2:B:320:ASP:OD2	1.87	0.75
1:A:731:LEU:CA	1:A:734:ILE:HD13	2.15	0.75
1:A:240:ALA:HA	1:A:243:ASN:OD1	1.86	0.74
2:B:340:MET:CE	2:B:341:GLU:HA	2.17	0.74
1:A:437:THR:CG2	1:A:508:LEU:HD23	1.96	0.74
2:B:416:GLN:HA	2:B:419:ASN:HD22	1.51	0.74
1:A:216:ARG:HG3	1:A:220:LEU:HD11	1.69	0.74
1:A:384:ARG:CZ	2:B:312:LYS:O	2.35	0.74
1:A:340:ASN:OD1	1:A:342:MET:N	2.21	0.74
1:A:800:GLY:O	1:A:803:THR:OG1	2.06	0.74
1:A:680:HIS:HD2	1:A:730:ILE:HG23	1.52	0.74
1:A:392:LEU:N	1:A:392:LEU:HD12	2.03	0.73
1:A:677:LEU:N	1:A:677:LEU:HD23	2.04	0.73
1:A:346:SER:O	1:A:349:VAL:O	2.07	0.73
1:A:510:GLU:O	1:A:513:ALA:HB3	1.89	0.73
1:A:217:THR:HA	1:A:220:LEU:HD13	1.70	0.72
1:A:606:ASN:HD22	1:A:609:SER:H	1.37	0.72
1:A:458:LEU:HB3	1:A:487:LEU:HD12	1.72	0.72
1:A:220:LEU:HD12	1:A:220:LEU:N	2.04	0.72
1:A:666:PHE:O	1:A:701:PRO:HG2	1.90	0.72

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:188:MET:SD	1:A:200:ILE:HG13	2.30	0.72
2:B:378:LYS:N	2:B:378:LYS:HD2	2.05	0.72
1:A:754:ASP:OD1	1:A:755:PRO:CD	2.36	0.71
2:B:424:TYR:CE1	2:B:427:ARG:NH2	2.58	0.71
2:B:430:ILE:HG22	2:B:434:LEU:HD12	1.71	0.71
2:B:416:GLN:O	2:B:419:ASN:CB	2.36	0.71
1:A:364:GLU:OE1	1:A:370:VAL:HG22	1.89	0.71
1:A:437:THR:HG21	1:A:508:LEU:CD2	1.98	0.70
1:A:453:GLU:OE1	1:A:453:GLU:HA	1.89	0.70
1:A:374:LYS:O	1:A:378:VAL:HG23	1.90	0.70
1:A:565:LEU:HD12	1:A:565:LEU:N	2.06	0.70
1:A:270:ILE:O	1:A:272:PRO:HD3	1.91	0.69
1:A:734:ILE:HD12	1:A:734:ILE:N	2.06	0.69
1:A:786:ILE:CG2	1:A:787:PRO:HD2	2.20	0.69
2:B:415:VAL:O	2:B:419:ASN:N	2.22	0.69
1:A:258:ARG:HD2	1:A:827:ASP:OD1	1.93	0.68
2:B:426:ARG:HG2	2:B:426:ARG:HH11	1.59	0.68
2:B:342:LEU:HD23	2:B:343:VAL:N	2.07	0.68
2:B:382:ARG:HG3	2:B:382:ARG:HH11	1.58	0.68
1:A:384:ARG:NH1	2:B:312:LYS:O	2.26	0.68
1:A:392:LEU:HD12	1:A:392:LEU:H	1.56	0.68
1:A:468:VAL:O	1:A:472:ARG:NH1	2.27	0.68
1:A:583:ASP:OD1	1:A:585:LYS:NZ	2.26	0.68
4:A:901:M8A:OAU	4:A:901:M8A:NAT	2.24	0.68
1:A:435:VAL:HG23	1:A:436:LYS:N	2.09	0.68
2:B:400:ARG:CB	2:B:402:PHE:HE1	2.07	0.67
2:B:426:ARG:HG2	2:B:426:ARG:NH1	2.09	0.67
1:A:220:LEU:CD1	1:A:220:LEU:H	2.06	0.67
1:A:182:ARG:NH1	1:A:341:PRO:HD3	2.10	0.67
1:A:332:MET:CE	1:A:704:LEU:CD2	2.72	0.67
1:A:445:LEU:HB2	2:B:359:LEU:HD12	1.77	0.67
1:A:533:PHE:HB3	1:A:688:ARG:NH1	2.08	0.67
2:B:402:PHE:HD2	2:B:418:LYS:HG2	1.59	0.66
1:A:262:ILE:HG13	1:A:263:ASN:HD22	1.60	0.66
1:A:685:THR:O	1:A:688:ARG:HG2	1.96	0.66
1:A:464:GLU:O	1:A:467:GLU:HB2	1.96	0.66
2:B:396:ARG:HD2	2:B:396:ARG:O	1.96	0.65
1:A:718:ILE:HG22	1:A:723:ILE:HG13	1.78	0.65
4:A:901:M8A:CAW	4:A:901:M8A:HAT	2.08	0.65
2:B:416:GLN:HA	2:B:419:ASN:ND2	2.11	0.65
1:A:435:VAL:HG12	2:B:349:ILE:HG12	1.79	0.65

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:235:LEU:HD21	1:A:246:THR:CG2	2.25	0.65
1:A:282:ILE:HG21	1:A:602:VAL:HG21	1.80	0.64
1:A:522:SER:N	1:A:525:ASP:HB2	2.13	0.64
2:B:399:GLY:N	2:B:437:TRP:NE1	2.45	0.64
1:A:451:LEU:O	1:A:455:ILE:HG13	1.97	0.64
1:A:606:ASN:ND2	1:A:608:ARG:HB2	2.13	0.64
1:A:332:MET:HE3	1:A:704:LEU:HD21	1.80	0.64
1:A:413:GLU:O	1:A:417:GLN:HG3	1.96	0.64
1:A:533:PHE:HB2	1:A:688:ARG:NH1	2.12	0.64
1:A:633:GLN:OE1	1:A:634:PRO:HA	1.98	0.64
2:B:337:GLN:O	2:B:341:GLU:HB2	1.96	0.64
2:B:370:TYR:N	2:B:370:TYR:CD1	2.63	0.63
1:A:566:THR:HG21	1:A:697:LEU:CD2	2.26	0.63
2:B:370:TYR:N	2:B:370:TYR:HD1	1.96	0.63
1:A:258:ARG:CD	1:A:827:ASP:OD1	2.47	0.63
1:A:524:ARG:O	1:A:528:ILE:HD12	1.99	0.63
2:B:377:GLN:HG3	2:B:410:GLY:O	1.97	0.63
1:A:462:TYR:O	1:A:466:SER:OG	2.15	0.63
1:A:666:PHE:O	1:A:701:PRO:HG3	1.97	0.62
2:B:402:PHE:N	2:B:402:PHE:HD1	1.97	0.62
2:B:377:GLN:CG	2:B:410:GLY:O	2.47	0.62
1:A:362:LEU:HD23	1:A:362:LEU:N	2.13	0.62
1:A:372:LYS:O	1:A:376:GLU:HG3	1.99	0.62
1:A:510:GLU:HG2	1:A:511:LEU:HD23	1.81	0.62
1:A:263:ASN:O	1:A:267:TYR:CZ	2.51	0.62
2:B:327:ASN:ND2	2:B:329:THR:H	1.97	0.62
1:A:503:LYS:O	1:A:506:GLU:HG2	2.00	0.62
1:A:755:PRO:HA	1:A:758:ARG:CZ	2.27	0.62
1:A:574:VAL:HB	1:A:575:PRO:CD	2.30	0.62
1:A:240:ALA:HA	1:A:241:PRO:C	2.20	0.61
2:B:415:VAL:O	2:B:419:ASN:CB	2.46	0.61
1:A:332:MET:HE3	1:A:704:LEU:CD2	2.30	0.61
1:A:240:ALA:N	1:A:243:ASN:CG	2.50	0.61
2:B:413:SER:OG	2:B:415:VAL:HG13	2.00	0.61
1:A:563:SER:O	1:A:565:LEU:CD1	2.48	0.61
1:A:667:ASP:OD1	1:A:667:ASP:N	2.24	0.61
2:B:376:ILE:HD12	2:B:376:ILE:H	1.65	0.61
2:B:399:GLY:CA	2:B:437:TRP:CE2	2.83	0.61
1:A:553:ASP:O	1:A:556:ASP:HB2	2.00	0.61
1:A:661:LYS:NZ	4:A:901:M8A:OAA	2.31	0.61
1:A:731:LEU:HD12	1:A:731:LEU:N	2.13	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:340:MET:CE	2:B:341:GLU:CA	2.79	0.61
2:B:377:GLN:OE1	2:B:377:GLN:HA	2.00	0.61
1:A:522:SER:OG	1:A:525:ASP:N	2.31	0.61
1:A:555:ASP:OD2	4:A:901:M8A:HB2C	2.01	0.61
2:B:400:ARG:HB3	2:B:402:PHE:HE1	1.64	0.61
1:A:484:HIS:CD2	2:B:372:LEU:HD13	2.36	0.60
1:A:786:ILE:HG22	1:A:787:PRO:CD	2.24	0.60
2:B:402:PHE:N	2:B:402:PHE:CD1	2.68	0.60
1:A:535:ASN:HD22	1:A:692:PHE:HE2	1.48	0.60
2:B:340:MET:HE3	2:B:341:GLU:CA	2.29	0.60
1:A:199:ILE:HD11	1:A:248:LEU:HD11	1.83	0.60
1:A:675:VAL:O	1:A:696:ASN:ND2	2.34	0.60
1:A:247:VAL:HG23	1:A:248:LEU:N	2.17	0.60
1:A:731:LEU:HA	1:A:734:ILE:CD1	2.20	0.59
1:A:448:MET:HE3	2:B:363:LEU:HD13	1.84	0.59
1:A:732:LYS:O	1:A:736:GLY:N	2.34	0.59
2:B:368:GLU:OE1	2:B:371:ARG:HG3	2.01	0.59
1:A:243:ASN:OD1	1:A:243:ASN:N	2.34	0.59
1:A:670:PHE:HD1	1:A:670:PHE:O	1.85	0.59
1:A:350:ASN:O	1:A:350:ASN:ND2	2.35	0.59
1:A:533:PHE:HB2	1:A:688:ARG:HH11	1.66	0.58
2:B:376:ILE:HD12	2:B:376:ILE:N	2.19	0.58
2:B:382:ARG:HG3	2:B:382:ARG:NH1	2.15	0.58
2:B:425:ARG:NH1	2:B:425:ARG:HG3	2.18	0.58
2:B:310:PRO:HB3	2:B:316:LEU:HD12	1.85	0.58
1:A:308:GLU:OE2	3:A:900:FAD:O3B	2.21	0.58
1:A:392:LEU:H	1:A:392:LEU:CD1	2.16	0.58
1:A:493:GLU:O	1:A:497:LEU:HD13	2.03	0.58
1:A:263:ASN:O	1:A:267:TYR:CE2	2.57	0.58
1:A:439:GLU:HG3	2:B:352:ILE:CD1	2.34	0.58
1:A:680:HIS:CD2	1:A:730:ILE:HG23	2.36	0.58
2:B:368:GLU:N	2:B:369:PRO:CD	2.63	0.58
2:B:405:ILE:O	2:B:409:ILE:HG13	2.04	0.58
1:A:449:VAL:HG23	2:B:363:LEU:HG	1.85	0.58
1:A:758:ARG:NH1	1:A:758:ARG:HG2	2.05	0.58
1:A:666:PHE:CE1	1:A:743:PRO:HB3	2.39	0.57
1:A:807:TYR:N	1:A:808:PRO:CD	2.67	0.57
2:B:396:ARG:O	2:B:437:TRP:HD1	1.87	0.57
2:B:402:PHE:CE2	2:B:418:LYS:HD2	2.39	0.57
1:A:391:TYR:CD1	1:A:395:GLN:HG3	2.38	0.57
1:A:641:PRO:HB2	1:A:642:PRO:CD	2.35	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:537:GLU:HG2	1:A:544:LEU:HD23	1.78	0.57
1:A:661:LYS:HD3	1:A:704:LEU:HD21	1.87	0.57
1:A:311:ASP:OD1	1:A:311:ASP:N	2.30	0.57
1:A:776:MET:HE3	1:A:776:MET:HA	1.87	0.57
1:A:801:GLU:HG2	1:A:809:ALA:H	1.69	0.57
2:B:416:GLN:C	2:B:419:ASN:CB	2.65	0.57
1:A:262:ILE:HG13	1:A:263:ASN:ND2	2.20	0.57
1:A:340:ASN:HB2	1:A:560:PHE:CD2	2.40	0.57
2:B:399:GLY:HA3	2:B:437:TRP:CE2	2.39	0.57
1:A:574:VAL:HB	1:A:575:PRO:HD2	1.87	0.56
1:A:750:ARG:O	1:A:753:ALA:HB3	2.05	0.56
1:A:680:HIS:CD2	1:A:730:ILE:HD13	2.40	0.56
1:A:731:LEU:H	1:A:731:LEU:CD1	2.14	0.56
1:A:319:THR:HG21	1:A:570:GLY:HA3	1.88	0.56
1:A:263:ASN:C	1:A:267:TYR:HE2	2.07	0.56
1:A:361:PRO:C	1:A:362:LEU:HD23	2.27	0.56
1:A:569:ASN:OD1	1:A:569:ASN:N	2.32	0.56
2:B:425:ARG:HG3	2:B:425:ARG:HH11	1.71	0.56
1:A:356:ILE:HD11	1:A:566:THR:HG23	1.88	0.56
1:A:379:GLU:O	1:A:382:PHE:HB3	2.06	0.56
1:A:755:PRO:N	1:A:758:ARG:HH12	2.01	0.56
2:B:415:VAL:C	2:B:419:ASN:HB2	2.25	0.56
1:A:216:ARG:C	1:A:220:LEU:CD1	2.71	0.55
2:B:327:ASN:OD1	2:B:330:ALA:HB2	2.07	0.55
1:A:486:ASP:OD1	2:B:398:TYR:OH	2.21	0.55
1:A:353:LEU:HB3	1:A:565:LEU:HD23	1.89	0.55
3:A:900:FAD:C4	4:A:901:M8A:HAJ	2.37	0.55
2:B:400:ARG:CA	2:B:402:PHE:HE1	2.20	0.55
1:A:801:GLU:CG	1:A:809:ALA:HA	2.34	0.55
2:B:344:SER:O	2:B:347:ARG:HG2	2.07	0.55
2:B:402:PHE:CD2	2:B:418:LYS:HD2	2.43	0.54
3:A:900:FAD:C4	4:A:901:M8A:CAP	2.80	0.54
1:A:407:SER:CB	1:A:545:SER:O	2.56	0.54
1:A:335:THR:HG21	4:A:901:M8A:HAL	1.89	0.54
1:A:495:ASP:OD2	2:B:371:ARG:NH2	2.39	0.54
2:B:399:GLY:HA3	2:B:437:TRP:CZ2	2.42	0.54
1:A:684:THR:HG22	1:A:686:ALA:N	2.20	0.54
1:A:363:TYR:CD2	1:A:734:ILE:HG21	2.33	0.54
1:A:544:LEU:HD23	1:A:544:LEU:N	2.23	0.54
2:B:421:PHE:HE1	2:B:434:LEU:HD11	1.72	0.54
1:A:647:LYS:O	1:A:651:VAL:HG23	2.08	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:241:PRO:O	1:A:244:SER:CB	2.51	0.54
1:A:366:ASN:HD21	1:A:368:GLN:HB2	1.72	0.53
1:A:231:PHE:HE1	1:A:249:VAL:HG12	1.72	0.53
2:B:389:LEU:O	2:B:393:GLN:HG3	2.08	0.53
1:A:188:MET:HG2	1:A:210:PHE:CE2	2.44	0.53
1:A:526:ARG:NH2	1:A:530:ASP:CG	2.53	0.53
1:A:235:LEU:CD2	1:A:246:THR:HG22	2.35	0.53
1:A:381:GLU:OE2	1:A:520:TYR:OH	2.21	0.53
3:A:900:FAD:O4	4:A:901:M8A:CAD	2.56	0.53
2:B:419:ASN:O	2:B:423:ASN:HB2	2.08	0.53
1:A:245:ASP:OD1	1:A:247:VAL:HG22	2.08	0.53
1:A:501:GLN:O	1:A:505:GLU:HG3	2.08	0.53
2:B:417:VAL:O	2:B:420:PHE:HB3	2.08	0.53
1:A:196:PHE:N	1:A:197:PRO:CD	2.71	0.53
1:A:399:ASN:O	1:A:406:VAL:HG23	2.09	0.53
1:A:750:ARG:HH11	1:A:750:ARG:CG	2.22	0.52
2:B:315:PHE:CD1	2:B:315:PHE:N	2.77	0.52
2:B:403:GLN:OE1	2:B:403:GLN:HA	2.09	0.52
1:A:363:TYR:HD1	1:A:363:TYR:N	2.05	0.52
1:A:445:LEU:CB	2:B:359:LEU:HD12	2.39	0.52
1:A:319:THR:HB	1:A:572:SER:HB3	1.91	0.52
1:A:447:LYS:HD3	1:A:497:LEU:HD21	1.90	0.52
1:A:448:MET:CE	2:B:363:LEU:HD13	2.40	0.52
1:A:435:VAL:CG2	1:A:436:LYS:N	2.73	0.52
2:B:430:ILE:HG22	2:B:434:LEU:CD1	2.38	0.52
1:A:363:TYR:N	1:A:363:TYR:CD1	2.75	0.52
1:A:439:GLU:HG3	2:B:352:ILE:HD13	1.92	0.52
1:A:510:GLU:O	1:A:513:ALA:CB	2.58	0.52
1:A:510:GLU:O	1:A:513:ALA:N	2.42	0.52
2:B:429:ASN:CB	2:B:432:GLU:OE1	2.56	0.52
1:A:422:HIS:CE1	2:B:315:PHE:CZ	2.98	0.52
1:A:677:LEU:N	1:A:677:LEU:CD2	2.73	0.52
1:A:734:ILE:H	1:A:734:ILE:CD1	2.12	0.52
1:A:563:SER:O	1:A:565:LEU:HD11	2.10	0.52
1:A:641:PRO:HB2	1:A:642:PRO:HD2	1.91	0.51
1:A:356:ILE:HD11	1:A:566:THR:CG2	2.40	0.51
1:A:534:ALA:HB2	1:A:688:ARG:HB2	1.91	0.51
1:A:388:ALA:O	1:A:392:LEU:CD1	2.59	0.51
1:A:448:MET:HB3	2:B:363:LEU:HD11	1.92	0.51
2:B:369:PRO:HG2	2:B:370:TYR:CD1	2.46	0.51
1:A:566:THR:CG2	1:A:697:LEU:HD22	2.30	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:388:ALA:O	1:A:391:TYR:HB3	2.11	0.51
1:A:391:TYR:CE1	1:A:395:GLN:HG3	2.45	0.51
2:B:324:VAL:HG13	2:B:331:ALA:HA	1.93	0.51
2:B:377:GLN:HB2	2:B:410:GLY:O	2.08	0.51
1:A:448:MET:CB	2:B:363:LEU:HD11	2.41	0.50
1:A:230:THR:O	1:A:234:THR:OG1	2.26	0.50
1:A:308:GLU:HG3	1:A:310:ARG:H	1.76	0.50
1:A:670:PHE:CD1	1:A:670:PHE:C	2.84	0.50
1:A:633:GLN:OE1	1:A:635:PRO:HD3	2.11	0.50
1:A:308:GLU:CD	3:A:900:FAD:O3B	2.50	0.50
2:B:416:GLN:CA	2:B:419:ASN:HB2	2.41	0.50
2:B:367:ILE:C	2:B:369:PRO:HD2	2.32	0.50
1:A:349:VAL:HG12	1:A:350:ASN:N	2.26	0.50
1:A:451:LEU:HD23	1:A:494:TYR:HB2	1.93	0.50
1:A:460:GLN:HE21	1:A:460:GLN:CA	2.25	0.50
2:B:402:PHE:HD1	2:B:402:PHE:H	1.59	0.50
2:B:384:THR:O	2:B:388:GLN:HG3	2.12	0.50
2:B:400:ARG:HB3	2:B:402:PHE:CE1	2.44	0.50
1:A:221:TRP:O	1:A:224:ASN:O	2.29	0.49
1:A:479:LEU:O	1:A:483:LYS:HB2	2.12	0.49
1:A:666:PHE:CD1	1:A:743:PRO:HA	2.46	0.49
1:A:804:ILE:O	1:A:808:PRO:HD3	2.11	0.49
1:A:385:LEU:O	1:A:388:ALA:HB3	2.10	0.49
1:A:750:ARG:HH11	1:A:750:ARG:HG3	1.77	0.49
3:A:900:FAD:C2	4:A:901:M8A:HAJ	2.43	0.49
1:A:574:VAL:CB	1:A:575:PRO:CD	2.90	0.49
1:A:231:PHE:HE1	1:A:249:VAL:CG1	2.26	0.49
2:B:400:ARG:O	2:B:402:PHE:N	2.46	0.49
1:A:366:ASN:OD1	1:A:367:GLY:N	2.46	0.49
1:A:363:TYR:HE2	1:A:734:ILE:CG2	2.20	0.49
1:A:680:HIS:ND1	1:A:680:HIS:C	2.65	0.49
2:B:327:ASN:ND2	2:B:329:THR:OG1	2.45	0.49
1:A:321:ARG:NH2	1:A:569:ASN:O	2.46	0.49
1:A:670:PHE:O	1:A:670:PHE:CD1	2.65	0.49
1:A:724:VAL:O	1:A:727:CYS:HB2	2.13	0.49
1:A:817:SER:O	1:A:820:ARG:HB3	2.13	0.49
2:B:342:LEU:HD23	2:B:342:LEU:C	2.34	0.49
2:B:416:GLN:HA	2:B:419:ASN:HB2	1.90	0.49
1:A:773:TYR:CE1	1:A:808:PRO:HB3	2.48	0.48
2:B:413:SER:OG	2:B:415:VAL:CG1	2.61	0.48
1:A:364:GLU:OE2	1:A:524:ARG:NE	2.46	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:460:GLN:CA	1:A:460:GLN:NE2	2.76	0.48
1:A:728:LEU:CA	1:A:731:LEU:HD13	2.40	0.48
1:A:231:PHE:CE1	1:A:249:VAL:HG12	2.48	0.48
1:A:641:PRO:CB	1:A:642:PRO:CD	2.91	0.48
1:A:346:SER:HA	1:A:351:MET:SD	2.54	0.48
1:A:448:MET:HE3	2:B:363:LEU:CD1	2.44	0.48
1:A:547:LEU:HD22	1:A:552:TRP:HB2	1.95	0.48
1:A:671:TRP:HA	1:A:735:PHE:CE2	2.49	0.48
3:A:900:FAD:C10	4:A:901:M8A:HAP2	2.36	0.48
1:A:448:MET:CE	2:B:363:LEU:CD1	2.91	0.47
1:A:222:LEU:O	1:A:225:PRO:HD3	2.14	0.47
1:A:761:TYR:CZ	4:A:901:M8A:HAK	2.49	0.47
1:A:296:GLN:HA	1:A:296:GLN:OE1	2.13	0.47
1:A:310:ARG:NH1	1:A:754:ASP:OD2	2.25	0.47
1:A:392:LEU:N	1:A:392:LEU:CD1	2.72	0.47
2:B:402:PHE:CD2	2:B:418:LYS:HG2	2.43	0.47
2:B:361:GLU:O	2:B:364:ASP:HB3	2.14	0.47
1:A:308:GLU:OE1	3:A:900:FAD:O3B	2.32	0.47
1:A:565:LEU:N	1:A:565:LEU:CD1	2.76	0.47
1:A:662:VAL:HG13	1:A:748:VAL:HG22	1.96	0.47
1:A:782:PRO:HG3	1:A:795:ARG:HG3	1.95	0.47
1:A:195:CYS:HB2	1:A:196:PHE:CD1	2.49	0.47
1:A:533:PHE:O	1:A:537:GLU:HG3	2.15	0.47
1:A:758:ARG:NH1	1:A:758:ARG:CG	2.76	0.47
1:A:594:ARG:O	1:A:600:CYS:HB3	2.15	0.47
1:A:594:ARG:HA	1:A:640:VAL:O	2.15	0.47
1:A:520:TYR:CD2	1:A:521:LEU:HG	2.50	0.47
1:A:435:VAL:CG1	2:B:349:ILE:HG12	2.45	0.47
2:B:424:TYR:CD1	2:B:427:ARG:NH2	2.83	0.47
1:A:474:ILE:HD12	1:A:474:ILE:HA	1.62	0.47
1:A:654:MET:HE2	1:A:654:MET:HB3	1.62	0.47
1:A:601:GLU:HA	1:A:616:TYR:O	2.15	0.46
1:A:209:VAL:HG13	1:A:242:TYR:HD1	1.80	0.46
1:A:362:LEU:C	1:A:363:TYR:CD1	2.69	0.46
1:A:456:LYS:HA	2:B:370:TYR:CE2	2.50	0.46
1:A:524:ARG:HH11	1:A:524:ARG:CG	2.29	0.46
1:A:418:LEU:CD1	2:B:324:VAL:HG21	2.45	0.46
1:A:677:LEU:HD23	1:A:677:LEU:H	1.77	0.46
2:B:399:GLY:N	2:B:437:TRP:CD1	2.84	0.46
1:A:188:MET:HG2	1:A:210:PHE:HE2	1.80	0.46
1:A:389:THR:HA	1:A:392:LEU:HD13	1.96	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:786:ILE:CG2	1:A:787:PRO:CD	2.91	0.46
1:A:366:ASN:OD1	1:A:368:GLN:CB	2.63	0.46
1:A:491:CYS:C	1:A:495:ASP:OD1	2.48	0.46
1:A:524:ARG:NH1	1:A:524:ARG:HG2	2.31	0.46
2:B:384:THR:HG1	2:B:387:GLU:CD	2.19	0.46
1:A:358:GLN:OE1	1:A:358:GLN:HA	2.16	0.46
1:A:701:PRO:HG2	1:A:701:PRO:O	2.16	0.46
1:A:716:GLU:CD	1:A:750:ARG:HB3	2.36	0.46
1:A:393:SER:O	1:A:397:ASP:HA	2.15	0.46
1:A:834:TYR:CD1	1:A:835:THR:HG22	2.51	0.46
1:A:216:ARG:O	1:A:219:GLN:HB3	2.16	0.45
1:A:340:ASN:HA	1:A:341:PRO:HD2	1.80	0.45
1:A:513:ALA:CB	1:A:514:ASN:OD1	2.65	0.45
1:A:261:LEU:HD23	1:A:261:LEU:HA	1.64	0.45
1:A:446:ASN:OD1	2:B:359:LEU:HD11	2.17	0.45
1:A:564:HIS:CA	1:A:565:LEU:HD12	2.46	0.45
2:B:312:LYS:HD2	2:B:312:LYS:HA	1.69	0.45
2:B:400:ARG:CA	2:B:402:PHE:CE1	2.99	0.45
1:A:677:LEU:HB2	1:A:693:LEU:HD11	1.98	0.45
2:B:383:TRP:CZ2	2:B:420:PHE:HB2	2.51	0.45
1:A:258:ARG:HD3	1:A:827:ASP:OD1	2.17	0.45
1:A:260:GLY:O	1:A:264:PHE:CD2	2.70	0.45
1:A:269:ARG:HG2	1:A:271:LYS:O	2.16	0.45
1:A:474:ILE:HG23	1:A:475:THR:N	2.32	0.45
1:A:524:ARG:HH11	1:A:524:ARG:HG2	1.81	0.45
1:A:719:SER:HG	1:A:722:VAL:HG23	1.74	0.45
1:A:217:THR:HG23	1:A:234:THR:HG21	1.99	0.44
1:A:728:LEU:O	1:A:729:ALA:C	2.55	0.44
1:A:754:ASP:HA	1:A:755:PRO:HD3	1.82	0.44
1:A:248:LEU:HD12	1:A:248:LEU:HA	1.71	0.44
1:A:264:PHE:CD1	1:A:264:PHE:C	2.91	0.44
1:A:317:VAL:HG13	1:A:571:TYR:HB3	1.98	0.44
1:A:442:LYS:HB2	2:B:356:ASN:OD1	2.17	0.44
1:A:717:ASN:O	1:A:718:ILE:HG13	2.16	0.44
1:A:217:THR:HG23	1:A:234:THR:CG2	2.47	0.44
1:A:351:MET:HA	1:A:569:ASN:HD21	1.83	0.44
2:B:368:GLU:OE1	2:B:368:GLU:HA	2.16	0.44
1:A:370:VAL:HA	1:A:371:PRO:HD2	1.71	0.44
1:A:205:GLN:O	1:A:209:VAL:HG23	2.18	0.44
1:A:228:GLN:HA	1:A:263:ASN:OD1	2.17	0.44
1:A:457:GLU:O	1:A:461:GLN:HG3	2.18	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:378:LYS:O	2:B:411:ASN:HB2	2.17	0.44
2:B:397:LYS:HD3	2:B:398:TYR:CZ	2.52	0.44
1:A:399:ASN:C	1:A:406:VAL:HG23	2.37	0.44
1:A:441:LEU:CD2	2:B:356:ASN:HD22	2.14	0.44
1:A:763:TYR:HE1	1:A:765:ALA:HA	1.82	0.44
1:A:366:ASN:ND2	1:A:368:GLN:HB2	2.32	0.44
1:A:444:LEU:HD23	1:A:501:GLN:HB2	2.00	0.44
1:A:460:GLN:NE2	1:A:460:GLN:HA	2.32	0.44
1:A:700:ALA:HB1	1:A:701:PRO:HD2	1.99	0.44
1:A:750:ARG:CG	1:A:750:ARG:NH1	2.78	0.44
1:A:676:ASN:HB2	1:A:677:LEU:CD2	2.48	0.44
2:B:327:ASN:HD22	2:B:329:THR:H	1.64	0.44
1:A:175:GLU:HG2	1:A:185:HIS:CG	2.53	0.43
1:A:372:LYS:O	1:A:376:GLU:CG	2.65	0.43
1:A:425:ASP:OD1	2:B:338:LEU:CD1	2.66	0.43
1:A:308:GLU:OE2	3:A:900:FAD:H1B	2.18	0.43
1:A:806:ASN:C	1:A:807:TYR:CD1	2.92	0.43
2:B:389:LEU:HD23	2:B:389:LEU:HA	1.87	0.43
2:B:395:ILE:HG22	2:B:433:VAL:CG1	2.48	0.43
2:B:380:ASN:OD1	2:B:381:ALA:N	2.51	0.43
2:B:426:ARG:CD	2:B:426:ARG:H	2.31	0.43
1:A:445:LEU:O	1:A:449:VAL:N	2.46	0.43
1:A:448:MET:HG2	1:A:497:LEU:HD23	2.01	0.43
1:A:484:HIS:HD2	2:B:372:LEU:HD13	1.81	0.43
1:A:229:LEU:N	1:A:263:ASN:OD1	2.41	0.43
1:A:523:SER:O	1:A:527:GLN:HG3	2.18	0.43
1:A:308:GLU:OE2	3:A:900:FAD:C2B	2.65	0.43
1:A:456:LYS:CG	2:B:370:TYR:HE2	2.32	0.43
1:A:536:LEU:HD23	1:A:544:LEU:HD13	1.99	0.43
1:A:660:ASN:OD1	1:A:749:SER:C	2.57	0.43
2:B:340:MET:HE2	2:B:341:GLU:CA	2.48	0.43
1:A:445:LEU:O	1:A:446:ASN:C	2.57	0.43
1:A:603:ILE:HG12	1:A:615:ILE:CD1	2.49	0.42
1:A:418:LEU:HA	1:A:418:LEU:HD12	1.74	0.42
1:A:522:SER:O	1:A:525:ASP:HB2	2.20	0.42
1:A:513:ALA:HB3	1:A:514:ASN:OD1	2.20	0.42
1:A:538:PHE:CD1	1:A:706:LEU:HD23	2.53	0.42
1:A:572:SER:O	1:A:573:CYS:C	2.54	0.42
1:A:381:GLU:O	1:A:385:LEU:N	2.47	0.42
1:A:655:GLY:O	1:A:762:SER:HA	2.19	0.42
1:A:671:TRP:O	1:A:673:PRO:HD3	2.18	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:315:PHE:C	2:B:316:LEU:HG	2.38	0.42
1:A:362:LEU:O	1:A:363:TYR:HD1	1.99	0.42
1:A:407:SER:HB3	1:A:545:SER:O	2.20	0.42
1:A:199:ILE:CD1	1:A:248:LEU:HD11	2.49	0.42
1:A:327:ALA:HA	1:A:698:TYR:CE2	2.55	0.42
1:A:643:LEU:HD23	1:A:643:LEU:HA	1.78	0.42
1:A:729:ALA:O	1:A:730:ILE:C	2.58	0.42
1:A:266:ILE:CD1	1:A:577:ALA:HB1	2.49	0.42
1:A:319:THR:OG1	1:A:328:ASP:OD1	2.30	0.42
1:A:205:GLN:O	1:A:205:GLN:NE2	2.53	0.42
1:A:718:ILE:HG22	1:A:723:ILE:CG1	2.48	0.42
1:A:672:ASP:OD1	1:A:674:SER:N	2.51	0.42
1:A:716:GLU:HG2	1:A:750:ARG:CB	2.29	0.42
1:A:514:ASN:OD1	1:A:514:ASN:N	2.51	0.41
1:A:537:GLU:HG3	1:A:544:LEU:HD21	1.95	0.41
1:A:503:LYS:HE3	1:A:503:LYS:HB2	1.82	0.41
1:A:719:SER:O	1:A:723:ILE:HG13	2.20	0.41
1:A:808:PRO:O	1:A:810:THR:HG23	2.21	0.41
2:B:340:MET:CE	2:B:341:GLU:N	2.83	0.41
2:B:369:PRO:C	2:B:370:TYR:HD1	2.22	0.41
1:A:360:CYS:HA	1:A:361:PRO:HD2	1.67	0.41
1:A:392:LEU:HD11	2:B:316:LEU:HD22	2.02	0.41
1:A:676:ASN:HB2	1:A:677:LEU:HD23	2.00	0.41
2:B:413:SER:O	2:B:416:GLN:HB2	2.19	0.41
1:A:513:ALA:C	1:A:514:ASN:OD1	2.59	0.41
1:A:594:ARG:HG2	1:A:640:VAL:HB	2.03	0.41
1:A:684:THR:HG22	1:A:685:THR:N	2.36	0.41
1:A:757:ALA:O	1:A:758:ARG:HB2	2.20	0.41
1:A:412:LEU:O	1:A:416:ILE:HG13	2.21	0.41
1:A:725:GLY:O	1:A:726:ARG:C	2.59	0.41
1:A:770:GLY:O	1:A:773:TYR:HB2	2.20	0.41
2:B:318:GLN:HG3	2:B:322:GLU:OE2	2.20	0.41
2:B:347:ARG:HG3	2:B:348:GLN:H	1.82	0.41
2:B:344:SER:O	2:B:347:ARG:CG	2.68	0.41
1:A:793:ILE:N	1:A:793:ILE:HD12	2.36	0.41
1:A:460:GLN:HE21	1:A:460:GLN:C	2.24	0.41
2:B:413:SER:HG	2:B:415:VAL:HG13	1.85	0.41
1:A:247:VAL:CG2	1:A:248:LEU:N	2.83	0.41
1:A:308:GLU:HG3	1:A:310:ARG:N	2.36	0.41
1:A:780:ILE:HB	1:A:796:LEU:HB3	2.02	0.41
1:A:804:ILE:HD13	1:A:804:ILE:HG21	1.90	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:832:ALA:HB1	1:A:834:TYR:CE2	2.56	0.41
1:A:282:ILE:HA	1:A:282:ILE:HD13	1.70	0.41
1:A:728:LEU:CA	1:A:731:LEU:CD1	2.98	0.41
2:B:379:CYS:SG	2:B:412:LYS:C	2.99	0.41
1:A:467:GLU:OE1	1:A:467:GLU:CA	2.69	0.40
1:A:543:PRO:HG3	1:A:710:GLU:HG2	2.02	0.40
1:A:564:HIS:CE1	4:A:901:M8A:HAI	2.56	0.40
1:A:754:ASP:O	1:A:758:ARG:NH1	2.54	0.40
2:B:331:ALA:O	2:B:335:LEU:HG	2.21	0.40
1:A:364:GLU:HA	1:A:681:VAL:HB	2.03	0.40
1:A:388:ALA:O	1:A:392:LEU:HD12	2.20	0.40
1:A:537:GLU:CG	1:A:544:LEU:CD2	2.73	0.40
1:A:654:MET:HE1	1:A:773:TYR:CZ	2.56	0.40
1:A:312:ARG:HH11	1:A:312:ARG:HD2	1.68	0.40
1:A:763:TYR:CD1	1:A:763:TYR:C	2.95	0.40
1:A:794:PRO:HD3	1:A:828:GLN:NE2	2.37	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	664/852 (78%)	639 (96%)	21 (3%)	4 (1%)	25 53
2	B	131/482 (27%)	128 (98%)	3 (2%)	0	100 100
All	All	795/1334 (60%)	767 (96%)	24 (3%)	4 (0%)	29 57

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	793	ILE
1	A	831	GLY

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Mol	Chain	Res	Type
1	A	369	ALA
1	A	225	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	566/699 (81%)	483 (85%)	83 (15%)	3 8
2	B	117/395 (30%)	87 (74%)	30 (26%)	0 1
All	All	683/1094 (62%)	570 (84%)	113 (16%)	2 5

All (113) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	187	ARG
1	A	191	GLN
1	A	200	ILE
1	A	205	GLN
1	A	206	THR
1	A	236	GLN
1	A	237	GLN
1	A	243	ASN
1	A	244	SER
1	A	246	THR
1	A	258	ARG
1	A	275	THR
1	A	289	SER
1	A	296	GLN
1	A	311	ASP
1	A	350	ASN
1	A	351	MET
1	A	362	LEU
1	A	364	GLU
1	A	374	LYS
1	A	404	LYS

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Mol	Chain	Res	Type
1	A	413	GLU
1	A	418	LEU
1	A	433	LYS
1	A	438	GLN
1	A	441	LEU
1	A	449	VAL
1	A	453	GLU
1	A	454	LYS
1	A	456	LYS
1	A	458	LEU
1	A	460	GLN
1	A	463	LYS
1	A	466	SER
1	A	467	GLU
1	A	472	ARG
1	A	479	LEU
1	A	485	ARG
1	A	487	LEU
1	A	499	GLU
1	A	508	LEU
1	A	511	LEU
1	A	517	SER
1	A	523	SER
1	A	524	ARG
1	A	526	ARG
1	A	538	PHE
1	A	543	PRO
1	A	544	LEU
1	A	545	SER
1	A	550	LYS
1	A	563	SER
1	A	568	ARG
1	A	571	TYR
1	A	588	THR
1	A	591	ARG
1	A	598	SER
1	A	607	THR
1	A	610	THR
1	A	612	GLN
1	A	624	THR
1	A	632	GLN
1	A	645	GLU

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Mol	Chain	Res	Type
1	A	667	ASP
1	A	668	ARG
1	A	677	LEU
1	A	680	HIS
1	A	683	SER
1	A	685	THR
1	A	696	ASN
1	A	697	LEU
1	A	704	LEU
1	A	727	CYS
1	A	731	LEU
1	A	750	ARG
1	A	755	PRO
1	A	758	ARG
1	A	776	MET
1	A	785	SER
1	A	801	GLU
1	A	815	LEU
1	A	833	MET
1	A	835	THR
2	B	308	ARG
2	B	312	LYS
2	B	314	MET
2	B	316	LEU
2	B	325	SER
2	B	327	ASN
2	B	337	GLN
2	B	339	ASP
2	B	340	MET
2	B	342	LEU
2	B	344	SER
2	B	347	ARG
2	B	351	ASN
2	B	353	LYS
2	B	354	GLN
2	B	360	LYS
2	B	364	ASP
2	B	370	TYR
2	B	375	VAL
2	B	376	ILE
2	B	378	LYS
2	B	382	ARG

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Mol	Chain	Res	Type
2	B	384	THR
2	B	402	PHE
2	B	418	LYS
2	B	421	PHE
2	B	425	ARG
2	B	426	ARG
2	B	430	ILE
2	B	438	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (20) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	205	GLN
1	A	237	GLN
1	A	395	GLN
1	A	410	GLN
1	A	422	HIS
1	A	427	GLN
1	A	438	GLN
1	A	460	GLN
1	A	484	HIS
1	A	551	HIS
1	A	564	HIS
1	A	680	HIS
1	A	696	ASN
1	A	742	GLN
1	A	828	GLN
2	B	327	ASN
2	B	348	GLN
2	B	350	GLN
2	B	351	ASN
2	B	419	ASN

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 (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

2 ligands are 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	$\#\|Z\| > 2$
3	FAD	A	900	4	53,58,58	1.83	8 (15%)	68,89,89	2.12	17 (25%)
4	M8A	A	901	3	30,30,30	2.36	7 (23%)	39,39,39	2.76	11 (28%)

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	FAD	A	900	4	-	9/30/50/50	0/6/6/6
4	M8A	A	901	3	-	6/20/31/31	0/3/3/3

All (15) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	900	FAD	C4X-N5	8.19	1.46	1.30
4	A	901	M8A	CA-C	-6.54	1.37	1.52
4	A	901	M8A	OAA-CAD	6.39	1.56	1.19
4	A	901	M8A	CAP-CAX	-5.53	1.35	1.51
3	A	900	FAD	C5X-N5	-4.38	1.31	1.39
4	A	901	M8A	CAZ-NAT	-3.62	1.34	1.41
3	A	900	FAD	C9A-C5X	3.46	1.47	1.41
3	A	900	FAD	C4-N3	-3.12	1.33	1.38
3	A	900	FAD	C5'-C4'	3.02	1.56	1.51
3	A	900	FAD	C2-N3	-2.38	1.33	1.39

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	901	M8A	CAS-CAY	-2.31	1.45	1.50
3	A	900	FAD	C8-C7	2.31	1.46	1.40
4	A	901	M8A	CD-N	-2.29	1.43	1.47
4	A	901	M8A	CAG-CAI	2.22	1.43	1.38
3	A	900	FAD	C2B-C1B	-2.08	1.50	1.53

All (28) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	A	901	M8A	OAU-CAW-N	10.74	122.85	111.05
3	A	900	FAD	C10-C4X-N5	-7.61	108.71	124.86
3	A	900	FAD	C4-C4X-C10	-6.74	105.47	116.79
4	A	901	M8A	OAU-CAW-OAC	-5.61	115.23	124.78
4	A	901	M8A	CA-N-CAW	5.05	134.60	122.72
4	A	901	M8A	CG-CD-N	4.69	111.47	103.25
4	A	901	M8A	CD-N-CA	-4.57	104.76	112.00
3	A	900	FAD	C9A-C5X-N5	-4.37	117.68	122.43
4	A	901	M8A	CAZ-NAT-C	-3.97	117.89	127.40
3	A	900	FAD	C9A-N10-C10	-3.80	114.85	120.77
3	A	900	FAD	P-O3P-PA	-3.27	121.62	132.83
4	A	901	M8A	OAC-CAW-N	-3.10	120.67	124.26
3	A	900	FAD	O4-C4-N3	-3.01	114.35	120.12
3	A	900	FAD	C5'-C4'-C3'	-2.89	106.63	112.20
4	A	901	M8A	CB-CA-N	2.72	107.06	103.03
3	A	900	FAD	C5X-N5-C4X	-2.69	113.60	118.07
3	A	900	FAD	C5X-C9A-N10	2.67	120.72	117.95
3	A	900	FAD	C4-C4X-N5	-2.66	114.44	118.23
3	A	900	FAD	O5'-P-O1P	2.66	119.46	109.07
4	A	901	M8A	OAU-CAS-CAY	-2.57	103.23	109.39
4	A	901	M8A	CAS-OAU-CAW	2.51	122.18	115.53
3	A	900	FAD	O2'-C2'-C1'	-2.48	103.79	109.80
3	A	900	FAD	O4B-C1B-C2B	-2.45	103.35	106.93
3	A	900	FAD	C4X-C4-N3	2.38	119.23	113.19
3	A	900	FAD	C6-C5X-C9A	2.27	122.15	118.94
3	A	900	FAD	C1'-N10-C9A	2.16	124.11	120.51
4	A	901	M8A	CAL-CAZ-CAM	-2.15	116.09	119.03
3	A	900	FAD	O5'-C5'-C4'	2.10	114.98	109.36

There are no chirality outliers.

All (15) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	900	FAD	O4'-C4'-C5'-O5'
3	A	900	FAD	C5'-O5'-P-O1P
4	A	901	M8A	N-CAW-OAU-CAS
4	A	901	M8A	OAC-CAW-OAU-CAS
3	A	900	FAD	PA-O3P-P-O5'
3	A	900	FAD	C5'-O5'-P-O3P
3	A	900	FAD	P-O3P-PA-O1A
3	A	900	FAD	P-O3P-PA-O2A
3	A	900	FAD	C5'-O5'-P-O2P
4	A	901	M8A	CAL-CAZ-NAT-C
4	A	901	M8A	CAD-CAN-CAP-CAX
4	A	901	M8A	CAM-CAZ-NAT-C
4	A	901	M8A	NAT-C-CA-CB
3	A	900	FAD	O4B-C4B-C5B-O5B
3	A	900	FAD	O2'-C2'-C3'-O3'

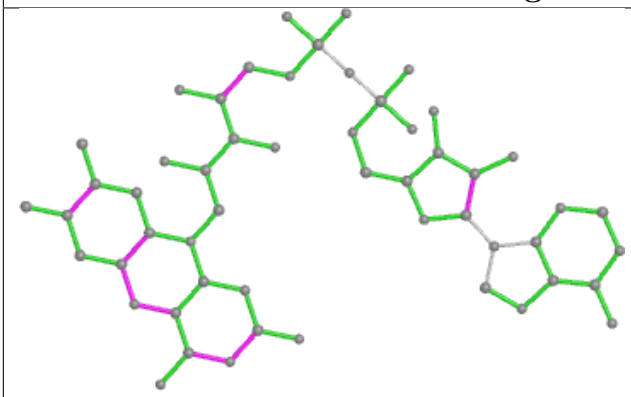
There are no ring outliers.

2 monomers are involved in 25 short contacts:

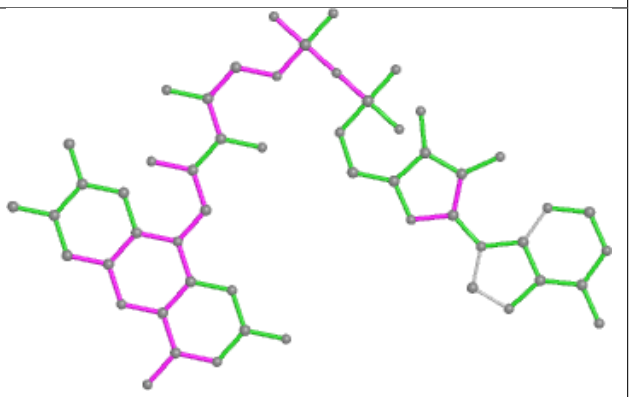
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	900	FAD	18	0
4	A	901	M8A	17	0

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.

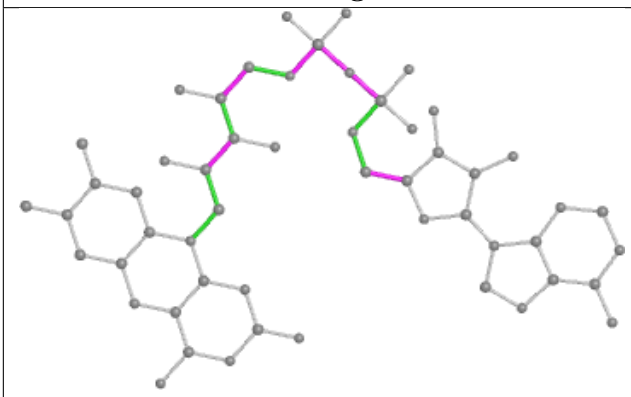
Ligand FAD A 900



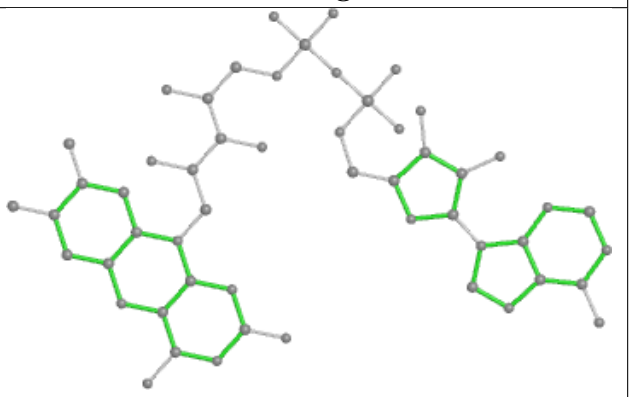
Bond lengths



Bond angles

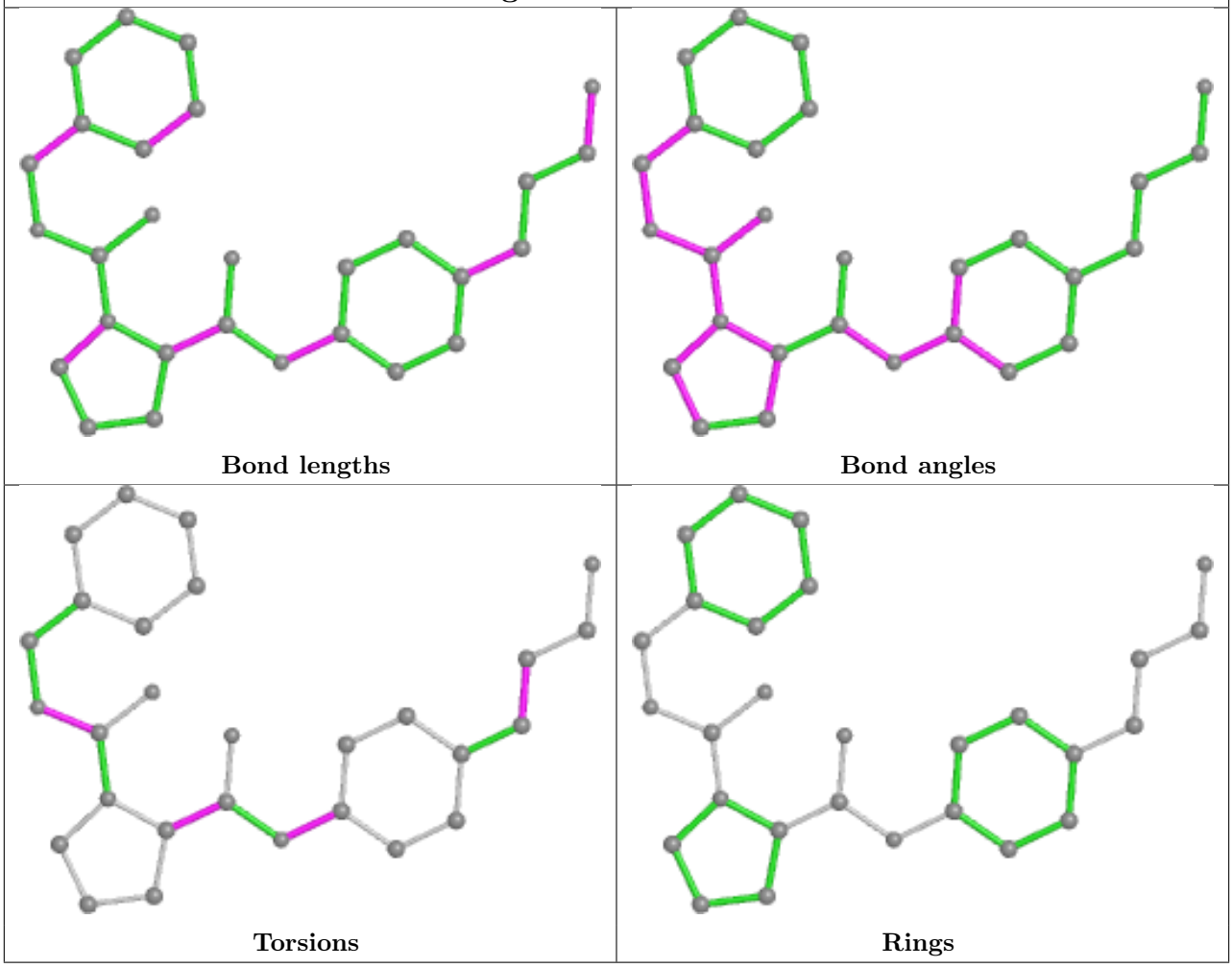


Torsions



Rings

Ligand M8A 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	666/852 (78%)	0.24	4 (0%)	89	89	39, 70, 112, 145	0
2	B	133/482 (27%)	0.26	3 (2%)	60	57	66, 103, 133, 156	0
All	All	799/1334 (59%)	0.24	7 (0%)	84	84	39, 76, 120, 156	0

All (7) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	308	ARG	2.5
2	B	378	LYS	2.4
1	A	395	GLN	2.4
1	A	398	PHE	2.4
1	A	401	LEU	2.3
2	B	309	LYS	2.2
1	A	403	ASN	2.0

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

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

6.3 Carbohydrates

There are no monosaccharides in this entry.

6.4 Ligands

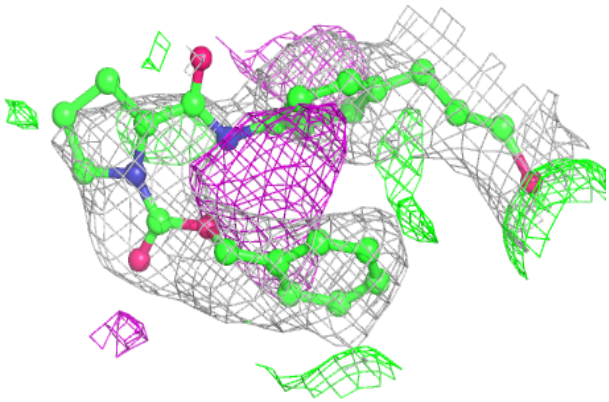
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9'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

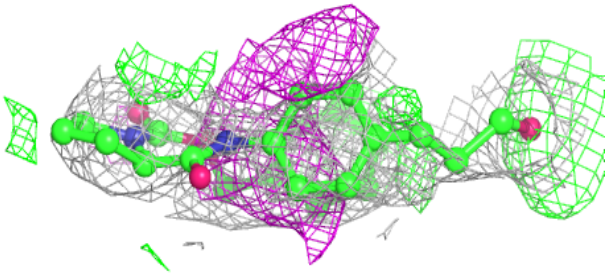
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
4	M8A	A	901	28/28	0.83	0.45	47,117,177,196	0
3	FAD	A	900	53/53	0.98	0.22	38,54,73,82	0

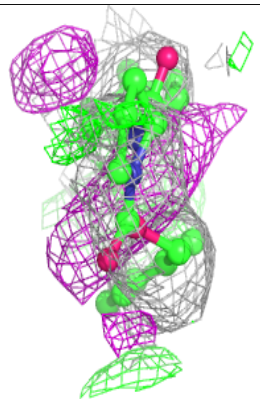
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around M8A 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)

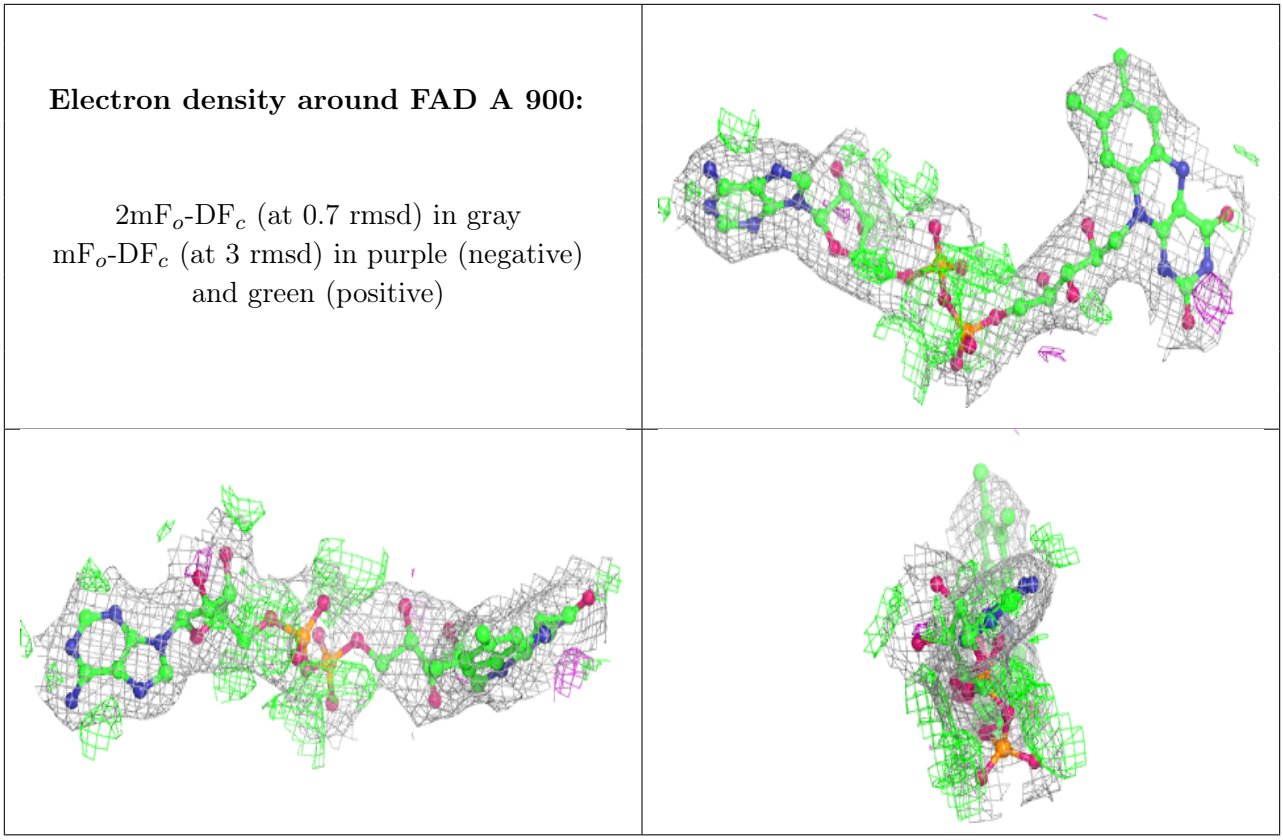






Electron density around FAD A 900:

$2mF_o$-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 (i)

There are no such residues in this entry.