Full wwPDB X-ray Structure Validation Report ⓘ

Jan 27, 2025 – 10:53 AM EST

PDB ID	:	9EL8
Title	:	LSD1-CoREST in complex with T105 1S2R enantiomer
Authors	:	Caroli, J.; Mattevi, A.
Deposited on	:	2024-12-04
Resolution	:	2.91 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:

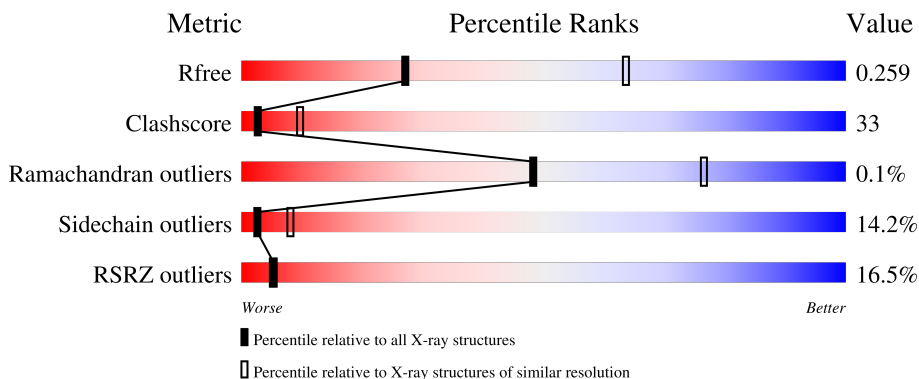|		
MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.21
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.004 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.40

1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.91 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	Percentile Ranks	Value
Rfree		0.259
Clashscore		33
Ramachandran outliers		0.1%
Sidechain outliers		14.2%
RSRZ outliers		16.5%

Worse   *Better*

▮ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	2797 (2.94-2.90)
Clashscore	180529	3049 (2.94-2.90)
Ramachandran outliers	177936	2981 (2.94-2.90)
Sidechain outliers	177891	2983 (2.94-2.90)
RSRZ outliers	164620	2799 (2.94-2.90)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments 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	10% 46% 25% 5% 24%
2	B	144	33% 43% 35% 15% 8%

2 Entry composition ⓘ

There are 4 unique types of molecules in this entry. The entry contains 6381 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	665	Total 5210	C 3319	N 905	O 966	S 20	0	0	0

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 1076	C 676	N 194	O 203	S 3	0	0	0

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 [(2R,3S,4R,5R)-5-(6-amino-9H-purin-9-yl)-3,4-dihydroxyoxolan-2-yl]methyl (2 S,3R,4S)-2,3,4-trihydroxy-5-[(1R,3R,3aS,13R)-1-hydroxy-10,11-dimethyl-3-{3-[(5-methyl-1, 3,4-thiadiazol-2-yl)carbamoyl]phenyl}-4,6-dioxo-2,3,5,6-tetrahydro-1H-benzo[g]pyrrolo[2,1-e]pteridin-8(4H)-yl]pentyl dihydrogen diphosphate (non-preferred name) (three-letter code: XHT) (formula: $C_{40}H_{46}N_{12}O_{17}P_2S$) (labeled as "Ligand of Interest" by depositor).

XHT
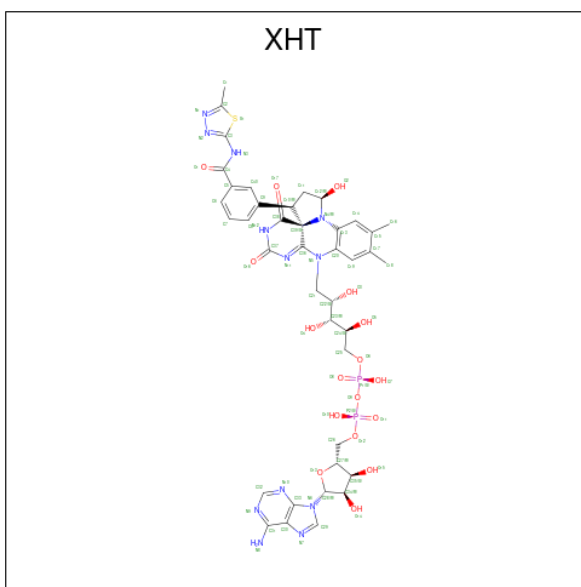
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
			Total	C	N	O	P	S		
3	A	1	72	40	12	17	2	1	0	0

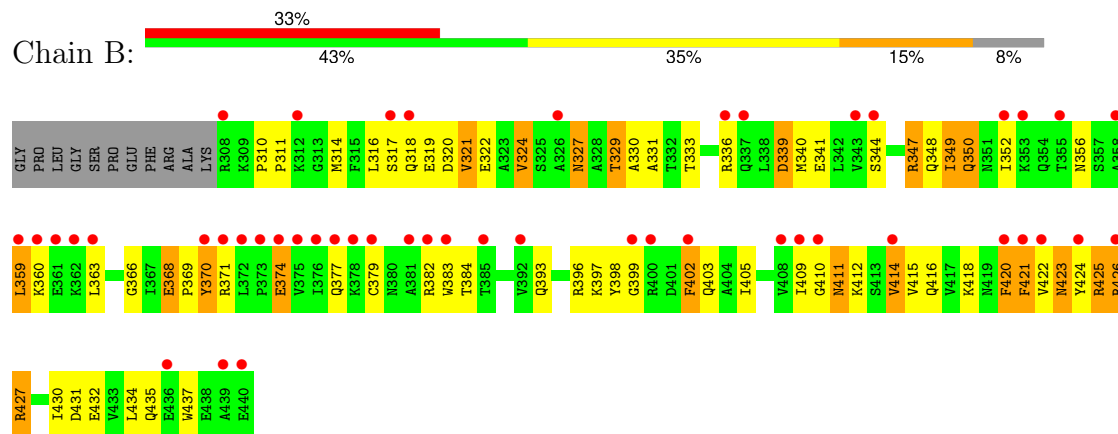- Molecule 4 is 3-[(1R,2S)-2-(cyclobutylamino)cyclopropyl]-N-(5-methyl-1,3,4-thiadiazol -2-yl)benzamide (three-letter code: XHX) (formula: $C_{17}H_{20}N_4OS$) (labeled as "Ligand of Interest" by depositor).

XHX
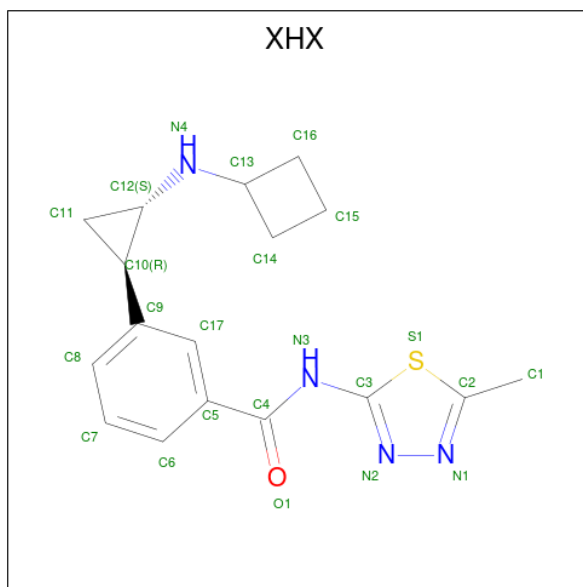
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	S		
4	A	1	23	17	4	1	1	0	0

3 Residue-property plots ⓘ

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

GLN
SER
PRO
SER
MET

• Molecule 2: REST corepressor 1

Chain B:

33%

43%   35%   15%   8%

4 Data and refinement statistics (i)

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants a, b, c, α, β, γ	121.48Å　　178.28Å　　234.61Å 90.00°　　　90.00°　　　90.00°	Depositor
Resolution (Å)	45.68　–　2.91 45.68　–　2.91	Depositor EDS
% Data completeness (in resolution range)	98.2 (45.68-2.91) 98.9 (45.68-2.91)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.34 (at 2.91Å)	Xtriage
Refinement program	PHENIX (1.18.2_3874: ???)	Depositor
R, R_{free}	0.214　,　0.244 0.257　,　0.259	Depositor DCC
R_{free} test set	54154 reflections (3.58%)	wwPDB-VP
Wilson B-factor (Å^2)	84.0	Xtriage
Anisotropy	0.498	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 71.6	EDS
L-test for twinning[2]	$< |L| > = 0.51, < L^2 > = 0.35$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	6381	wwPDB-VP
Average B, all atoms (Å^2)	97.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.02% of the height of the origin peak. No significant pseudotranslation is detected.*

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[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: XHX, XHT

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	0.76	1/5323 (0.0%)	0.81	2/7221 (0.0%)
2	B	0.63	0/1091	0.82	0/1471
All	All	0.74	1/6414 (0.0%)	0.81	2/8692 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	821	GLU	CD-OE1	-6.30	1.18	1.25

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	510	GLU	CB-CA-C	-6.66	97.09	110.40
1	A	401	LEU	CB-CG-CD2	5.08	119.63	111.00

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	5210	0	5244	316	0
2	B	1076	0	1091	151	0
3	A	72	0	0	3	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	A	23	0	0	1	0
All	All	6381	0	6335	416	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 33.

All (416) 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)
2:B:402:PHE:HB3	2:B:418:LYS:CE	1.53	1.36
2:B:317:SER:HB3	2:B:320:ASP:OD1	1.14	1.30
1:A:435:VAL:CG1	2:B:349:ILE:CD1	2.10	1.28
2:B:424:TYR:CE2	2:B:427:ARG:NH1	2.02	1.28
1:A:720:ASP:O	1:A:724:VAL:HG23	1.28	1.25
1:A:435:VAL:HG12	2:B:349:ILE:CD1	1.67	1.20
1:A:437:THR:HG22	1:A:508:LEU:HD21	1.23	1.20
2:B:317:SER:CB	2:B:320:ASP:OD1	1.92	1.18
1:A:666:PHE:O	1:A:701:PRO:HG2	1.45	1.17
2:B:402:PHE:CB	2:B:418:LYS:HE3	1.77	1.14
1:A:720:ASP:O	1:A:724:VAL:CG2	1.96	1.13
2:B:424:TYR:O	2:B:430:ILE:HD11	1.48	1.12
1:A:435:VAL:CG1	2:B:349:ILE:HD11	1.75	1.12
1:A:437:THR:CG2	1:A:508:LEU:HD21	1.79	1.11
1:A:231:PHE:HE1	1:A:249:VAL:HG12	0.95	1.09
1:A:231:PHE:CE1	1:A:249:VAL:HG12	1.86	1.09
1:A:435:VAL:HG13	2:B:349:ILE:HD11	1.17	1.09
1:A:442:LYS:HB2	2:B:356:ASN:OD1	1.50	1.08
1:A:437:THR:CG2	1:A:508:LEU:CD2	2.32	1.08
1:A:435:VAL:HG13	2:B:349:ILE:CD1	1.81	1.06
1:A:719:SER:HB3	1:A:722:VAL:HG23	1.37	1.05
2:B:424:TYR:CD2	2:B:427:ARG:NH1	2.21	1.05
1:A:456:LYS:HA	2:B:370:TYR:CE2	1.91	1.04
1:A:732:LYS:HG3	1:A:740:VAL:HG11	1.39	1.03
1:A:732:LYS:CG	1:A:740:VAL:HG11	1.87	1.02
1:A:793:ILE:HD12	1:A:793:ILE:H	1.27	0.99
1:A:654:MET:HE2	1:A:776:MET:HG2	1.43	0.99
1:A:437:THR:HG22	1:A:508:LEU:CD2	1.95	0.96
2:B:318:GLN:NE2	2:B:322:GLU:OE2	1.98	0.96
1:A:437:THR:HG21	1:A:508:LEU:HD23	1.47	0.96
2:B:424:TYR:HE2	2:B:427:ARG:HH12	1.00	0.96
1:A:231:PHE:HE1	1:A:249:VAL:CG1	1.79	0.96

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:402:PHE:CB	2:B:418:LYS:CE	2.41	0.95
1:A:346:SER:HA	1:A:351:MET:HE2	1.48	0.94
1:A:393:SER:HB2	1:A:549:LEU:HD22	1.50	0.94
1:A:435:VAL:CG1	2:B:349:ILE:HD13	1.97	0.94
1:A:346:SER:HB3	1:A:351:MET:HE3	1.51	0.92
1:A:435:VAL:HG12	2:B:349:ILE:HD12	1.50	0.91
2:B:402:PHE:HB3	2:B:418:LYS:HE3	0.91	0.91
1:A:666:PHE:O	1:A:701:PRO:CG	2.19	0.91
1:A:456:LYS:HA	2:B:370:TYR:CD2	2.07	0.90
1:A:379:GLU:HG2	1:A:532:HIS:CE1	2.08	0.89
1:A:379:GLU:CG	1:A:532:HIS:CE1	2.56	0.89
1:A:245:ASP:OD1	1:A:247:VAL:HG23	1.72	0.89
1:A:286:SER:OG	1:A:313:VAL:HG12	1.70	0.88
1:A:308:GLU:HB3	1:A:586:LEU:HA	1.53	0.88
2:B:311:PRO:HG2	2:B:314:MET:HG3	1.56	0.86
1:A:666:PHE:CE1	1:A:743:PRO:HA	2.09	0.86
1:A:456:LYS:HA	2:B:370:TYR:HE2	1.41	0.85
1:A:456:LYS:CG	2:B:370:TYR:HE2	1.90	0.85
1:A:346:SER:HA	1:A:351:MET:CE	2.05	0.85
1:A:198:ASP:OD1	1:A:198:ASP:N	2.08	0.84
1:A:346:SER:HB3	1:A:351:MET:CE	2.07	0.84
1:A:379:GLU:CG	1:A:532:HIS:HE1	1.91	0.84
1:A:437:THR:HG21	1:A:508:LEU:CD2	2.01	0.82
1:A:654:MET:HE2	1:A:776:MET:CG	2.09	0.82
2:B:402:PHE:HB3	2:B:418:LYS:NZ	1.95	0.82
2:B:424:TYR:HE2	2:B:427:ARG:NH1	1.52	0.80
2:B:322:GLU:OE1	2:B:322:GLU:N	2.14	0.80
1:A:666:PHE:CE1	1:A:743:PRO:CA	2.65	0.80
2:B:350:GLN:HA	2:B:350:GLN:NE2	1.96	0.80
2:B:424:TYR:O	2:B:430:ILE:CD1	2.30	0.79
1:A:442:LYS:CB	2:B:356:ASN:OD1	2.30	0.79
2:B:348:GLN:HE21	2:B:348:GLN:HA	1.47	0.79
1:A:312:ARG:HH11	1:A:312:ARG:HG3	1.46	0.78
1:A:421:LYS:NZ	2:B:320:ASP:OD2	2.16	0.78
1:A:732:LYS:HG2	1:A:740:VAL:HG11	1.65	0.78
1:A:724:VAL:O	1:A:727:CYS:HB2	1.84	0.78
1:A:379:GLU:HG3	1:A:532:HIS:CE1	2.19	0.78
1:A:319:THR:HB	1:A:572:SER:HB3	1.66	0.77
1:A:451:LEU:HD23	1:A:494:TYR:HB2	1.67	0.77
1:A:666:PHE:HE1	1:A:743:PRO:CA	1.98	0.77
1:A:666:PHE:CD1	1:A:743:PRO:HA	2.20	0.77

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:654:MET:CE	1:A:776:MET:CG	2.63	0.76
2:B:382:ARG:O	2:B:412:LYS:NZ	2.19	0.75
2:B:359:LEU:HD23	2:B:359:LEU:N	2.01	0.75
2:B:425:ARG:HA	2:B:430:ILE:HD12	1.69	0.75
1:A:346:SER:CB	1:A:351:MET:HE3	2.16	0.74
2:B:416:GLN:OE1	2:B:416:GLN:N	2.15	0.74
1:A:509:GLN:HA	1:A:509:GLN:NE2	2.02	0.74
2:B:383:TRP:CZ3	2:B:420:PHE:CD1	2.76	0.74
2:B:424:TYR:HA	2:B:427:ARG:HD3	1.69	0.73
1:A:198:ASP:CG	1:A:251:ARG:HH22	1.91	0.73
1:A:504:LEU:N	1:A:504:LEU:HD23	2.02	0.73
1:A:319:THR:CB	1:A:572:SER:HB3	2.17	0.73
2:B:383:TRP:CH2	2:B:420:PHE:CD1	2.75	0.73
1:A:456:LYS:CG	2:B:370:TYR:CE2	2.72	0.73
2:B:424:TYR:HD2	2:B:427:ARG:HH11	1.36	0.73
2:B:377:GLN:NE2	2:B:410:GLY:O	2.20	0.72
1:A:311:ASP:OD1	1:A:311:ASP:N	2.21	0.72
1:A:346:SER:CA	1:A:351:MET:CE	2.67	0.72
2:B:318:GLN:O	2:B:321:VAL:HG23	1.90	0.72
1:A:754:ASP:OD1	1:A:755:PRO:HD2	1.89	0.71
1:A:793:ILE:HD12	1:A:793:ILE:N	2.03	0.71
1:A:346:SER:CB	1:A:351:MET:CE	2.69	0.71
1:A:312:ARG:HG3	1:A:312:ARG:NH1	2.04	0.71
2:B:421:PHE:HD1	2:B:421:PHE:H	1.39	0.71
1:A:456:LYS:CA	2:B:370:TYR:HE2	2.02	0.71
1:A:526:ARG:HH11	1:A:526:ARG:CG	2.05	0.70
1:A:691:LEU:CD2	1:A:727:CYS:SG	2.79	0.70
1:A:286:SER:HB3	1:A:308:GLU:OE2	1.92	0.70
1:A:209:VAL:HG12	1:A:213:ILE:HD11	1.73	0.70
1:A:439:GLU:CG	2:B:352:ILE:CD1	2.70	0.69
1:A:458:LEU:HB3	1:A:487:LEU:HD12	1.74	0.69
2:B:426:ARG:HH21	2:B:427:ARG:HD2	1.57	0.69
1:A:456:LYS:HG3	2:B:370:TYR:CE2	2.27	0.69
1:A:569:ASN:OD1	1:A:569:ASN:N	2.18	0.69
1:A:583:ASP:OD2	1:A:585:LYS:NZ	2.26	0.69
1:A:437:THR:CG2	1:A:508:LEU:HD23	2.10	0.69
1:A:271:LYS:HG3	1:A:271:LYS:O	1.92	0.69
1:A:418:LEU:HD13	2:B:324:VAL:HG11	1.74	0.68
1:A:793:ILE:HG22	1:A:794:PRO:CD	2.24	0.68
1:A:793:ILE:HG22	1:A:794:PRO:HD2	1.76	0.68
2:B:348:GLN:HA	2:B:348:GLN:NE2	2.08	0.68

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:574:VAL:HB	1:A:575:PRO:HD3	1.75	0.68
1:A:439:GLU:HG2	2:B:352:ILE:CD1	2.23	0.67
1:A:438:GLN:HG2	1:A:508:LEU:HD11	1.77	0.67
2:B:319:GLU:HG2	2:B:319:GLU:O	1.93	0.67
2:B:383:TRP:CZ3	2:B:420:PHE:CE1	2.82	0.67
2:B:402:PHE:HB2	2:B:414:VAL:CG1	2.25	0.66
2:B:377:GLN:CG	2:B:410:GLY:O	2.42	0.66
1:A:521:LEU:HD22	1:A:525:ASP:HB3	1.78	0.66
3:A:901:XHT:O17	3:A:901:XHT:O2	2.13	0.66
1:A:821:GLU:HA	1:A:821:GLU:OE1	1.95	0.65
1:A:719:SER:HB3	1:A:722:VAL:CG2	2.22	0.65
1:A:352:GLU:HB3	1:A:568:ARG:HB2	1.79	0.65
2:B:424:TYR:HD2	2:B:427:ARG:NH1	1.90	0.65
1:A:442:LYS:N	2:B:356:ASN:HD21	1.95	0.65
2:B:425:ARG:HG3	2:B:425:ARG:HH11	1.62	0.65
1:A:456:LYS:CA	2:B:370:TYR:CE2	2.73	0.64
2:B:424:TYR:HA	2:B:427:ARG:CD	2.26	0.64
1:A:456:LYS:CB	2:B:370:TYR:HE2	2.10	0.64
2:B:382:ARG:O	2:B:412:LYS:CE	2.46	0.64
1:A:732:LYS:HG2	1:A:740:VAL:CG1	2.27	0.64
1:A:691:LEU:HD23	1:A:727:CYS:SG	2.37	0.64
2:B:424:TYR:HA	2:B:427:ARG:CG	2.28	0.63
1:A:393:SER:HB2	1:A:549:LEU:CD2	2.26	0.63
1:A:435:VAL:HG12	2:B:349:ILE:HD13	1.67	0.63
1:A:720:ASP:O	1:A:724:VAL:HG22	1.96	0.63
2:B:336:ARG:HA	2:B:339:ASP:HB2	1.80	0.63
2:B:397:LYS:O	2:B:397:LYS:HG3	1.96	0.63
1:A:448:MET:CE	2:B:363:LEU:HD13	2.29	0.63
1:A:453:GLU:OE1	1:A:453:GLU:HA	1.98	0.63
1:A:718:ILE:HG22	1:A:723:ILE:HG13	1.81	0.63
1:A:198:ASP:OD2	1:A:251:ARG:NH2	2.32	0.62
1:A:424:LYS:HE3	2:B:339:ASP:OD1	1.99	0.62
1:A:235:LEU:O	1:A:235:LEU:HD12	2.00	0.62
1:A:510:GLU:OE1	1:A:510:GLU:HA	2.00	0.62
1:A:526:ARG:HH11	1:A:526:ARG:HG2	1.65	0.62
1:A:530:ASP:OD2	1:A:685:THR:HA	2.00	0.62
1:A:594:ARG:HG2	1:A:640:VAL:HB	1.82	0.61
1:A:654:MET:CE	1:A:776:MET:HG2	2.20	0.61
1:A:720:ASP:C	1:A:724:VAL:HG23	2.15	0.61
2:B:425:ARG:HH11	2:B:425:ARG:CG	2.12	0.61
1:A:379:GLU:HG2	1:A:532:HIS:HE1	1.54	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:199:ILE:N	1:A:199:ILE:HD13	2.16	0.61
1:A:258:ARG:NH1	1:A:258:ARG:HG2	2.15	0.60
1:A:295:ARG:HD3	1:A:578:LEU:O	2.01	0.60
1:A:399:ASN:O	1:A:406:VAL:HG23	2.01	0.60
1:A:286:SER:OG	1:A:286:SER:O	2.14	0.60
1:A:740:VAL:O	1:A:740:VAL:HG13	2.01	0.60
1:A:793:ILE:H	1:A:793:ILE:CD1	2.04	0.60
1:A:645:GLU:OE1	1:A:649:SER:OG	2.16	0.60
1:A:456:LYS:HG3	2:B:370:TYR:OH	2.01	0.60
1:A:744:LYS:HG3	1:A:745:GLU:HG2	1.84	0.60
1:A:468:VAL:HG12	1:A:468:VAL:O	2.02	0.60
2:B:431:ASP:O	2:B:435:GLN:HG3	2.01	0.60
1:A:382:PHE:CZ	1:A:386:LEU:HD11	2.36	0.59
1:A:574:VAL:HB	1:A:575:PRO:CD	2.32	0.59
1:A:804:ILE:HG23	1:A:804:ILE:O	2.02	0.59
1:A:732:LYS:CG	1:A:740:VAL:CG1	2.75	0.59
2:B:348:GLN:HE21	2:B:348:GLN:CA	2.09	0.59
1:A:669:VAL:HG12	1:A:669:VAL:O	2.03	0.59
1:A:509:GLN:HA	1:A:509:GLN:HE21	1.68	0.59
1:A:316:ARG:NH1	1:A:801:GLU:OE2	2.35	0.59
1:A:385:LEU:O	1:A:388:ALA:HB3	2.03	0.59
2:B:396:ARG:O	2:B:396:ARG:NH1	2.33	0.59
1:A:319:THR:OG1	1:A:572:SER:HB3	2.02	0.59
2:B:424:TYR:HA	2:B:427:ARG:HG3	1.84	0.59
1:A:439:GLU:HG3	2:B:352:ILE:CD1	2.33	0.59
1:A:452:LYS:HE3	2:B:366:GLY:O	2.03	0.59
1:A:691:LEU:N	1:A:691:LEU:HD12	2.18	0.59
1:A:399:ASN:C	1:A:406:VAL:HG23	2.23	0.58
2:B:399:GLY:HA3	2:B:437:TRP:CD2	2.38	0.58
1:A:256:LEU:HB3	1:A:262:ILE:HG12	1.85	0.58
1:A:418:LEU:CD1	2:B:324:VAL:HG11	2.33	0.58
1:A:452:LYS:CE	2:B:366:GLY:O	2.52	0.58
1:A:654:MET:HE1	1:A:776:MET:CG	2.34	0.58
1:A:744:LYS:HD2	1:A:744:LYS:O	2.04	0.57
2:B:402:PHE:HB3	2:B:418:LYS:HZ1	1.69	0.57
1:A:335:THR:O	1:A:335:THR:OG1	2.16	0.57
2:B:370:TYR:N	2:B:370:TYR:CD1	2.71	0.57
1:A:742:GLN:OE1	1:A:742:GLN:HA	2.03	0.57
1:A:457:GLU:O	1:A:461:GLN:HG3	2.04	0.57
1:A:371:PRO:HG2	1:A:374:LYS:CG	2.35	0.57
1:A:444:LEU:HD23	1:A:444:LEU:C	2.26	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:789:ALA:HB1	1:A:790:PRO:HD2	1.86	0.56
2:B:402:PHE:HB2	2:B:414:VAL:HG13	1.86	0.56
2:B:350:GLN:HA	2:B:350:GLN:HE21	1.71	0.56
1:A:370:VAL:HG21	1:A:528:ILE:CD1	2.36	0.55
1:A:592:GLN:NE2	1:A:638:GLN:HE21	2.03	0.55
2:B:370:TYR:N	2:B:370:TYR:HD1	2.03	0.55
1:A:235:LEU:HD11	1:A:243:ASN:HB2	1.89	0.55
1:A:238:LEU:HD22	1:A:243:ASN:HB3	1.87	0.55
1:A:331:ALA:HA	3:A:901:XHT:N4	2.21	0.55
1:A:424:LYS:CE	2:B:339:ASP:OD1	2.54	0.55
2:B:383:TRP:HA	2:B:412:LYS:HE2	1.89	0.55
1:A:603:ILE:HG13	1:A:615:ILE:HD13	1.88	0.55
1:A:666:PHE:CE1	1:A:743:PRO:HB3	2.42	0.55
1:A:258:ARG:HG2	1:A:258:ARG:HH11	1.71	0.55
2:B:383:TRP:CE3	2:B:420:PHE:CE1	2.95	0.54
2:B:377:GLN:CD	2:B:410:GLY:O	2.45	0.54
1:A:444:LEU:HD23	1:A:445:LEU:HD23	1.89	0.54
1:A:356:ILE:HG21	3:A:901:XHT:C1	2.38	0.54
1:A:363:TYR:CE1	1:A:734:ILE:HG23	2.43	0.54
2:B:318:GLN:O	2:B:322:GLU:OE1	2.26	0.54
1:A:442:LYS:HA	2:B:356:ASN:OD1	2.07	0.54
1:A:791:GLN:OE1	1:A:792:PRO:HD2	2.07	0.54
1:A:258:ARG:HH11	1:A:258:ARG:CG	2.20	0.54
1:A:793:ILE:HG23	1:A:828:GLN:NE2	2.23	0.54
1:A:199:ILE:N	1:A:199:ILE:CD1	2.72	0.53
1:A:601:GLU:HA	1:A:616:TYR:O	2.08	0.53
2:B:374:GLU:OE2	2:B:374:GLU:HA	2.04	0.53
1:A:444:LEU:HD13	1:A:500:THR:HG22	1.91	0.53
1:A:188:MET:CE	1:A:200:ILE:HB	2.38	0.53
2:B:383:TRP:CZ2	2:B:420:PHE:HD1	2.26	0.53
1:A:294:ALA:HB1	1:A:582:LEU:HD13	1.91	0.53
1:A:474:ILE:N	1:A:474:ILE:CD1	2.71	0.53
2:B:347:ARG:NH1	2:B:347:ARG:HG3	2.23	0.53
1:A:412:LEU:HD13	1:A:533:PHE:CE1	2.43	0.53
1:A:671:TRP:O	1:A:673:PRO:HD3	2.09	0.53
1:A:511:LEU:N	1:A:511:LEU:CD2	2.71	0.53
1:A:439:GLU:HG2	2:B:352:ILE:HD13	1.90	0.52
1:A:602:VAL:HG22	1:A:616:TYR:HB2	1.90	0.52
1:A:625:LEU:HD22	1:A:629:VAL:HG11	1.91	0.52
2:B:347:ARG:HH11	2:B:347:ARG:CG	2.23	0.52
1:A:255:TYR:CD2	1:A:256:LEU:HD13	2.45	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:456:LYS:HG3	2:B:370:TYR:CZ	2.45	0.52
1:A:474:ILE:N	1:A:474:ILE:HD12	2.25	0.52
1:A:511:LEU:N	1:A:511:LEU:HD23	2.24	0.52
1:A:653:ARG:HG3	1:A:653:ARG:HH11	1.75	0.52
2:B:421:PHE:CD1	2:B:421:PHE:N	2.78	0.52
1:A:439:GLU:HG2	2:B:352:ILE:HD11	1.91	0.52
1:A:284:ILE:HG12	1:A:590:VAL:HG21	1.91	0.52
1:A:442:LYS:CA	2:B:356:ASN:OD1	2.58	0.52
1:A:509:GLN:NE2	1:A:509:GLN:CA	2.73	0.51
2:B:359:LEU:N	2:B:359:LEU:CD2	2.72	0.51
1:A:653:ARG:HG3	1:A:653:ARG:NH1	2.24	0.51
1:A:467:GLU:OE2	1:A:467:GLU:HA	2.11	0.51
1:A:654:MET:CE	1:A:776:MET:SD	2.99	0.51
1:A:461:GLN:OE1	1:A:483:LYS:HE3	2.10	0.51
1:A:209:VAL:O	1:A:213:ILE:HG13	2.11	0.51
1:A:378:VAL:HG11	1:A:528:ILE:HG21	1.93	0.51
2:B:402:PHE:CB	2:B:418:LYS:NZ	2.69	0.51
1:A:392:LEU:HD23	1:A:398:PHE:CD2	2.45	0.51
1:A:661:LYS:HD3	1:A:704:LEU:HD21	1.93	0.51
1:A:687:SER:O	1:A:687:SER:OG	2.25	0.51
2:B:383:TRP:CH2	2:B:420:PHE:HD1	2.26	0.51
2:B:425:ARG:CG	2:B:425:ARG:NH1	2.72	0.51
1:A:245:ASP:OD1	1:A:247:VAL:CG2	2.54	0.51
1:A:449:VAL:HG23	2:B:363:LEU:HG	1.92	0.51
1:A:680:HIS:C	1:A:680:HIS:CD2	2.84	0.51
2:B:317:SER:HB2	2:B:320:ASP:OD1	2.00	0.51
2:B:369:PRO:HB2	2:B:370:TYR:CD1	2.46	0.51
1:A:574:VAL:CB	1:A:575:PRO:CD	2.89	0.50
1:A:205:GLN:O	1:A:209:VAL:HG23	2.11	0.50
1:A:321:ARG:NH2	1:A:569:ASN:O	2.44	0.50
1:A:214:ARG:NH1	1:A:215:ASN:OD1	2.44	0.50
1:A:574:VAL:CB	1:A:575:PRO:HD3	2.41	0.50
1:A:654:MET:HE1	1:A:776:MET:HG3	1.93	0.50
2:B:424:TYR:HD2	2:B:427:ARG:HD3	1.77	0.50
2:B:424:TYR:CA	2:B:427:ARG:HG3	2.41	0.50
1:A:341:PRO:HG3	1:A:816:LEU:HD21	1.94	0.50
1:A:530:ASP:OD2	1:A:685:THR:OG1	2.15	0.50
1:A:448:MET:HE2	2:B:363:LEU:HD13	1.94	0.50
1:A:666:PHE:HE1	1:A:743:PRO:N	2.09	0.50
1:A:438:GLN:OE1	1:A:508:LEU:CD1	2.61	0.49
2:B:420:PHE:CD2	2:B:420:PHE:C	2.85	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:347:ARG:NH1	2:B:347:ARG:CG	2.75	0.49
1:A:382:PHE:CE1	1:A:386:LEU:HD11	2.47	0.49
1:A:656:PHE:CE2	1:A:759:GLY:HA3	2.47	0.49
1:A:716:GLU:HG2	1:A:750:ARG:HG2	1.93	0.49
2:B:330:ALA:O	2:B:333:THR:HB	2.12	0.49
1:A:666:PHE:CE1	1:A:743:PRO:CB	2.95	0.49
1:A:437:THR:CB	1:A:508:LEU:HD21	2.39	0.49
1:A:180:GLN:HA	1:A:339:GLY:HA2	1.94	0.49
1:A:444:LEU:CD1	1:A:500:THR:HG22	2.43	0.48
1:A:458:LEU:HD13	1:A:487:LEU:HB2	1.94	0.48
1:A:363:TYR:CD1	1:A:734:ILE:HG23	2.48	0.48
1:A:378:VAL:HG11	1:A:528:ILE:CG2	2.42	0.48
1:A:667:ASP:OD1	1:A:667:ASP:N	2.43	0.48
1:A:266:ILE:HD11	1:A:578:LEU:HD23	1.94	0.48
1:A:474:ILE:HG22	2:B:393:GLN:OE1	2.14	0.48
2:B:430:ILE:HG22	2:B:434:LEU:CD1	2.44	0.48
1:A:337:LEU:HD23	1:A:337:LEU:N	2.28	0.48
1:A:352:GLU:HB3	1:A:568:ARG:CB	2.43	0.48
2:B:359:LEU:HD23	2:B:359:LEU:H	1.76	0.48
1:A:653:ARG:HE	1:A:772:ASP:CG	2.18	0.47
1:A:538:PHE:HB2	1:A:708:ALA:HB2	1.96	0.47
1:A:775:LEU:HD23	1:A:775:LEU:HA	1.64	0.47
1:A:370:VAL:HG21	1:A:528:ILE:HD11	1.96	0.47
1:A:793:ILE:CG2	1:A:794:PRO:CD	2.91	0.47
1:A:358:GLN:OE1	1:A:358:GLN:N	2.47	0.47
1:A:392:LEU:HD11	2:B:316:LEU:HD13	1.97	0.47
1:A:521:LEU:CD2	1:A:525:ASP:HB3	2.44	0.47
1:A:567:VAL:HG11	1:A:570:GLY:O	2.15	0.46
1:A:296:GLN:O	1:A:299:SER:HB3	2.14	0.46
1:A:438:GLN:OE1	1:A:508:LEU:HD12	2.15	0.46
1:A:438:GLN:HB3	2:B:352:ILE:CG2	2.45	0.46
1:A:452:LYS:HE2	2:B:366:GLY:O	2.15	0.46
2:B:424:TYR:CD2	2:B:427:ARG:HD3	2.50	0.46
1:A:239:GLU:H	1:A:239:GLU:CD	2.19	0.46
4:A:902:XHX:C15	4:A:902:XHX:C12	2.91	0.46
1:A:742:GLN:HG3	1:A:743:PRO:HD2	1.96	0.46
1:A:807:TYR:N	1:A:808:PRO:CD	2.78	0.46
2:B:402:PHE:CB	2:B:418:LYS:HZ1	2.28	0.46
1:A:353:LEU:HD12	1:A:353:LEU:HA	1.69	0.46
1:A:526:ARG:CG	1:A:526:ARG:NH1	2.72	0.46
1:A:531:TRP:O	1:A:531:TRP:CE3	2.69	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:691:LEU:HD21	1:A:727:CYS:SG	2.56	0.46
2:B:369:PRO:HB2	2:B:370:TYR:HD1	1.80	0.46
2:B:317:SER:O	2:B:321:VAL:HG22	2.16	0.45
1:A:427:GLN:O	1:A:431:TRP:HD1	1.99	0.45
2:B:430:ILE:HG22	2:B:434:LEU:HD11	1.98	0.45
1:A:370:VAL:HG21	1:A:528:ILE:HD13	1.98	0.45
1:A:444:LEU:CD1	1:A:500:THR:CG2	2.94	0.45
1:A:670:PHE:O	1:A:670:PHE:CD1	2.70	0.45
1:A:384:ARG:HB3	2:B:314:MET:CE	2.46	0.45
1:A:781:THR:HA	1:A:794:PRO:HA	1.99	0.45
2:B:402:PHE:CA	2:B:418:LYS:CE	2.94	0.45
1:A:419:GLN:NE2	2:B:314:MET:HA	2.32	0.45
1:A:744:LYS:CD	1:A:744:LYS:C	2.85	0.45
2:B:397:LYS:HG2	2:B:398:TYR:CE2	2.52	0.45
1:A:538:PHE:CD1	1:A:706:LEU:HD23	2.51	0.45
1:A:213:ILE:CD1	1:A:248:LEU:HD23	2.47	0.44
1:A:238:LEU:HD13	1:A:249:VAL:HG21	1.99	0.44
1:A:391:TYR:CZ	2:B:310:PRO:HD3	2.52	0.44
2:B:423:ASN:OD1	2:B:423:ASN:N	2.49	0.44
1:A:424:LYS:HD3	2:B:339:ASP:OD1	2.17	0.44
1:A:392:LEU:CD1	2:B:316:LEU:HD13	2.47	0.44
1:A:524:ARG:HA	1:A:527:GLN:NE2	2.32	0.44
1:A:566:THR:HG21	1:A:697:LEU:HD22	2.00	0.44
2:B:336:ARG:O	2:B:340:MET:HG3	2.18	0.44
1:A:606:ASN:HD21	1:A:608:ARG:HE	1.65	0.44
1:A:524:ARG:HA	1:A:527:GLN:HE21	1.81	0.44
1:A:438:GLN:HB3	2:B:352:ILE:HG21	1.99	0.43
1:A:548:SER:O	1:A:552:TRP:HB3	2.17	0.43
1:A:777:ALA:HB2	1:A:803:THR:HB	2.01	0.43
2:B:399:GLY:HA3	2:B:437:TRP:CE3	2.53	0.43
1:A:308:GLU:HG2	1:A:586:LEU:CD2	2.48	0.43
1:A:690:GLU:OE2	1:A:726:ARG:NH1	2.50	0.43
1:A:439:GLU:CG	2:B:352:ILE:HD11	2.46	0.43
1:A:441:LEU:HD23	2:B:356:ASN:HD22	1.83	0.43
1:A:188:MET:HE1	1:A:200:ILE:HB	2.00	0.43
1:A:231:PHE:CZ	1:A:250:HIS:HB2	2.53	0.43
1:A:297:LEU:HD23	1:A:297:LEU:HA	1.80	0.43
1:A:346:SER:HB3	1:A:351:MET:HE1	1.97	0.43
1:A:671:TRP:HA	1:A:735:PHE:CE1	2.53	0.43
2:B:368:GLU:HB2	2:B:369:PRO:HD3	2.00	0.43
1:A:191:GLN:HG2	1:A:255:TYR:OH	2.18	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:321:ARG:HG2	1:A:326:VAL:HG22	2.00	0.43
1:A:780:ILE:HB	1:A:796:LEU:HB3	2.00	0.43
1:A:370:VAL:CG2	1:A:528:ILE:HD11	2.49	0.43
1:A:456:LYS:HA	2:B:370:TYR:HD2	1.72	0.43
1:A:715:MET:O	1:A:723:ILE:HD11	2.18	0.43
1:A:665:CYS:HA	1:A:702:ILE:HG12	2.01	0.43
1:A:672:ASP:HB3	1:A:675:VAL:HG22	2.01	0.43
2:B:383:TRP:CE3	2:B:420:PHE:HE1	2.35	0.43
1:A:253:HIS:ND1	1:A:253:HIS:C	2.73	0.42
1:A:333:VAL:HA	1:A:565:LEU:O	2.19	0.42
1:A:239:GLU:CD	1:A:239:GLU:N	2.72	0.42
1:A:319:THR:HB	1:A:572:SER:CB	2.43	0.42
1:A:432:LYS:HA	1:A:435:VAL:HG22	2.00	0.42
1:A:732:LYS:HG2	1:A:737:SER:HA	2.01	0.42
2:B:341:GLU:O	2:B:341:GLU:HG3	2.16	0.42
2:B:350:GLN:NE2	2:B:350:GLN:CA	2.73	0.42
2:B:383:TRP:CE3	2:B:420:PHE:CD1	3.08	0.42
1:A:527:GLN:HE21	1:A:527:GLN:HB2	1.63	0.42
1:A:538:PHE:HD1	1:A:659:LEU:HD22	1.83	0.42
1:A:239:GLU:N	1:A:239:GLU:OE2	2.49	0.42
1:A:276:LYS:HD2	1:A:277:LYS:N	2.34	0.42
1:A:448:MET:HE3	1:A:448:MET:HB3	1.73	0.42
2:B:383:TRP:CZ2	2:B:420:PHE:CD1	3.06	0.42
1:A:371:PRO:HG2	1:A:374:LYS:HG2	2.02	0.42
1:A:550:LYS:HG2	1:A:551:HIS:CE1	2.54	0.42
1:A:232:GLU:H	1:A:232:GLU:CD	2.21	0.42
1:A:384:ARG:HB3	2:B:314:MET:HE3	2.02	0.42
1:A:283:ILE:HG12	1:A:622:LEU:HB3	2.01	0.42
1:A:471:PRO:O	1:A:471:PRO:HG2	2.20	0.42
2:B:425:ARG:HD3	2:B:430:ILE:HD12	2.01	0.42
1:A:385:LEU:O	1:A:389:THR:HG23	2.20	0.41
1:A:438:GLN:HG2	1:A:508:LEU:CD1	2.49	0.41
1:A:662:VAL:HB	1:A:705:ALA:HB3	2.02	0.41
2:B:324:VAL:HG23	2:B:331:ALA:HB2	2.00	0.41
2:B:349:ILE:HD12	2:B:349:ILE:HA	1.78	0.41
1:A:793:ILE:CG2	1:A:828:GLN:CG	2.99	0.41
1:A:198:ASP:OD2	1:A:251:ARG:NH1	2.53	0.41
1:A:510:GLU:HB2	1:A:511:LEU:HD23	2.03	0.41
1:A:258:ARG:HD3	1:A:258:ARG:HA	1.35	0.41
1:A:691:LEU:HA	1:A:706:LEU:O	2.20	0.41
1:A:438:GLN:CG	1:A:508:LEU:HD11	2.47	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:538:PHE:CD1	1:A:538:PHE:O	2.74	0.41
2:B:368:GLU:N	2:B:369:PRO:CD	2.84	0.41
1:A:332:MET:HG3	1:A:661:LYS:NZ	2.36	0.41
1:A:828:GLN:O	1:A:828:GLN:HG3	2.21	0.41
2:B:324:VAL:O	2:B:324:VAL:CG2	2.69	0.41
1:A:238:LEU:HD23	1:A:239:GLU:N	2.36	0.40
1:A:710:GLU:H	1:A:710:GLU:HG2	1.67	0.40
1:A:458:LEU:HD23	1:A:458:LEU:HA	1.65	0.40
1:A:734:ILE:O	1:A:734:ILE:CG2	2.69	0.40
2:B:426:ARG:NH2	2:B:427:ARG:HD2	2.30	0.40
1:A:572:SER:O	1:A:576:VAL:HG23	2.21	0.40
1:A:195:CYS:HB2	1:A:196:PHE:CD1	2.57	0.40
1:A:366:ASN:OD1	1:A:367:GLY:N	2.54	0.40
1:A:594:ARG:HA	1:A:640:VAL:O	2.22	0.40
2:B:327:ASN:OD1	2:B:329:THR:N	2.55	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	663/871 (76%)	628 (95%)	35 (5%)	0	100	100
2	B	131/144 (91%)	119 (91%)	11 (8%)	1 (1%)	16	44
All	All	794/1015 (78%)	747 (94%)	46 (6%)	1 (0%)	48	76

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	411	ASN

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	565/715 (79%)	500 (88%)	65 (12%)	4	14
2	B	117/125 (94%)	85 (73%)	32 (27%)	0	1
All	All	682/840 (81%)	585 (86%)	97 (14%)	2	8

All (97) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	182	ARG
1	A	198	ASP
1	A	199	ILE
1	A	235	LEU
1	A	237	GLN
1	A	239	GLU
1	A	247	VAL
1	A	251	ARG
1	A	256	LEU
1	A	258	ARG
1	A	275	THR
1	A	276	LYS
1	A	286	SER
1	A	308	GLU
1	A	311	ASP
1	A	349	VAL
1	A	350	ASN
1	A	351	MET
1	A	353	LEU
1	A	368	GLN
1	A	379	GLU
1	A	381	GLU
1	A	418	LEU
1	A	444	LEU
1	A	445	LEU
1	A	449	VAL
1	A	457	GLU

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Mol	Chain	Res	Type
1	A	458	LEU
1	A	466	SER
1	A	467	GLU
1	A	469	LYS
1	A	472	ARG
1	A	482	SER
1	A	485	ARG
1	A	501	GLN
1	A	504	LEU
1	A	506	GLU
1	A	508	LEU
1	A	509	GLN
1	A	510	GLU
1	A	511	LEU
1	A	524	ARG
1	A	526	ARG
1	A	536	LEU
1	A	538	PHE
1	A	568	ARG
1	A	569	ASN
1	A	571	TYR
1	A	572	SER
1	A	575	PRO
1	A	582	LEU
1	A	667	ASP
1	A	668	ARG
1	A	669	VAL
1	A	684	THR
1	A	685	THR
1	A	687	SER
1	A	724	VAL
1	A	752	ARG
1	A	758	ARG
1	A	769	SER
1	A	786	ILE
1	A	791	GLN
1	A	801	GLU
1	A	824	ARG
2	B	321	VAL
2	B	324	VAL
2	B	327	ASN
2	B	329	THR

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Mol	Chain	Res	Type
2	B	339	ASP
2	B	344	SER
2	B	347	ARG
2	B	349	ILE
2	B	350	GLN
2	B	359	LEU
2	B	360	LYS
2	B	368	GLU
2	B	370	TYR
2	B	371	ARG
2	B	374	GLU
2	B	379	CYS
2	B	384	THR
2	B	402	PHE
2	B	403	GLN
2	B	405	ILE
2	B	409	ILE
2	B	411	ASN
2	B	414	VAL
2	B	415	VAL
2	B	420	PHE
2	B	421	PHE
2	B	422	VAL
2	B	423	ASN
2	B	425	ARG
2	B	426	ARG
2	B	427	ARG
2	B	432	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	509	GLN
1	A	514	ASN
1	A	527	GLN
1	A	532	HIS
1	A	551	HIS
1	A	592	GLN
1	A	680	HIS
2	B	348	GLN
2	B	350	GLN
2	B	429	ASN

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Mol	Chain	Res	Type
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 ⓘ

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
4	XHX	A	902	-	21,26,26	1.13	1 (4%)	21,37,37	1.04	1 (4%)
3	XHT	A	901	-	69,80,80	1.45	15 (21%)	85,124,124	1.32	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	XHX	A	902	-	-	0/10/27/27	0/4/4/4
3	XHT	A	901	-	-	14/40/114/114	0/8/9/9

All (16) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	901	XHT	P2-O9	-3.64	1.55	1.59
3	A	901	XHT	C37-N11	-3.22	1.29	1.36
3	A	901	XHT	O3-C22	-3.04	1.37	1.43
3	A	901	XHT	C13-N4	-2.95	1.36	1.41
3	A	901	XHT	P1-O9	-2.91	1.56	1.59
4	A	902	XHX	C12-N4	-2.88	1.42	1.47
3	A	901	XHT	C38-N12	-2.88	1.32	1.37
3	A	901	XHT	C36-N5	-2.52	1.32	1.38
3	A	901	XHT	C29-N7	-2.39	1.30	1.34
3	A	901	XHT	O4-C23	-2.33	1.37	1.43
3	A	901	XHT	C21-C22	-2.19	1.49	1.52
3	A	901	XHT	O16-C37	-2.13	1.20	1.24
3	A	901	XHT	C28-N6	-2.08	1.44	1.49
3	A	901	XHT	P2-O10	-2.05	1.45	1.55
3	A	901	XHT	C20-C13	-2.04	1.37	1.41
3	A	901	XHT	C14-C15	-2.01	1.36	1.39

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	A	901	XHT	C13-N4-C12	-5.03	112.38	123.92
3	A	901	XHT	C38-C39-C36	-3.77	106.72	113.40
3	A	901	XHT	C39-N4-C12	-3.76	105.72	109.50
3	A	901	XHT	C38-N12-C37	-3.21	120.58	125.42
3	A	901	XHT	C27-O13-C28	-2.81	107.35	109.92
3	A	901	XHT	C3-N3-C4	-2.59	120.51	126.58
4	A	902	XHX	C3-N3-C4	-2.58	120.54	126.58
3	A	901	XHT	C1-C2-N1	2.22	124.53	119.65
3	A	901	XHT	C30-C31-N8	2.22	123.69	120.31
3	A	901	XHT	O16-C37-N11	-2.13	118.26	121.80
3	A	901	XHT	O10-P2-O11	2.02	121.83	112.44

There are no chirality outliers.

All (14) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	901	XHT	C21-C22-C23-C24
3	A	901	XHT	C21-C22-C23-O4
3	A	901	XHT	O3-C22-C23-C24
3	A	901	XHT	O3-C22-C23-O4
3	A	901	XHT	C26-O12-P2-O11

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Mol	Chain	Res	Type	Atoms
3	A	901	XHT	C25-O6-P1-O8
3	A	901	XHT	C25-O6-P1-O9
3	A	901	XHT	P1-O9-P2-O11
3	A	901	XHT	O5-C24-C25-O6
3	A	901	XHT	P2-O9-P1-O6
3	A	901	XHT	C25-O6-P1-O7
3	A	901	XHT	P1-O9-P2-O10
3	A	901	XHT	P2-O9-P1-O8
3	A	901	XHT	O12-C26-C27-O13

There are no ring outliers.

2 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	902	XHX	1	0
3	A	901	XHT	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 XHX A 902

Bond lengths

Bond angles

Torsions

Rings

Ligand XHT A 901

Bond lengths

Bond angles

Torsions

Rings
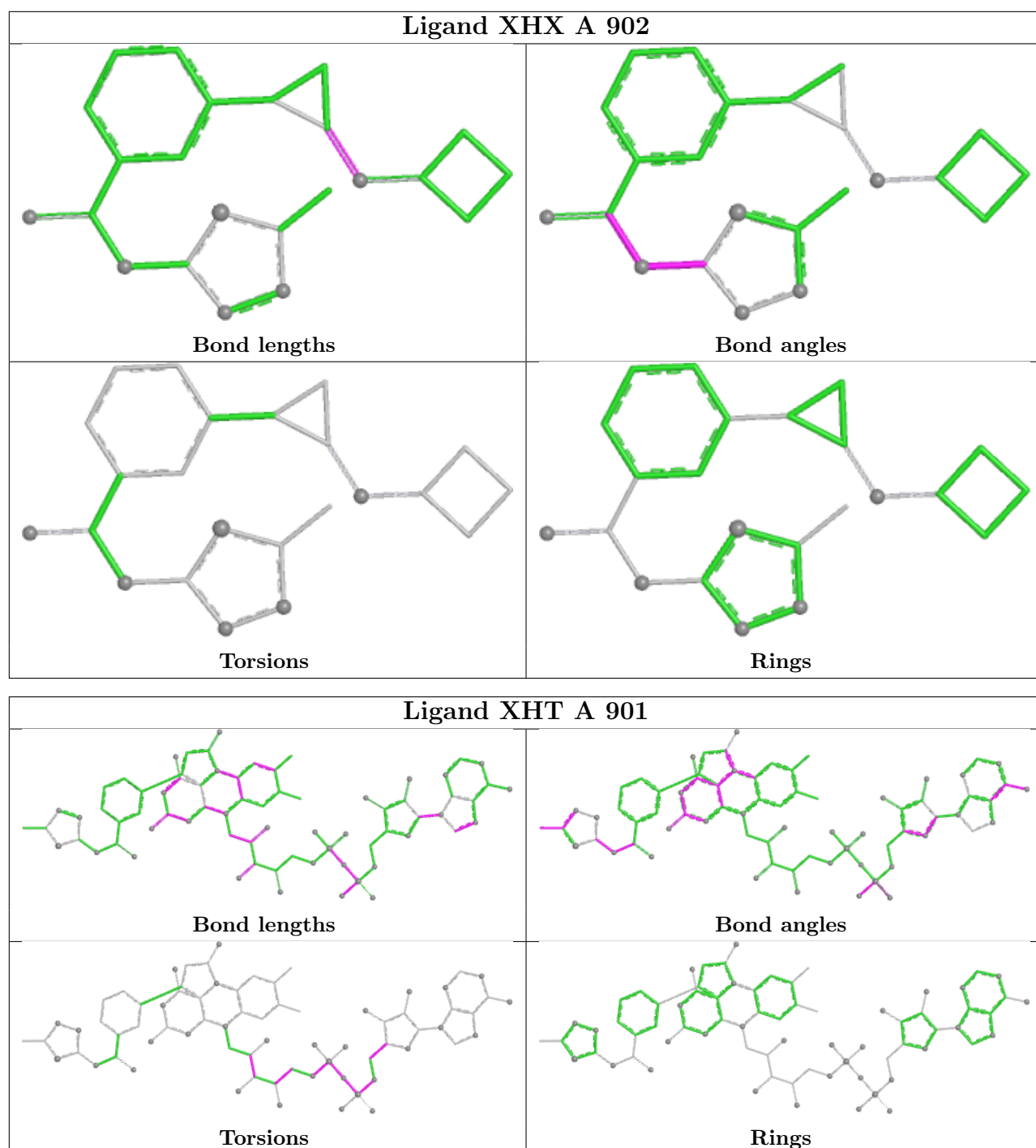
5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled 'Q< 0.9' lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å^2)	Q<0.9
1	A	665/871 (76%)	0.89	84 (12%)	9	8	59, 90, 124, 138	0
2	B	133/144 (92%)	1.79	48 (36%)	1	1	86, 121, 142, 155	0
All	All	798/1015 (78%)	1.04	132 (16%)	5	5	59, 97, 130, 155	0

All (132) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	402	PHE	6.3
2	B	375	VAL	5.7
1	A	836	LEU	5.1
2	B	374	GLU	4.8
2	B	376	ILE	4.2
1	A	506	GLU	4.1
1	A	510	GLU	4.0
1	A	335	THR	4.0
1	A	667	ASP	4.0
2	B	399	GLY	3.9
1	A	835	THR	3.7
2	B	344	SER	3.7
2	B	355	THR	3.7
2	B	372	LEU	3.6
1	A	467	GLU	3.5
2	B	359	LEU	3.6
1	A	741	PRO	3.5
1	A	523	SER	3.4
2	B	378	LYS	3.4
2	B	383	TRP	3.4
2	B	439	ALA	3.3
2	B	373	PRO	3.3
1	A	699	LYS	3.3
1	A	275	THR	3.3

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Mol	Chain	Res	Type	RSRZ
1	A	172	SER	3.2
1	A	269	ARG	3.2
2	B	308	ARG	3.2
1	A	456	LYS	3.1
2	B	363	LEU	3.1
2	B	317	SER	3.1
1	A	206	THR	3.1
1	A	700	ALA	3.0
2	B	385	THR	3.0
2	B	377	GLN	3.0
1	A	374	LYS	2.9
1	A	240	ALA	2.9
2	B	381	ALA	2.9
1	A	373	GLU	2.9
2	B	440	GLU	2.9
1	A	204	GLN	2.9
1	A	509	GLN	2.9
2	B	337	GLN	2.9
1	A	242	TYR	2.9
1	A	236	GLN	2.9
1	A	363	TYR	2.9
1	A	468	VAL	2.9
1	A	750	ARG	2.8
1	A	457	GLU	2.8
2	B	352	ILE	2.8
1	A	350	ASN	2.8
2	B	370	TYR	2.8
2	B	382	ARG	2.7
1	A	517	SER	2.7
2	B	379	CYS	2.7
1	A	454	LYS	2.7
2	B	408	VAL	2.7
1	A	527	GLN	2.7
1	A	720	ASP	2.7
1	A	466	SER	2.6
1	A	673	PRO	2.6
1	A	474	ILE	2.6
1	A	239	GLU	2.6
1	A	277	LYS	2.6
1	A	205	GLN	2.6
2	B	318	GLN	2.6
2	B	360	LYS	2.5

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Mol	Chain	Res	Type	RSRZ
1	A	323	GLY	2.5
2	B	420	PHE	2.5
2	B	436	GLU	2.5
2	B	424	TYR	2.5
2	B	400	ARG	2.5
1	A	570	GLY	2.5
1	A	246	THR	2.5
1	A	179	PHE	2.5
1	A	237	GLN	2.4
2	B	426	ARG	2.4
2	B	358	ALA	2.4
2	B	343	VAL	2.4
2	B	422	VAL	2.4
1	A	231	PHE	2.4
1	A	740	VAL	2.4
1	A	464	GLU	2.4
1	A	668	ARG	2.4
1	A	226	LYS	2.3
1	A	737	SER	2.3
1	A	501	GLN	2.3
2	B	312	LYS	2.3
2	B	392	VAL	2.3
1	A	431	TRP	2.3
1	A	785	SER	2.3
2	B	336	ARG	2.3
1	A	465	ALA	2.3
2	B	361	GLU	2.3
2	B	421	PHE	2.3
1	A	433	LYS	2.3
2	B	353	LYS	2.3
1	A	511	LEU	2.2
1	A	267	TYR	2.2
1	A	494	TYR	2.2
2	B	371	ARG	2.2
1	A	493	GLU	2.2
2	B	326	ALA	2.2
2	B	409	ILE	2.2
1	A	336	GLY	2.2
2	B	414	VAL	2.2
1	A	224	ASN	2.2
1	A	175	GLU	2.2
1	A	504	LEU	2.2

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Mol	Chain	Res	Type	RSRZ
1	A	272	PRO	2.2
1	A	377	MET	2.2
1	A	276	LYS	2.2
1	A	190	SER	2.2
1	A	208	LYS	2.1
1	A	359	LYS	2.1
1	A	338	GLY	2.1
1	A	320	PHE	2.1
1	A	470	PRO	2.1
1	A	372	LYS	2.1
1	A	203	PRO	2.1
1	A	747	VAL	2.1
1	A	463	LYS	2.1
1	A	492	LYS	2.1
1	A	611	SER	2.1
1	A	462	TYR	2.1
1	A	496	GLU	2.0
1	A	213	ILE	2.0
1	A	187	ARG	2.0
1	A	591	ARG	2.0
2	B	410	GLY	2.0
1	A	559	GLU	2.0
2	B	362	LYS	2.0
1	A	508	LEU	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.
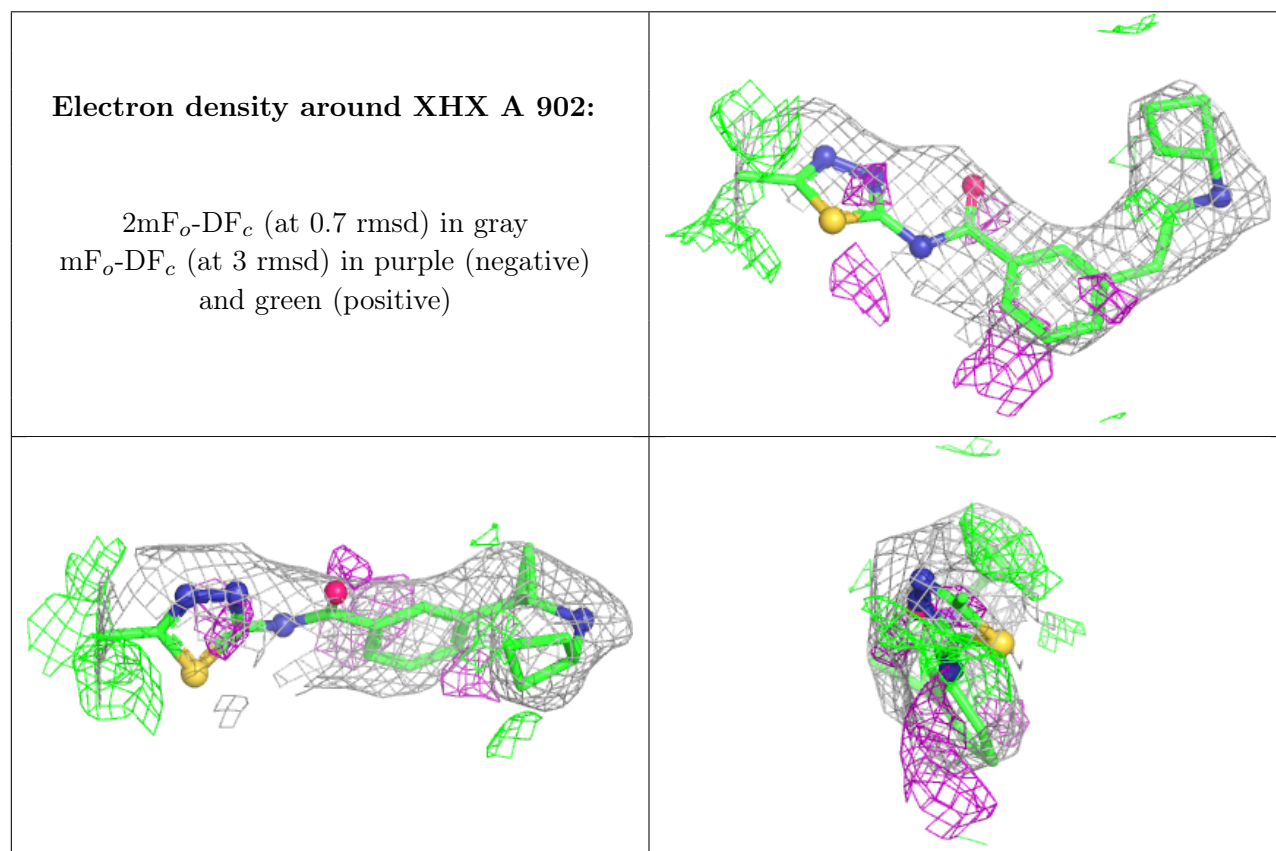
6.3 Carbohydrates (i)
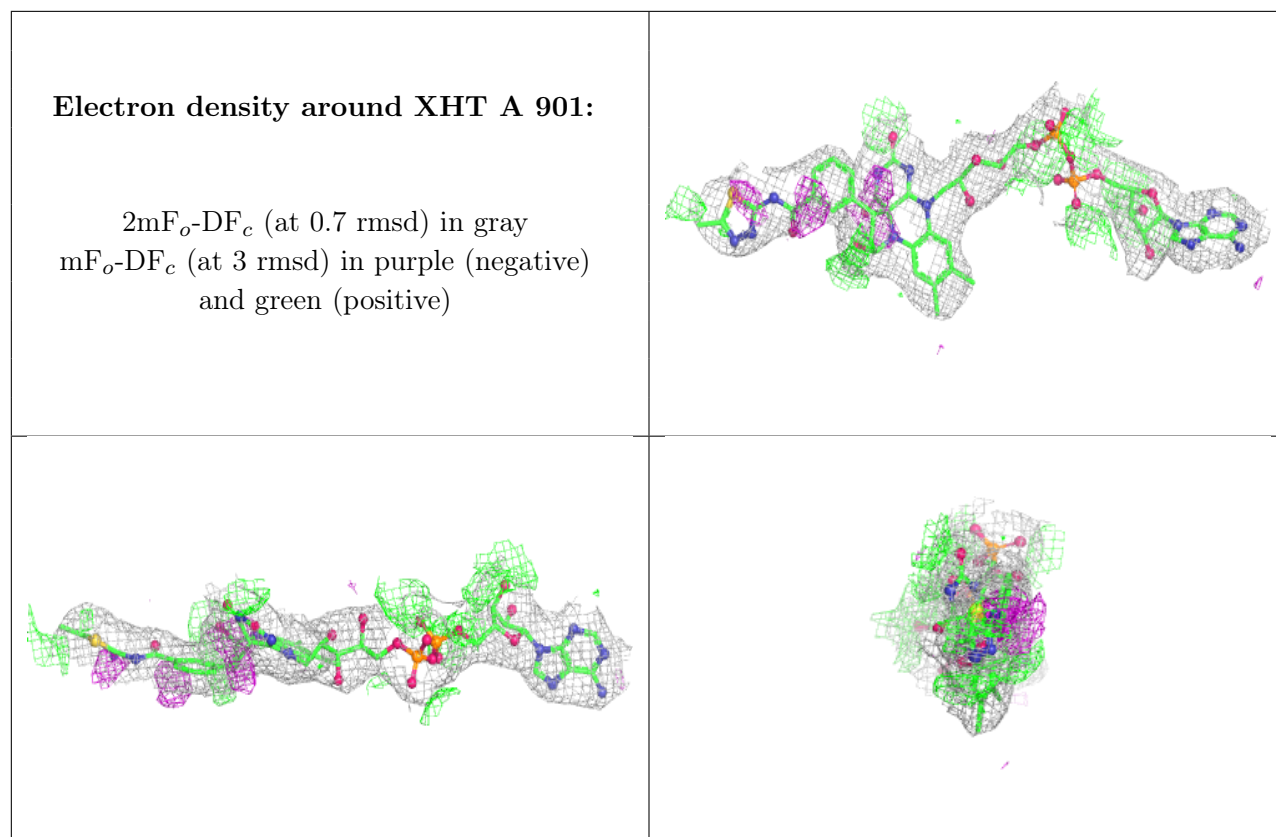
There are no monosaccharides in this entry.

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, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($Å^2$)	Q<0.9
4	XHX	A	902	23/23	0.85	0.24	93,107,135,147	0
3	XHT	A	901	72/72	0.95	0.12	56,75,109,124	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 XHX A 902:

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

Electron density around XHT 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.