



Full wwPDB X-ray Structure Validation Report ⓘ

Nov 7, 2023 – 06:19 PM EST

PDB ID : 8U6H
Title : Crystal Structure of HIV-1 Reverse Transcriptase in Complex with 3-(2-(2-(3-acryloyl-2-oxo-2,3-dihydro-1H-benzo[d]imidazol-1-yl)ethoxy)-4-chlorophenoxy)-5-chlorobenzonitrile (JLJ744), a non-nucleoside inhibitor
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Deposited on : 2023-09-13
Resolution : 2.99 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 : 1.8.5 (274361), 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

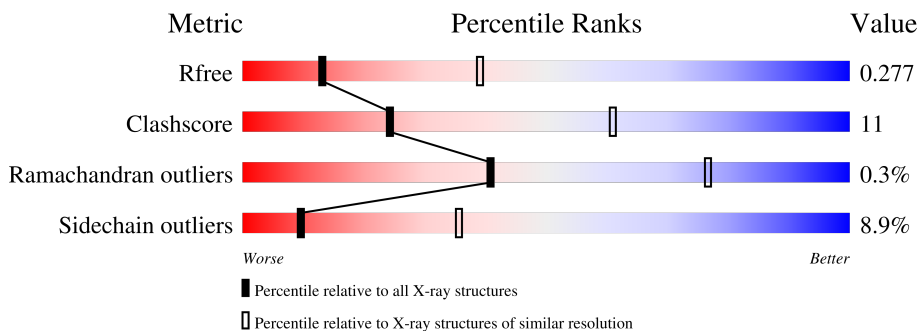
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.99 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	2092 (3.00-3.00)
Clashscore	141614	2416 (3.00-3.00)
Ramachandran outliers	138981	2333 (3.00-3.00)
Sidechain outliers	138945	2336 (3.00-3.00)

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 $\leq 5\%$.

Mol	Chain	Length	Quality of chain
1	A	556	74% (green), 21% (yellow), 5% (orange), 0% (red), 0% (grey)
1	C	556	70% (green), 23% (yellow), 5% (orange), 2% (red), 0% (grey)
2	B	428	69% (green), 22% (yellow), 6% (orange), 3% (red), 0% (grey)
2	D	428	72% (green), 19% (yellow), 8% (orange), 1% (red), 0% (grey)

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 14102 atoms, of which 17 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 Reverse transcriptase/ribonuclease H.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	550	Total	C	N	O	S	0	0	0
			4192	2701	698	787	6			
1	C	531	Total	C	N	O	S	0	1	0
			3794	2418	645	727	4			

There are 10 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	MET	-	expression tag	UNP P03366
A	0	VAL	-	expression tag	UNP P03366
A	172	ALA	LYS	engineered mutation	UNP P03366
A	173	ALA	LYS	engineered mutation	UNP P03366
A	280	SER	CYS	engineered mutation	UNP P03366
C	-1	MET	-	expression tag	UNP P03366
C	0	VAL	-	expression tag	UNP P03366
C	172	ALA	LYS	engineered mutation	UNP P03366
C	173	ALA	LYS	engineered mutation	UNP P03366
C	280	SER	CYS	engineered mutation	UNP P03366

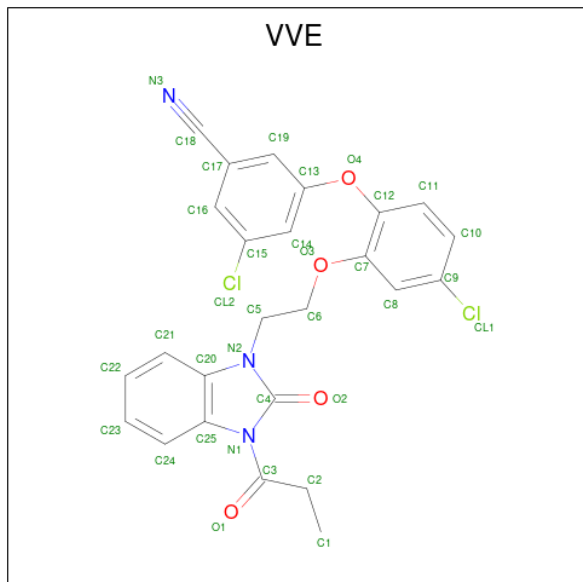
- Molecule 2 is a protein called p51 RT.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	403	Total	C	N	O	S	0	0	0
			3230	2097	527	601	5			
2	D	395	Total	C	N	O	S	2	1	0
			2774	1775	472	524	3			

There are 2 discrepancies between the modelled and reference sequences:

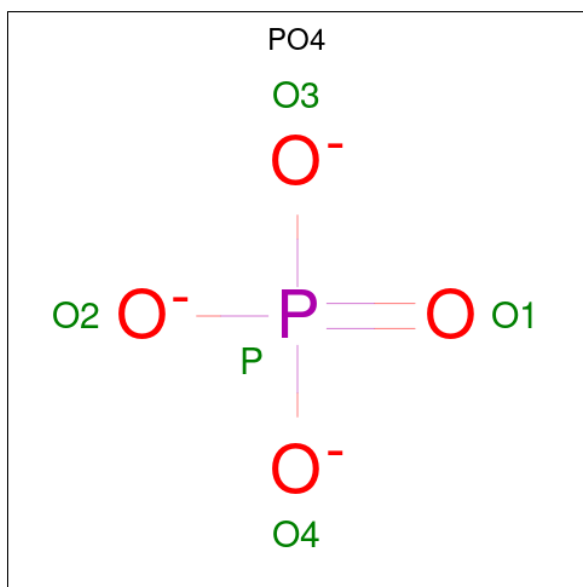
Chain	Residue	Modelled	Actual	Comment	Reference
B	280	SER	CYS	engineered mutation	UNP P03366
D	280	SER	CYS	engineered mutation	UNP P03366

- Molecule 3 is 3-chloro-5-{4-chloro-2-[2-(2-oxo-3-propanoyl-2,3-dihydro-1H-benzimidazol-1-yl)ethoxy]phenoxy}benzonitrile (three-letter code: VVE) (formula: C₂₅H₁₉Cl₂N₃O₄).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	Cl	N	O		
3	A	1	34	25	2	3	4	0	0
3	C	1	51	25	2	17	3	4	0

- Molecule 4 is PHOSPHATE ION (three-letter code: PO4) (formula: O₄P).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	O	P	0	0
			5	4	1		
4	B	1	Total	O	P	0	0
			5	4	1		

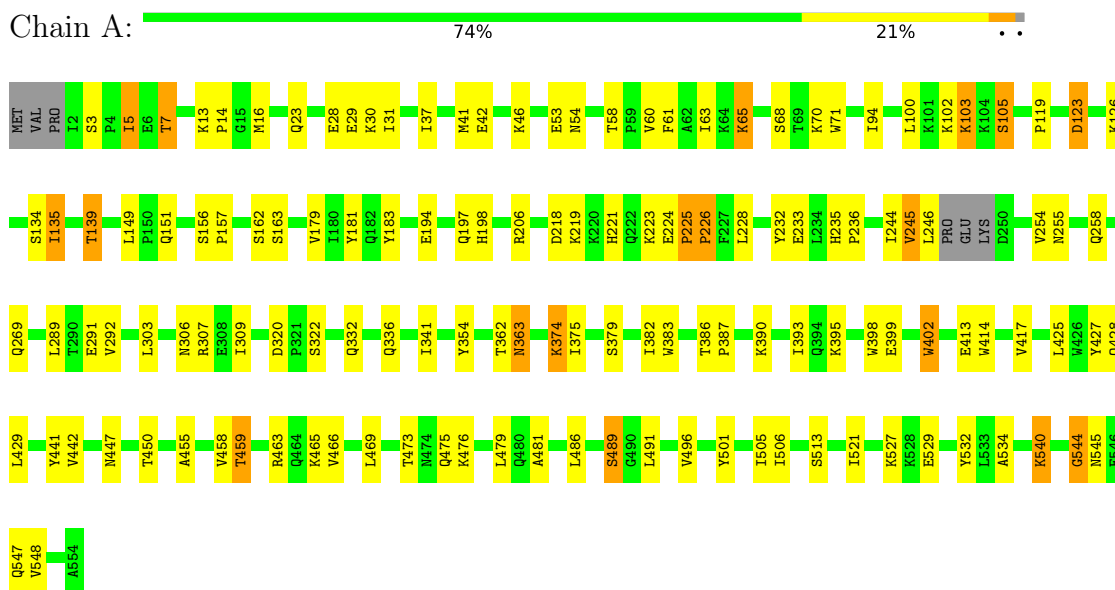
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	9	Total	O	0	0
			9	9		
5	B	6	Total	O	0	0
			6	6		
5	C	2	Total	O	0	0
			2	2		

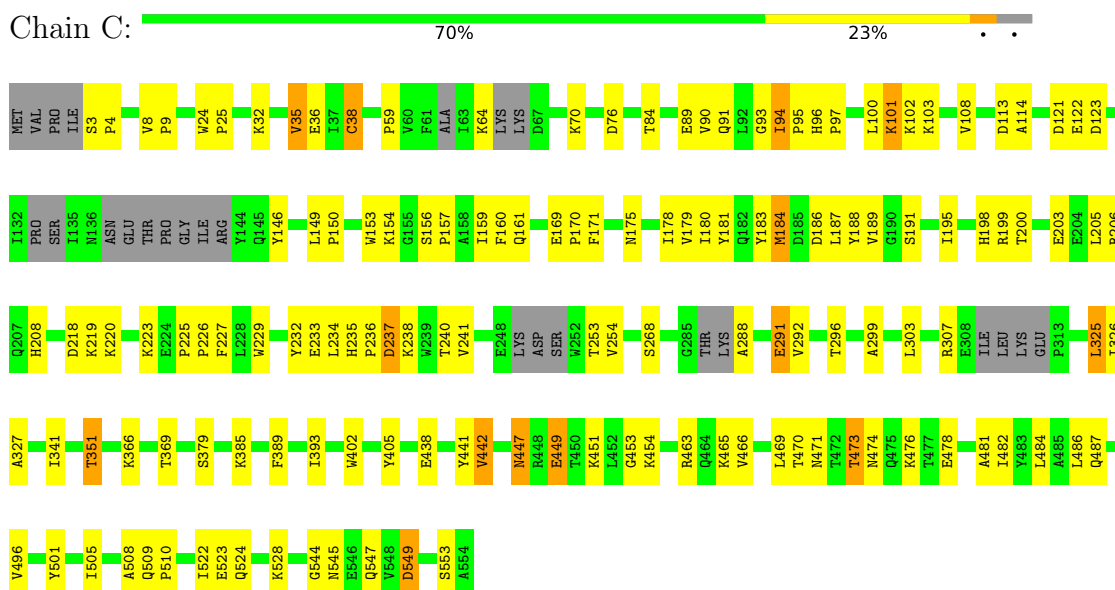
3 Residue-property plots [i](#)

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. 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. 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: Reverse transcriptase/ribonuclease H

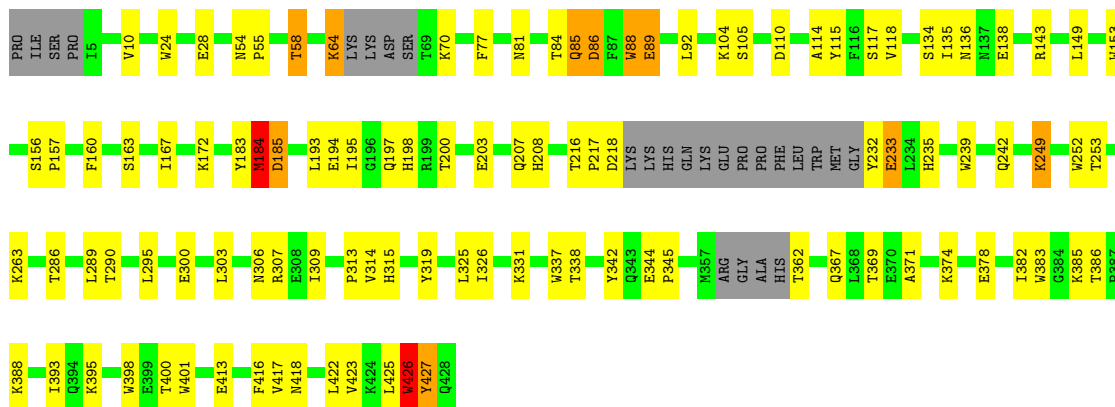


- Molecule 1: Reverse transcriptase/ribonuclease H



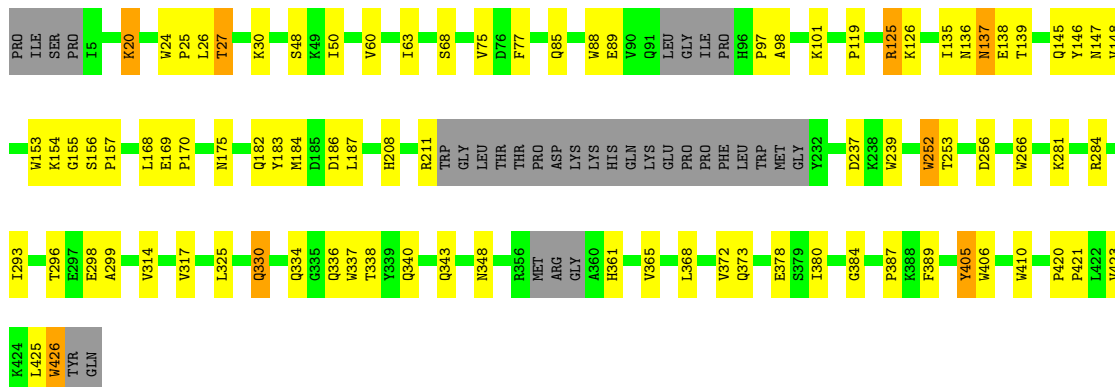
- Molecule 2: p51 RT

Chain B:  69% 22% 6%



- Molecule 2: p51 RT

Chain D:  72% 19% 8%



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	112.40Å 73.19Å 171.58Å 90.00° 97.51° 90.00°	Depositor
Resolution (Å)	170.11 – 2.99 30.85 – 2.99	Depositor EDS
% Data completeness (in resolution range)	99.6 (170.11-2.99) 99.6 (30.85-2.99)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.38 (at 3.00Å)	Xtrriage
Refinement program	REFMAC 5.8.0405	Depositor
R, R_{free}	0.220 , 0.279 0.265 , 0.277	Depositor DCC
R_{free} test set	1999 reflections (3.56%)	wwPDB-VP
Wilson B-factor (Å ²)	87.5	Xtrriage
Anisotropy	0.031	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.26 , 93.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.92	EDS
Total number of atoms	14102	wwPDB-VP
Average B, all atoms (Å ²)	102.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.09% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: VVE, PO4

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	0.47	0/4303	0.75	1/5889 (0.0%)
1	C	0.43	0/3892	0.61	0/5346
2	B	0.48	0/3322	0.78	0/4538
2	D	0.45	0/2851	0.65	1/3940 (0.0%)
All	All	0.46	0/14368	0.70	2/19713 (0.0%)

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
2	D	0	4

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
1	A	544	GLY	N-CA-C	-5.40	99.59	113.10
2	D	348	ASN	CB-CA-C	5.26	120.92	110.40

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	D	97	PRO	Mainchain
2	D	98[A]	ALA	Mainchain
2	D	98[B]	ALA	Mainchain

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	4192	0	3936	88	0
1	C	3794	0	3243	103	0
2	B	3230	0	3113	60	0
2	D	2774	0	2275	48	0
3	A	34	0	0	8	0
3	C	34	17	0	6	0
4	A	5	0	0	0	0
4	B	5	0	0	0	0
5	A	9	0	0	0	0
5	B	6	0	0	0	0
5	C	2	0	0	0	0
All	All	14085	17	12567	293	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 11.

All (293) 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:D:182:GLN:HA	2:D:187:LEU:HA	1.36	1.07
3:C:601:VVE:C1	3:C:601:VVE:O2	2.17	0.92
1:A:102:LYS:HD2	3:A:601:VVE:C2	2.04	0.86
1:C:225:PRO:HB2	1:C:226:PRO:HD3	1.58	0.85
1:C:451:LYS:HA	1:C:471:ASN:H	1.49	0.78
1:A:103:LYS:O	3:A:601:VVE:C2	2.36	0.73
1:A:225:PRO:HB2	1:A:226:PRO:HD3	1.70	0.73
1:C:253:THR:HA	1:C:292:VAL:HA	1.71	0.72
1:C:191:SER:OG	1:C:198:HIS:ND1	2.23	0.70
2:D:50:ILE:HG21	2:D:145:GLN:HB3	1.74	0.69
1:A:102:LYS:CD	3:A:601:VVE:C2	2.67	0.69
1:C:89:GLU:OE1	1:C:90:VAL:N	2.25	0.69
2:D:60:VAL:HG12	2:D:75:VAL:HG22	1.75	0.68
1:C:171:PHE:HB2	1:C:208:HIS:HD1	1.58	0.68
2:B:369:THR:HG22	2:B:398:TRP:CH2	2.29	0.68
1:C:195:ILE:HG13	1:C:199:ARG:HH11	1.60	0.67

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:236:PRO:HA	3:C:601:VVE:O1	1.94	0.67
1:A:399:GLU:HA	1:A:402:TRP:CE3	2.30	0.66
1:A:223:LYS:O	1:A:226:PRO:HD2	1.95	0.66
1:A:102:LYS:HD2	3:A:601:VVE:O2	1.96	0.64
2:B:156:SER:N	2:B:157:PRO:HD2	2.13	0.63
1:C:59:PRO:HG2	1:C:76:ASP:H	1.63	0.62
1:C:233:GLU:HB3	1:C:235:HIS:CE1	2.34	0.62
1:C:225:PRO:HB2	1:C:226:PRO:CD	2.30	0.62
2:D:373:GLN:NE2	2:D:406:TRP:O	2.32	0.62
1:A:194:GLU:HG2	1:A:197:GLN:H	1.64	0.62
1:C:227:PHE:CB	1:C:234:LEU:H	2.13	0.62
1:C:218:ASP:OD1	1:C:220:LYS:HD2	2.00	0.61
1:C:181:TYR:CD1	2:D:138:GLU:HB3	2.35	0.61
1:A:102:LYS:HE2	1:A:236:PRO:O	2.01	0.60
1:A:390:LYS:HB3	1:A:417:VAL:HG21	1.82	0.60
1:A:134:SER:HB3	1:A:139:THR:O	2.00	0.60
1:C:218:ASP:O	1:C:220:LYS:HG3	2.01	0.60
2:D:88:TRP:CB	2:D:154:LYS:HE2	2.31	0.60
1:C:227:PHE:CB	1:C:234:LEU:N	2.65	0.60
1:C:89:GLU:OE1	1:C:91:GLN:N	2.35	0.59
1:A:255:ASN:HB2	1:A:289:LEU:HB3	1.85	0.59
1:C:223:LYS:H	1:C:226:PRO:HG2	1.68	0.59
1:A:3:SER:OG	1:A:5:ILE:HG22	2.03	0.59
1:A:105:SER:HB2	1:A:198:HIS:CD2	2.38	0.59
2:D:211:ARG:O	2:D:211:ARG:HG3	2.03	0.58
2:D:325:LEU:HD23	2:D:343:GLN:HG3	1.84	0.58
2:B:425:LEU:O	2:B:427:TYR:N	2.37	0.58
2:D:85:GLN:O	2:D:89:GLU:N	2.26	0.58
1:A:134:SER:CB	1:A:139:THR:O	2.52	0.58
1:C:501:TYR:CZ	1:C:505:ILE:HD11	2.38	0.58
1:A:473:THR:HG22	1:A:476:LYS:HE3	1.86	0.58
1:A:320:ASP:OD1	1:A:322:SER:OG	2.20	0.57
2:B:194:GLU:HB3	2:B:197:GLN:HG3	1.85	0.57
1:C:32:LYS:HA	1:C:35:VAL:HG12	1.86	0.57
1:C:524:GLN:O	1:C:528:LYS:HG2	2.04	0.57
1:A:7:THR:HG23	1:A:119:PRO:HB2	1.87	0.57
1:C:484:LEU:HA	1:C:487:GLN:HE21	1.70	0.57
1:C:97:PRO:HG2	1:C:232:TYR:CD1	2.39	0.56
1:A:363:ASN:OD1	1:A:363:ASN:C	2.42	0.56
2:D:387:PRO:HG2	2:D:389:PHE:CE1	2.40	0.56
1:C:223:LYS:C	1:C:226:PRO:HD2	2.25	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:332:GLN:O	1:A:336:GLN:HB2	2.05	0.56
1:C:150:PRO:HB2	1:C:153:TRP:HB2	1.87	0.56
1:C:203:GLU:OE2	1:C:206:ARG:NH1	2.38	0.56
2:D:156:SER:HB2	2:D:157:PRO:HD3	1.88	0.56
1:C:171:PHE:HB2	1:C:208:HIS:ND1	2.20	0.56
1:A:425:LEU:HD13	1:A:428:GLN:HE21	1.70	0.56
1:C:327:ALA:HB3	1:C:389:PHE:CD1	2.41	0.56
1:A:156:SER:N	1:A:157:PRO:CD	2.69	0.55
2:B:422:LEU:O	2:B:423:VAL:C	2.44	0.55
3:C:601:VVE:C1	3:C:601:VVE:C4	2.84	0.55
1:A:402:TRP:CD1	1:A:402:TRP:C	2.80	0.55
1:A:442:VAL:HB	1:A:481:ALA:HB1	1.89	0.55
2:B:313:PRO:HB2	2:B:315:HIS:CE1	2.42	0.55
1:A:306:ASN:HA	1:A:309:ILE:HD12	1.88	0.55
1:C:510:PRO:HB2	1:C:522:ILE:HD11	1.88	0.55
1:C:451:LYS:O	1:C:470:THR:HA	2.07	0.54
1:C:441:TYR:CD2	1:C:544:GLY:HA3	2.42	0.54
1:C:114:ALA:HB1	1:C:160:PHE:CE1	2.43	0.54
1:A:459:THR:HG22	1:A:463:ARG:N	2.23	0.54
2:B:85:GLN:O	2:B:89:GLU:N	2.41	0.53
2:B:395:LYS:HG3	2:B:416:PHE:CE2	2.43	0.53
1:C:233:GLU:HB3	1:C:235:HIS:NE2	2.24	0.53
1:C:181:TYR:CE1	2:D:138:GLU:HB3	2.43	0.53
1:C:169:GLU:HB2	1:C:170:PRO:HD3	1.91	0.53
2:D:296:THR:HG22	2:D:299:ALA:H	1.74	0.53
2:B:184:MET:O	2:B:185:ASP:HB2	2.09	0.53
1:C:447:ASN:OD1	1:C:449:GLU:HB3	2.08	0.52
1:A:425:LEU:HD13	1:A:428:GLN:NE2	2.23	0.52
1:C:505:ILE:O	1:C:508:ALA:HB3	2.09	0.52
1:A:13:LYS:HB3	1:A:14:PRO:HD2	1.92	0.52
2:B:232:TYR:CG	2:B:233:GLU:N	2.76	0.52
2:D:25:PRO:C	2:D:26:LEU:HD12	2.29	0.52
1:A:303:LEU:O	1:A:307:ARG:HG3	2.10	0.52
1:A:475:GLN:HB3	1:A:501:TYR:CE2	2.45	0.52
1:C:93:GLY:C	1:C:94:ILE:HD13	2.30	0.52
1:C:240:THR:OG1	1:C:241:VAL:N	2.43	0.51
2:B:203:GLU:O	2:B:207:GLN:HG2	2.10	0.51
1:A:218:ASP:HA	1:A:221:HIS:NE2	2.25	0.51
1:A:486:LEU:O	1:A:489:SER:HB2	2.10	0.51
2:D:425:LEU:O	2:D:426:TRP:C	2.48	0.51
1:C:442:VAL:HB	1:C:481:ALA:HB1	1.92	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:368:LEU:O	2:D:372:VAL:HG23	2.10	0.51
2:D:182:GLN:CA	2:D:187:LEU:HA	2.25	0.51
2:B:400:THR:HG22	2:B:401:TRP:CD2	2.46	0.51
2:D:75:VAL:HG11	2:D:77:PHE:CZ	2.46	0.51
1:A:224:GLU:O	1:A:225:PRO:C	2.50	0.51
2:B:28:GLU:HB2	2:B:135:ILE:HD11	1.92	0.50
2:B:362:THR:HG22	2:B:367:GLN:HG3	1.94	0.50
1:C:438:GLU:OE2	1:C:463:ARG:HD3	2.12	0.50
1:A:181:TYR:CE1	2:B:138:GLU:HB3	2.47	0.50
1:A:393:ILE:HG23	1:A:393:ILE:O	2.11	0.50
2:B:388:LYS:HG3	2:B:413:GLU:HB3	1.93	0.50
1:C:3:SER:N	1:C:4:PRO:CD	2.74	0.50
2:B:249:LYS:HD2	2:B:252:TRP:CE3	2.47	0.50
2:D:75:VAL:HG11	2:D:77:PHE:CE2	2.47	0.50
2:D:239:TRP:CZ2	2:D:378:GLU:HG2	2.47	0.50
1:A:123:ASP:N	1:A:123:ASP:OD1	2.45	0.50
1:C:8:VAL:O	1:C:121:ASP:HB2	2.12	0.49
1:A:70:LYS:O	1:A:71:TRP:HB2	2.11	0.49
1:A:135:ILE:H	1:A:135:ILE:HD12	1.77	0.49
2:B:303:LEU:O	2:B:307:ARG:HG3	2.12	0.49
1:C:35:VAL:HA	1:C:38:CYS:HB2	1.94	0.49
2:B:306:ASN:HA	2:B:309:ILE:HD12	1.93	0.49
2:D:119:PRO:HA	2:D:148:VAL:HA	1.95	0.49
2:B:183:TYR:O	2:B:184:MET:C	2.51	0.49
2:B:344:GLU:HB3	2:B:345:PRO:HD2	1.94	0.49
2:D:153:TRP:CZ3	2:D:155:GLY:HA3	2.48	0.49
1:C:549:ASP:O	1:C:553:SER:N	2.45	0.48
1:A:390:LYS:HB3	1:A:417:VAL:CG2	2.43	0.48
2:B:163:SER:O	2:B:167:ILE:HG13	2.12	0.48
2:B:331:LYS:HB2	2:B:337:TRP:CZ3	2.49	0.48
2:B:382:ILE:HG22	2:B:383:TRP:CD2	2.48	0.48
2:D:281:LYS:O	2:D:284:ARG:HD2	2.12	0.48
1:C:254:VAL:HG23	1:C:291:GLU:HG3	1.95	0.48
1:A:427:TYR:O	1:A:428:GLN:HG2	2.14	0.48
1:C:180:ILE:HG12	1:C:189:VAL:HG22	1.96	0.48
2:D:136:ASN:O	2:D:137:ASN:C	2.52	0.48
2:B:425:LEU:O	2:B:426:TRP:C	2.52	0.48
2:D:365:VAL:HG12	2:D:405:TYR:HE1	1.77	0.48
1:A:429:LEU:HD11	1:A:506:ILE:HG22	1.95	0.48
2:B:382:ILE:HG22	2:B:383:TRP:CG	2.49	0.48
1:C:32:LYS:O	1:C:36:GLU:N	2.47	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:330:GLN:NE2	2:D:338:THR:OG1	2.42	0.48
2:B:85:GLN:HG3	2:B:86:ASP:N	2.28	0.47
1:C:544:GLY:O	1:C:545:ASN:C	2.52	0.47
1:A:341:ILE:HG21	1:A:383:TRP:CH2	2.49	0.47
2:B:342:TYR:CD1	2:B:342:TYR:C	2.87	0.47
1:C:183:TYR:HD2	1:C:188:TYR:OH	1.97	0.47
1:A:28:GLU:HA	1:A:31:ILE:HG13	1.95	0.47
1:C:24:TRP:N	1:C:25:PRO:HD3	2.29	0.47
1:A:94:ILE:HG22	1:A:183:TYR:CE1	2.50	0.47
2:B:105:SER:HB2	2:B:198:HIS:ND1	2.30	0.47
1:A:206:ARG:CZ	1:A:218:ASP:HB2	2.45	0.47
1:A:540:LYS:HA	1:A:540:LYS:HD2	1.59	0.47
2:B:54:ASN:O	2:B:143:ARG:NH2	2.48	0.47
1:C:9:PRO:HA	1:C:121:ASP:OD2	2.14	0.47
2:D:20:LYS:O	2:D:20:LYS:HD3	2.15	0.47
2:D:157:PRO:HG2	2:D:184:MET:HA	1.96	0.47
2:D:169:GLU:N	2:D:170:PRO:CD	2.78	0.47
2:B:325:LEU:C	2:B:326:ILE:HD12	2.35	0.47
1:C:94:ILE:HG22	1:C:95:PRO:O	2.14	0.47
2:B:326:ILE:HG21	2:B:342:TYR:CZ	2.50	0.47
1:C:465:LYS:O	1:C:466:VAL:HB	2.15	0.46
2:D:334:GLN:OE1	2:D:334:GLN:HA	2.14	0.46
2:D:336:GLN:C	2:D:337:TRP:CD1	2.89	0.46
2:B:115:TYR:OH	2:B:157:PRO:HB3	2.16	0.46
1:C:101:LYS:O	1:C:103:LYS:HG2	2.16	0.46
2:D:380:ILE:O	2:D:384:GLY:N	2.46	0.46
1:A:379:SER:CB	1:A:387:PRO:HD3	2.46	0.46
1:C:97:PRO:HG2	1:C:232:TYR:CG	2.51	0.46
2:B:104:LYS:O	2:B:235:HIS:HA	2.15	0.46
2:B:172:LYS:HB2	2:B:172:LYS:HE3	1.60	0.46
1:C:84:THR:HB	1:C:154:LYS:HD3	1.97	0.46
1:A:179:VAL:HB	3:A:601:VVE:CL1	2.53	0.46
2:B:183:TYR:OH	2:B:386:THR:HG23	2.17	0.45
1:C:171:PHE:CZ	1:C:205:LEU:HB2	2.51	0.45
1:C:254:VAL:HG23	1:C:291:GLU:O	2.17	0.45
1:C:64:LYS:HA	1:C:70:LYS:O	2.17	0.45
1:C:96:HIS:H	2:D:136:ASN:ND2	2.14	0.45
2:D:50:ILE:CG2	2:D:145:GLN:HB3	2.45	0.45
1:A:65:LYS:HA	1:A:65:LYS:HD2	1.58	0.45
2:D:27:THR:CG2	2:D:30:LYS:HD3	2.47	0.45
1:A:473:THR:CG2	1:A:476:LYS:HE3	2.47	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:225:PRO:CB	1:C:226:PRO:CD	2.94	0.45
1:C:379:SER:HB3	1:C:385:LYS:O	2.16	0.45
1:A:29:GLU:HG3	1:A:30:LYS:N	2.31	0.45
1:A:245:VAL:O	1:A:246:LEU:CB	2.65	0.45
2:D:252:TRP:HA	2:D:252:TRP:CE3	2.51	0.45
1:C:94:ILE:HG23	1:C:229:TRP:CH2	2.52	0.45
2:D:296:THR:HB	2:D:299:ALA:HB2	1.99	0.45
1:A:53:GLU:HG2	1:A:54:ASN:N	2.31	0.44
2:B:28:GLU:HB2	2:B:135:ILE:CD1	2.46	0.44
1:C:121:ASP:OD1	1:C:122:GLU:N	2.50	0.44
1:C:501:TYR:CE1	1:C:505:ILE:HD11	2.52	0.44
2:B:295:LEU:HB3	2:B:300:GLU:HG2	1.98	0.44
2:B:371:ALA:O	2:B:374:LYS:N	2.50	0.44
2:D:183:TYR:N	2:D:186:ASP:O	2.45	0.44
2:D:24:TRP:N	2:D:24:TRP:CD1	2.84	0.44
1:A:37:ILE:O	1:A:41:MET:HG3	2.17	0.44
1:C:156:SER:N	1:C:157:PRO:CD	2.81	0.44
1:C:453:GLY:HA3	1:C:469:LEU:HB2	1.99	0.44
1:C:473:THR:O	1:C:474:ASN:C	2.55	0.44
2:D:125:ARG:HD3	2:D:147:ASN:HA	2.00	0.44
2:D:24:TRP:O	2:D:26:LEU:CD1	2.66	0.44
1:A:354:TYR:HB2	1:A:374:LYS:HE2	2.00	0.43
2:B:393:ILE:HD13	2:B:398:TRP:HB2	2.00	0.43
1:C:178:ILE:CG2	1:C:189:VAL:HG13	2.49	0.43
1:A:226:PRO:O	1:A:228:LEU:N	2.51	0.43
1:A:399:GLU:HA	1:A:402:TRP:CZ3	2.52	0.43
1:A:545:ASN:O	1:A:548:VAL:HG12	2.19	0.43
2:B:156:SER:N	2:B:157:PRO:CD	2.81	0.43
2:B:198:HIS:C	2:B:198:HIS:CD2	2.91	0.43
1:A:63:ILE:O	1:A:71:TRP:HA	2.19	0.43
1:A:476:LYS:HE3	1:A:476:LYS:HB2	1.80	0.43
1:A:491:LEU:HD23	1:A:529:GLU:CD	2.39	0.43
2:B:362:THR:CG2	2:B:367:GLN:HG3	2.49	0.43
1:C:183:TYR:O	1:C:184:MET:C	2.56	0.43
1:A:545:ASN:HA	1:A:548:VAL:HG12	1.99	0.43
2:B:239:TRP:CZ3	2:B:378:GLU:HG2	2.53	0.43
1:C:32:LYS:O	1:C:35:VAL:HG12	2.18	0.43
1:A:479:LEU:HD11	1:A:521:ILE:CD1	2.48	0.43
1:C:94:ILE:CG2	1:C:229:TRP:CH2	3.02	0.43
1:C:303:LEU:O	1:C:307:ARG:HB2	2.18	0.43
2:B:263:LYS:HG3	2:B:426:TRP:HB2	1.99	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:366:LYS:O	1:C:369:THR:HB	2.19	0.43
1:A:135:ILE:H	1:A:135:ILE:CD1	2.32	0.43
1:A:455:ALA:HB2	1:A:469:LEU:HD11	2.00	0.43
1:A:501:TYR:CZ	1:A:505:ILE:HD11	2.54	0.43
1:A:532:TYR:CE2	1:A:534:ALA:HB2	2.53	0.43
1:C:509:GLN:N	1:C:510:PRO:HD3	2.34	0.43
2:D:330:GLN:NE2	2:D:330:GLN:N	2.67	0.43
1:C:288:ALA:HB3	1:C:291:GLU:HB3	2.01	0.42
1:C:149:LEU:HD11	1:C:159:ILE:HG22	2.00	0.42
1:A:395:LYS:HG2	1:A:414:TRP:CH2	2.54	0.42
1:C:95:PRO:HG3	2:D:137:ASN:O	2.19	0.42
1:C:522:ILE:O	1:C:523:GLU:C	2.57	0.42
1:A:374:LYS:HG3	1:A:375:ILE:N	2.35	0.42
2:B:64:LYS:HG3	2:B:70:LYS:O	2.19	0.42
1:A:236:PRO:HA	3:A:601:VVE:C24	2.49	0.42
1:C:225:PRO:CB	1:C:226:PRO:HD3	2.39	0.42
1:A:382:ILE:O	2:B:136:ASN:HB2	2.20	0.42
1:C:59:PRO:HG3	1:C:76:ASP:HB3	2.02	0.42
1:C:235:HIS:HA	1:C:236:PRO:HD3	1.92	0.42
1:A:447:ASN:HB3	1:A:450:THR:OG1	2.19	0.42
2:B:425:LEU:C	2:B:427:TYR:N	2.73	0.42
1:A:102:LYS:HA	3:A:601:VVE:O2	2.20	0.42
1:C:179:VAL:HG11	3:C:601:VVE:CL1	2.56	0.42
1:C:544:GLY:HA2	1:C:547:GLN:OE1	2.19	0.42
1:A:60:VAL:HG22	1:A:61:PHE:N	2.34	0.41
1:A:398:TRP:CD1	1:A:402:TRP:CE3	3.07	0.41
1:C:102:LYS:HA	3:C:601:VVE:O2	2.19	0.41
1:C:478:GLU:O	1:C:482:ILE:HG12	2.20	0.41
1:A:100:LEU:HB3	3:A:601:VVE:C6	2.50	0.41
1:C:235:HIS:HB2	1:C:238:LYS:O	2.20	0.41
1:C:325:LEU:HD12	1:C:325:LEU:HA	1.74	0.41
2:D:168:LEU:HA	2:D:208:HIS:HE1	1.84	0.41
2:B:114:ALA:HB1	2:B:160:PHE:CZ	2.55	0.41
1:C:100:LEU:HD13	3:C:601:VVE:C19	2.49	0.41
1:C:236:PRO:O	1:C:237:ASP:CB	2.68	0.41
1:A:233:GLU:HB3	1:A:235:HIS:NE2	2.35	0.41
1:A:255:ASN:HA	1:A:258:GLN:HG3	2.03	0.41
1:C:486:LEU:O	1:C:528:LYS:NZ	2.54	0.41
2:D:125:ARG:HD3	2:D:146:TYR:O	2.21	0.41
1:A:245:VAL:O	1:A:246:LEU:HB3	2.21	0.41
1:C:296:THR:O	1:C:299:ALA:HB3	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:29:GLU:HG3	1:A:30:LYS:H	1.85	0.41
1:A:458:VAL:HG12	2:B:286:THR:HG21	2.02	0.41
2:B:167:ILE:O	2:B:208:HIS:NE2	2.46	0.41
1:A:149:LEU:HB3	1:A:156:SER:OG	2.20	0.41
1:C:108:VAL:HG23	1:C:188:TYR:HD1	1.85	0.41
2:D:337:TRP:CZ3	2:D:368:LEU:HD13	2.56	0.41
1:C:108:VAL:HG23	1:C:188:TYR:CD1	2.55	0.41
2:D:296:THR:HG22	2:D:298:GLU:N	2.36	0.41
1:A:254:VAL:HG23	1:A:291:GLU:O	2.21	0.41
1:A:459:THR:HG22	1:A:463:ARG:H	1.87	0.41
1:A:465:LYS:HG2	1:A:466:VAL:N	2.36	0.41
2:B:58:THR:HG21	2:B:77:PHE:CD1	2.55	0.41
2:B:239:TRP:CH2	2:B:378:GLU:HG3	2.56	0.41
1:C:326:ILE:O	1:C:341:ILE:HA	2.21	0.41
1:A:441:TYR:CD2	1:A:544:GLY:HA3	2.56	0.40
1:C:3:SER:N	1:C:4:PRO:HD2	2.35	0.40
1:A:496:VAL:HG21	2:B:289:LEU:HD21	2.02	0.40
1:C:175:ASN:HB3	1:C:178:ILE:HG12	2.03	0.40
1:C:268:SER:O	1:C:351:THR:O	2.39	0.40
1:C:473:THR:O	1:C:476:LYS:N	2.54	0.40
2:D:420:PRO:HB2	2:D:421:PRO:CD	2.52	0.40
2:B:81:ASN:OD1	2:B:153:TRP:HD1	2.04	0.40
2:B:319:TYR:OH	2:B:385:LYS:HD2	2.20	0.40
2:B:388:LYS:CG	2:B:413:GLU:HB3	2.50	0.40
1:C:291:GLU:HG3	1:C:291:GLU:O	2.20	0.40
1:C:545:ASN:O	1:C:549:ASP:HB2	2.22	0.40
2:B:10:VAL:HA	2:B:88:TRP:CH2	2.57	0.40
2:B:110:ASP:HB3	2:B:217:PRO:HG2	2.03	0.40
1:A:232:TYR:OH	1:A:269:GLN:NE2	2.39	0.40
2:B:118:VAL:HB	2:B:149:LEU:CD1	2.52	0.40
1:C:187:LEU:HD23	1:C:187:LEU:HA	1.81	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	546/556 (98%)	512 (94%)	32 (6%)	2 (0%)	34	72
1	C	516/556 (93%)	465 (90%)	50 (10%)	1 (0%)	47	82
2	B	395/428 (92%)	374 (95%)	19 (5%)	2 (0%)	29	68
2	D	388/428 (91%)	339 (87%)	49 (13%)	0	100	100
All	All	1845/1968 (94%)	1690 (92%)	150 (8%)	5 (0%)	41	76

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	426	TRP
1	C	237	ASP
2	B	184	MET
1	A	226	PRO
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	417/495 (84%)	383 (92%)	34 (8%)	11	39
1	C	328/495 (66%)	303 (92%)	25 (8%)	13	43
2	B	340/390 (87%)	310 (91%)	30 (9%)	10	36
2	D	224/390 (57%)	197 (88%)	27 (12%)	5	21
All	All	1309/1770 (74%)	1193 (91%)	116 (9%)	9	35

All (116) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	5	ILE
1	A	7	THR
1	A	16	MET

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Mol	Chain	Res	Type
1	A	23	GLN
1	A	42	GLU
1	A	46	LYS
1	A	58	THR
1	A	65	LYS
1	A	68	SER
1	A	103	LYS
1	A	105	SER
1	A	123	ASP
1	A	126	LYS
1	A	135	ILE
1	A	139	THR
1	A	151	GLN
1	A	162	SER
1	A	163	SER
1	A	219	LYS
1	A	244	ILE
1	A	245	VAL
1	A	292	VAL
1	A	362	THR
1	A	363	ASN
1	A	374	LYS
1	A	386	THR
1	A	402	TRP
1	A	413	GLU
1	A	459	THR
1	A	489	SER
1	A	513	SER
1	A	527	LYS
1	A	540	LYS
1	A	547	GLN
2	B	24	TRP
2	B	55	PRO
2	B	58	THR
2	B	64	LYS
2	B	84	THR
2	B	85	GLN
2	B	86	ASP
2	B	88	TRP
2	B	89	GLU
2	B	92	LEU
2	B	117	SER

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Mol	Chain	Res	Type
2	B	134	SER
2	B	184	MET
2	B	185	ASP
2	B	193	LEU
2	B	195	ILE
2	B	200	THR
2	B	216	THR
2	B	218	ASP
2	B	233	GLU
2	B	242	GLN
2	B	249	LYS
2	B	253	THR
2	B	290	THR
2	B	314	VAL
2	B	338	THR
2	B	417	VAL
2	B	418	ASN
2	B	426	TRP
2	B	427	TYR
1	C	35	VAL
1	C	38	CYS
1	C	94	ILE
1	C	101	LYS
1	C	113	ASP
1	C	123	ASP
1	C	146	TYR
1	C	161	GLN
1	C	184	MET
1	C	186	ASP
1	C	200	THR
1	C	219	LYS
1	C	291	GLU
1	C	325	LEU
1	C	351	THR
1	C	393	ILE
1	C	402	TRP
1	C	405	TYR
1	C	442	VAL
1	C	447	ASN
1	C	449	GLU
1	C	454	LYS
1	C	473	THR

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Mol	Chain	Res	Type
1	C	496	VAL
1	C	549	ASP
2	D	20	LYS
2	D	27	THR
2	D	48	SER
2	D	63	ILE
2	D	68	SER
2	D	101	LYS
2	D	125	ARG
2	D	126	LYS
2	D	135	ILE
2	D	137	ASN
2	D	139	THR
2	D	175	ASN
2	D	237	ASP
2	D	252	TRP
2	D	253	THR
2	D	256	ASP
2	D	266	TRP
2	D	293	ILE
2	D	314	VAL
2	D	317	VAL
2	D	330	GLN
2	D	340	GLN
2	D	361	HIS
2	D	405	TYR
2	D	410	TRP
2	D	423	VAL
2	D	426	TRP

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

Mol	Chain	Res	Type
1	A	23	GLN
1	A	235	HIS
1	A	269	GLN
2	B	242	GLN
2	B	315	HIS
1	C	175	ASN
1	C	182	GLN
1	C	269	GLN
1	C	487	GLN

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Mol	Chain	Res	Type
2	D	137	ASN
2	D	175	ASN
2	D	330	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

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

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

4 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	PO4	A	602	-	4,4,4	0.71	0	6,6,6	0.44	0
4	PO4	B	501	-	4,4,4	0.69	0	6,6,6	0.44	0
3	VVE	C	601	-	37,37,37	0.94	2 (5%)	50,52,52	1.14	2 (4%)
3	VVE	A	601	1	37,37,37	0.49	0	50,52,52	1.65	6 (12%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '2' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	VVE	C	601	-	-	6/18/18/18	0/4/4/4
3	VVE	A	601	1	-	5/18/18/18	0/4/4/4

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	601	VVE	C1-C2	-4.77	1.30	1.51
3	C	601	VVE	C2-C3	-2.07	1.47	1.51

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	601	VVE	C1-C2-C3	7.76	127.07	112.72
3	C	601	VVE	C1-C2-C3	6.37	124.48	112.72
3	A	601	VVE	O3-C7-C12	4.15	124.30	115.73
3	A	601	VVE	O3-C7-C8	-3.87	114.68	123.58
3	A	601	VVE	C25-N1-C4	-3.07	108.40	109.51
3	A	601	VVE	C5-N2-C4	2.67	125.93	122.30
3	A	601	VVE	C6-O3-C7	2.31	123.34	117.69
3	C	601	VVE	C5-N2-C4	2.06	125.11	122.30

There are no chirality outliers.

All (11) torsion outliers are listed below:

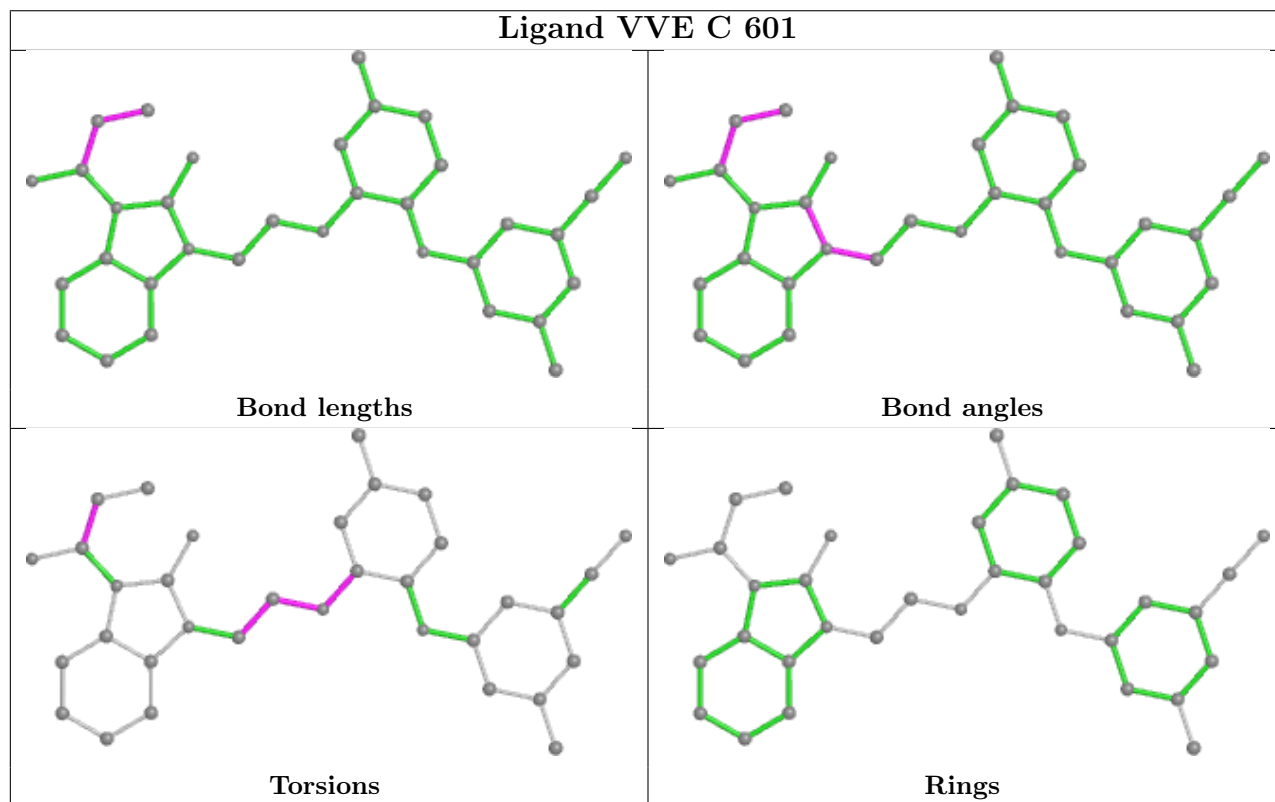
Mol	Chain	Res	Type	Atoms
3	C	601	VVE	C1-C2-C3-O1
3	C	601	VVE	C1-C2-C3-N1
3	A	601	VVE	C8-C7-O3-C6
3	A	601	VVE	C12-C7-O3-C6
3	C	601	VVE	N2-C5-C6-O3
3	C	601	VVE	C5-C6-O3-C7
3	A	601	VVE	C6-C5-N2-C4
3	C	601	VVE	C12-C7-O3-C6
3	A	601	VVE	C7-C12-O4-C13
3	A	601	VVE	C6-C5-N2-C20
3	C	601	VVE	C8-C7-O3-C6

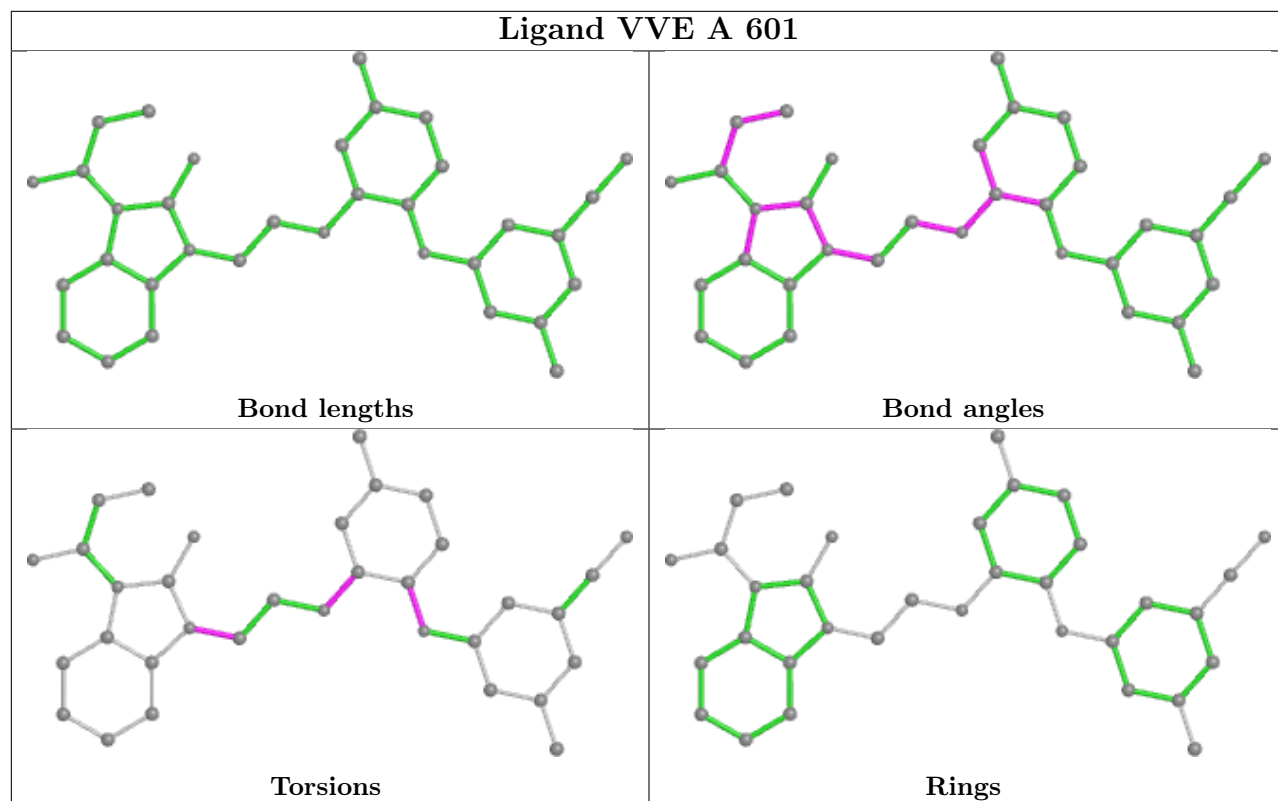
There are no ring outliers.

2 monomers are involved in 14 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	601	VVE	6	0
3	A	601	VVE	8	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 than 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.





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

Unable to reproduce the depositors R factor - this section is therefore empty.

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

Unable to reproduce the depositors R factor - this section is therefore empty.

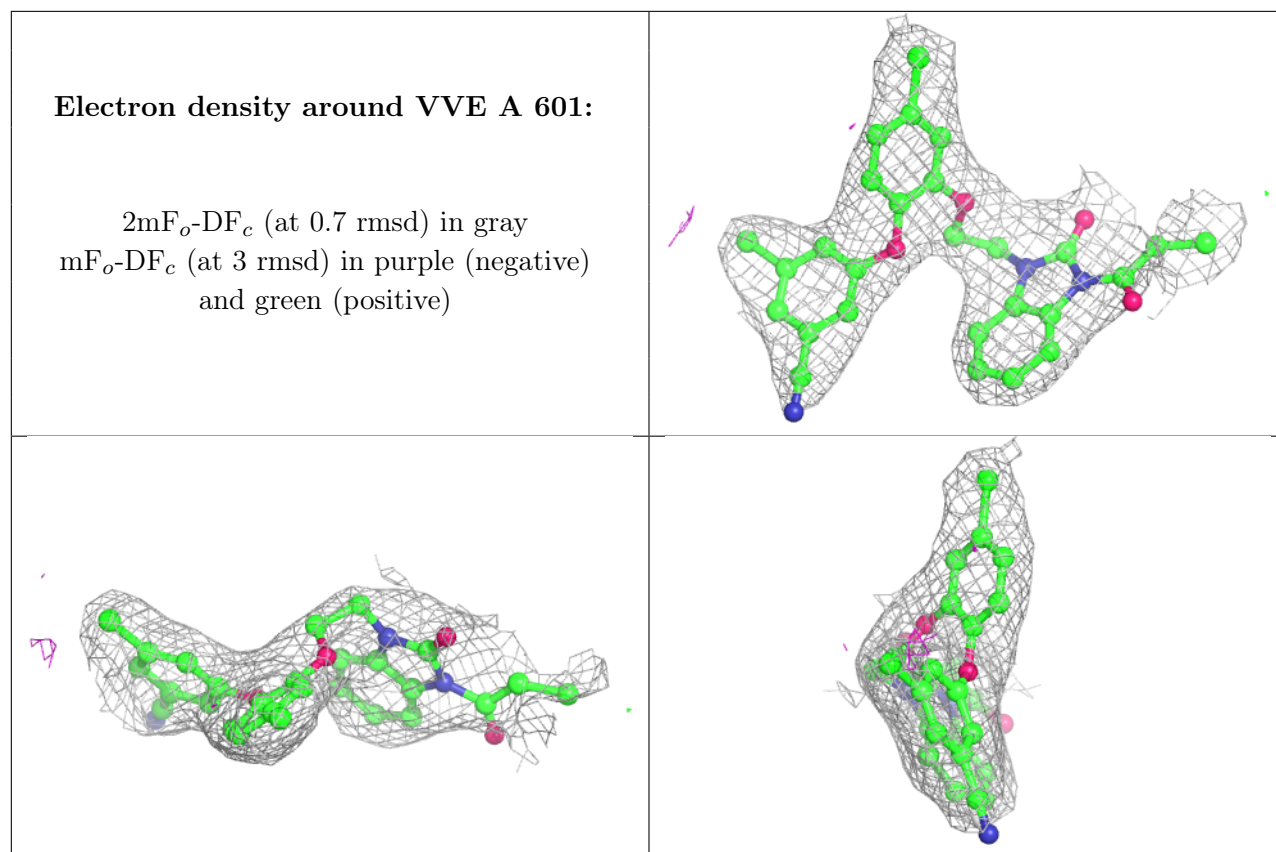
6.3 Carbohydrates

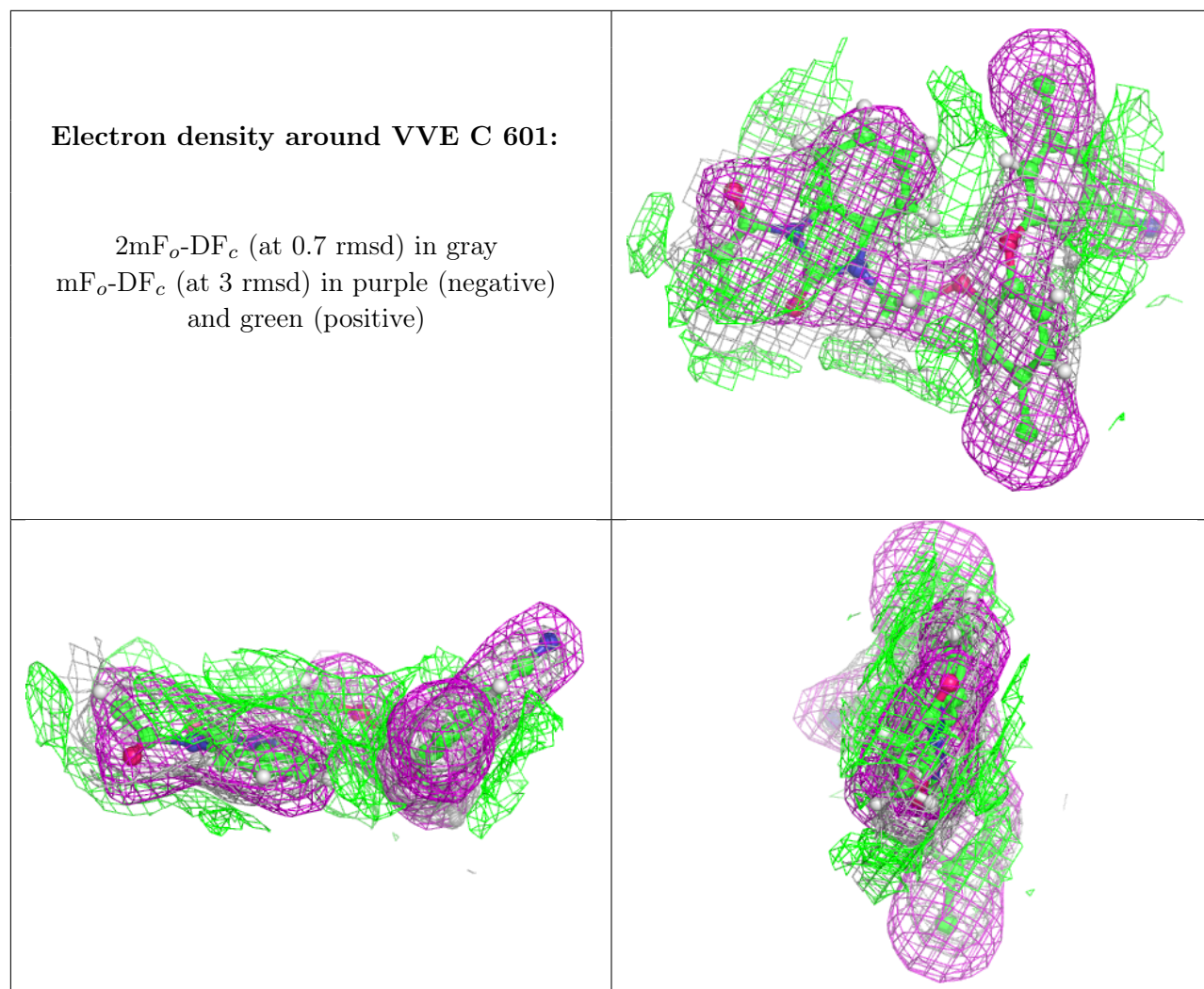
Unable to reproduce the depositors R factor - this section is therefore empty.

6.4 Ligands

Unable to reproduce the depositors R factor - this section is therefore empty.

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 [\(i\)](#)

Unable to reproduce the depositors R factor - this section is therefore empty.