Full wwPDB X-ray Structure Validation Report ⓘ

Jun 17, 2024 – 09:35 AM EDT

PDB ID	:	3KWJ
Title	:	Structure of human DPP-IV with (2S,3S,11bS)-3-(3-Fluoromethyl-phenyl)-9, 10-dimethoxy-1,3,4,6,7,11b-hexahydro-2H-pyrido[2,1-a]isoquinolin-2-ylamine
Authors	:	Hennig, M.; Stihle, M.; Thoma, R.
Deposited on	:	2009-12-01
Resolution	:	2.80 Å(reported)

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

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

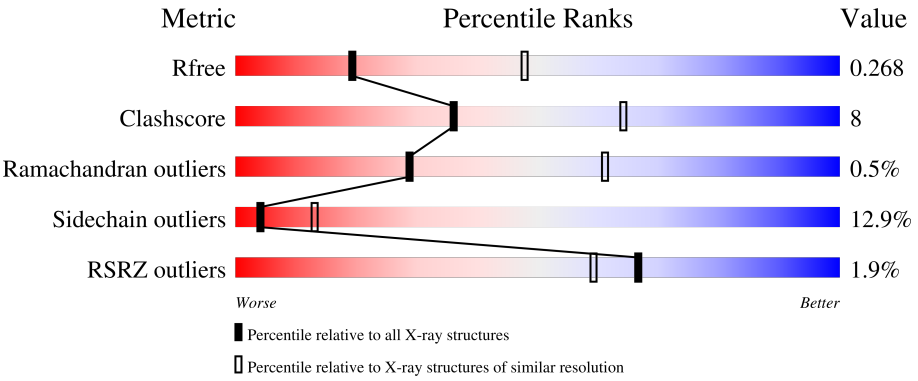
MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.20.1
EDS	:	2.37.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.37.1

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 2.80 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	3140 (2.80-2.80)
Clashscore	141614	3569 (2.80-2.80)
Ramachandran outliers	138981	3498 (2.80-2.80)
Sidechain outliers	138945	3500 (2.80-2.80)
RSRZ outliers	127900	3078 (2.80-2.80)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5% The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	728	2% 70% 26%
1	B	728	2% 73% 24%

2 Entry composition

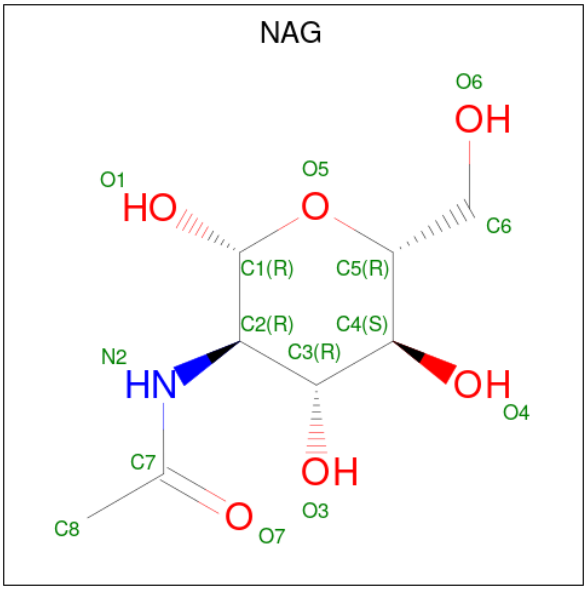
There are 4 unique types of molecules in this entry. The entry contains 12060 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Dipeptidyl peptidase 4 soluble form.

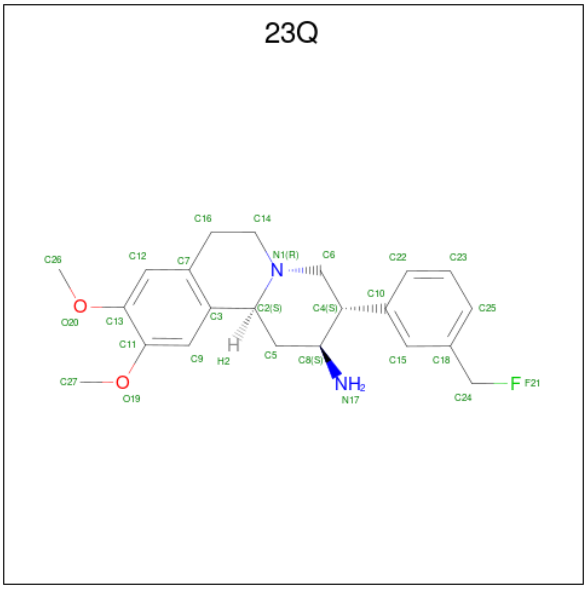
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	728	Total	C	N	O	S	0	0	0
			5963	3827	982	1128	26			
1	B	728	Total	C	N	O	S	0	0	0
			5963	3827	982	1128	26			

- Molecule 2 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			14	8	1	5		
2	A	1	Total	C	N	O	0	0
			14	8	1	5		
2	B	1	Total	C	N	O	0	0
			14	8	1	5		
2	B	1	Total	C	N	O	0	0
			14	8	1	5		

- Molecule 3 is (2S,3S,11bS)-3-[3-(fluoromethyl)phenyl]-9,10-dimethoxy-1,3,4,6,7,11b-hexahydro-2H-pyrido[2,1-a]isoquinolin-2-amine (three-letter code: 23Q) (formula: $C_{22}H_{27}FN_2O_2$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	F	N	O	0	0
			27	22	1	2	2		
3	B	1	Total	C	F	N	O	0	0
			27	22	1	2	2		

- Molecule 4 is water.

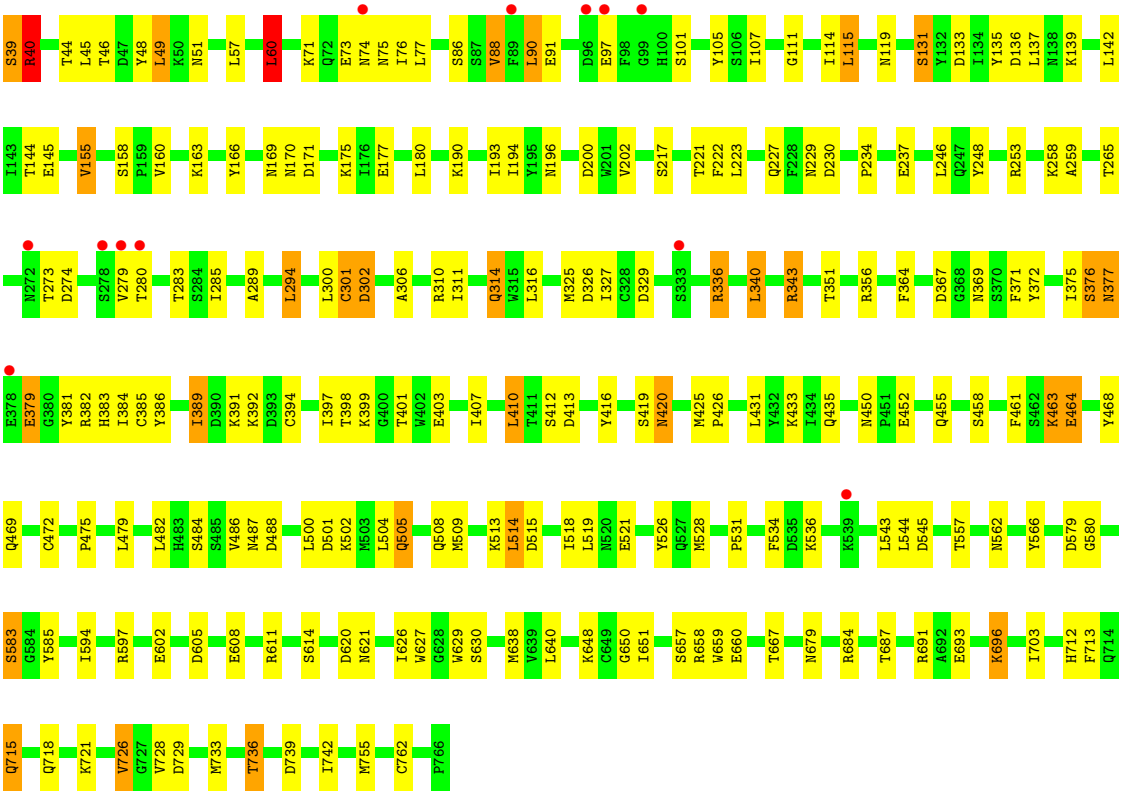
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	9	Total	O	0	0
			9	9		
4	B	15	Total	O	0	0
			15	15		

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.

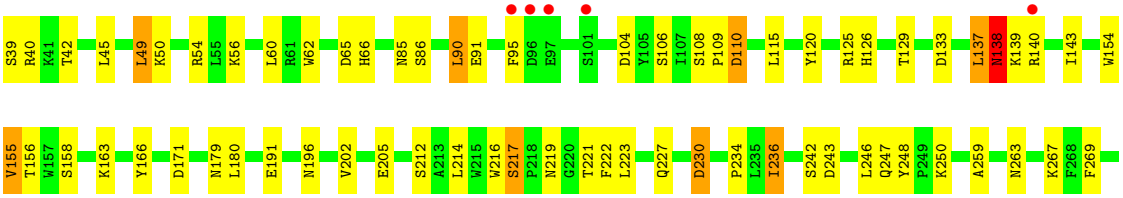
• Molecule 1: Dipeptidyl peptidase 4 soluble form

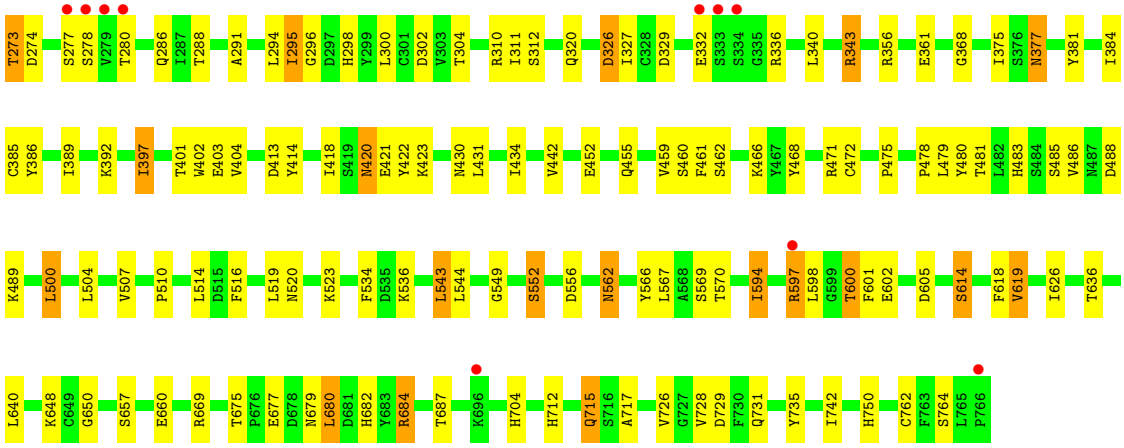
Chain A:



• Molecule 1: Dipeptidyl peptidase 4 soluble form

Chain B:




T273 D274 S277 S278 V279 T280 Q286 I287 T288 A291 L294 I295 G296 D297 H298 Y299 L300 C301 D302 V303 T304 R310 I311 S312 Q320 D326 I327 C328 D329 E332 S333 S334 G335 R336 L340 R343 R356 E361 G368 I375 S376 N377 Y381 I384
C385 Y386 I389 K392 I397 T401 W402 E403 V404 D413 Y414 I418 S419 N420 E421 Y422 K423 N430 L431 I434 V442 E452 Q455 V459 S460 F461 S462 K466 Y467 Y468 R471 C472 P475 P478 L479 Y480 T481 L482 H483 S484 S485 V486 N487 D488
K489 L500 L504 V507 P510 L514 D515 F516 L519 N520 K523 F534 D535 K536 L543 L544 G549 S552 D556 N562 Y566 L567 A568 S569 T570 I594 R597 L598 G599 T600 F601 E602 D605 S614 F618 V619 I626 T636
L640 K648 C649 G650 S657 E660 R669 T675 P676 E677 D678 N679 L680 D681 H682 Y683 R684 T687 K696 H704 H712 Q715 S716 A717 V726 G727 V728 D729 F730 Q731 Y735 I742 H750 C762 F763 S764 L765 P766

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	65.20Å 68.96Å 421.56Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	15.00 – 2.80 29.92 – 2.80	Depositor EDS
% Data completeness (in resolution range)	94.1 (15.00-2.80) 94.1 (29.92-2.80)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	4.21 (at 2.80Å)	Xtriage
Refinement program	REFMAC 5.1.24	Depositor
R, R_{free}	0.232 , 0.276 0.225 , 0.268	Depositor DCC
R_{free} test set	2320 reflections (5.12%)	wwPDB-VP
Wilson B-factor (Å^2)	50.7	Xtriage
Anisotropy	0.733	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 54.4	EDS
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.92	EDS
Total number of atoms	12060	wwPDB-VP
Average B, all atoms (Å^2)	51.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.75% 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 (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: 23Q, NAG

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	0.52	0/6135	0.79	18/8344 (0.2%)
1	B	0.57	0/6135	0.83	16/8344 (0.2%)
All	All	0.55	0/12270	0.81	34/16688 (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	B	0	1

There are no bond length outliers.

All (34) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	729	ASP	CB-CG-OD2	7.44	124.99	118.30
1	A	230	ASP	CB-CG-OD2	7.29	124.86	118.30
1	A	620	ASP	CB-CG-OD2	7.09	124.68	118.30
1	B	230	ASP	CB-CG-OD2	6.11	123.80	118.30
1	A	515	ASP	CB-CG-OD2	6.08	123.77	118.30
1	A	579	ASP	CB-CG-OD2	5.87	123.58	118.30
1	B	104	ASP	CB-CG-OD2	5.83	123.55	118.30
1	A	60	LEU	CA-CB-CG	5.79	128.61	115.30
1	B	329	ASP	CB-CG-OD2	5.73	123.46	118.30
1	A	274	ASP	CB-CG-OD2	5.72	123.45	118.30
1	A	501	ASP	CB-CG-OD2	5.70	123.43	118.30
1	B	488	ASP	CB-CG-OD2	5.69	123.42	118.30
1	B	729	ASP	CB-CG-OD2	5.68	123.41	118.30
1	B	413	ASP	CB-CG-OD2	5.65	123.39	118.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	413	ASP	CB-CG-OD2	5.60	123.34	118.30
1	A	133	ASP	CB-CG-OD2	5.58	123.33	118.30
1	B	110	ASP	CB-CG-OD2	5.57	123.31	118.30
1	A	329	ASP	CB-CG-OD2	5.50	123.25	118.30
1	A	488	ASP	CB-CG-OD2	5.46	123.22	118.30
1	A	200	ASP	CB-CG-OD2	5.34	123.10	118.30
1	A	545	ASP	CB-CG-OD2	5.25	123.02	118.30
1	A	605	ASP	CB-CG-OD2	5.25	123.02	118.30
1	B	65	ASP	CB-CG-OD2	5.22	123.00	118.30
1	A	171	ASP	CB-CG-OD2	5.21	122.99	118.30
1	A	302	ASP	CB-CG-OD2	5.18	122.96	118.30
1	B	171	ASP	CB-CG-OD2	5.16	122.94	118.30
1	B	274	ASP	CB-CG-OD2	5.14	122.93	118.30
1	B	133	ASP	CB-CG-OD2	5.10	122.89	118.30
1	B	302	ASP	CB-CG-OD2	5.10	122.89	118.30
1	B	326	ASP	CB-CG-OD2	5.07	122.87	118.30
1	A	739	ASP	CB-CG-OD2	5.07	122.86	118.30
1	B	605	ASP	CB-CG-OD2	5.06	122.85	118.30
1	B	556	ASP	CB-CG-OD2	5.05	122.85	118.30
1	B	243	ASP	CB-CG-OD2	5.03	122.83	118.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	110	ASP	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	5963	0	5684	92	0
1	B	5963	0	5684	102	0
2	A	28	0	26	2	0
2	B	28	0	26	3	0
3	A	27	0	27	0	0
3	B	27	0	27	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	A	9	0	0	1	0
4	B	15	0	0	0	0
All	All	12060	0	11474	187	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 8.

All (187) 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:229:ASN:HD21	2:A:796:NAG:C1	1.27	1.44
1:B:85:ASN:HD21	2:B:794:NAG:C1	1.45	1.29
1:A:229:ASN:ND2	2:A:796:NAG:C1	2.11	1.13
1:B:85:ASN:ND2	2:B:794:NAG:C1	2.22	1.00
1:B:735:TYR:OH	1:B:750:HIS:HD2	1.47	0.96
1:B:600:THR:HG22	1:B:601:PHE:H	1.33	0.92
1:A:221:THR:O	1:A:273:THR:HB	1.69	0.92
1:B:600:THR:HG22	1:B:601:PHE:N	1.89	0.85
1:B:155:VAL:HG13	1:B:166:TYR:HB3	1.59	0.84
1:B:221:THR:O	1:B:273:THR:HB	1.78	0.83
1:B:648:LYS:HE3	1:B:762:CYS:O	1.79	0.83
1:A:580:GLY:O	1:A:583:SER:OG	1.96	0.83
1:B:45:LEU:HG	1:B:49:LEU:HD22	1.65	0.79
1:A:403:GLU:H	1:A:420:ASN:HD21	1.31	0.79
1:A:196:ASN:OD1	1:A:227:GLN:HG3	1.84	0.78
1:B:735:TYR:OH	1:B:750:HIS:CD2	2.36	0.76
1:B:657:SER:H	1:B:715:GLN:NE2	1.84	0.75
1:A:377:ASN:HD22	1:A:377:ASN:C	1.92	0.73
1:A:420:ASN:H	1:A:420:ASN:HD22	1.38	0.72
1:A:455:GLN:HB2	1:A:475:PRO:HD3	1.76	0.68
1:B:726:VAL:HG12	1:B:728:VAL:HG23	1.76	0.67
1:A:640:LEU:HD11	1:A:650:GLY:HA3	1.77	0.65
1:A:237:GLU:HG2	1:A:253:ARG:HG2	1.79	0.64
1:B:461:PHE:CD1	1:B:468:TYR:HB3	2.33	0.64
1:B:291:ALA:O	1:B:295:ILE:HG22	1.97	0.64
1:B:600:THR:CG2	1:B:601:PHE:N	2.60	0.63
1:A:77:LEU:HD23	1:A:88:VAL:HA	1.81	0.63
1:A:463:LYS:O	1:A:464:GLU:HB2	1.98	0.63
1:B:500:LEU:HD22	1:B:504:LEU:HG	1.80	0.63
1:B:562:ASN:C	1:B:562:ASN:HD22	2.02	0.63
1:A:693:GLU:O	1:A:696:LYS:HG3	1.99	0.63

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:163:LYS:HD3	1:A:273:THR:HG21	1.81	0.62
1:B:403:GLU:H	1:B:420:ASN:HD21	1.46	0.62
1:A:504:LEU:HD13	1:A:509:MET:HE2	1.80	0.61
1:A:229:ASN:HB3	1:A:265:THR:OG1	2.02	0.59
1:A:736:THR:HG21	1:B:717:ALA:O	2.01	0.59
1:B:386:TYR:HB2	1:B:397:ILE:HD13	1.84	0.59
1:B:510:PRO:HD3	1:B:569:SER:HB2	1.85	0.59
1:B:420:ASN:H	1:B:420:ASN:HD22	1.51	0.59
1:B:377:ASN:ND2	1:B:381:TYR:H	2.01	0.59
1:A:718:GLN:OE1	1:A:721:LYS:NZ	2.36	0.59
1:B:402:TRP:NE1	1:B:421:GLU:HG3	2.16	0.58
1:B:402:TRP:CE2	1:B:421:GLU:HG3	2.39	0.58
1:B:597:ARG:O	1:B:600:THR:HB	2.03	0.57
1:B:516:PHE:CD1	1:B:523:LYS:HG2	2.39	0.57
1:B:657:SER:H	1:B:715:GLN:HE21	1.51	0.57
1:B:196:ASN:OD1	1:B:227:GLN:HG3	2.05	0.57
1:A:638:MET:O	1:A:691:ARG:NH1	2.38	0.57
1:B:137:LEU:C	1:B:139:LYS:H	2.07	0.57
1:B:543:LEU:HD12	1:B:567:LEU:HD13	1.87	0.57
1:B:648:LYS:CE	1:B:762:CYS:O	2.52	0.57
1:B:598:LEU:O	1:B:682:HIS:HE1	1.88	0.56
1:A:657:SER:H	1:A:715:GLN:NE2	2.03	0.56
1:B:726:VAL:CG1	1:B:728:VAL:HG23	2.35	0.56
1:B:401:THR:HG22	1:B:401:THR:O	2.06	0.56
1:B:640:LEU:HD11	1:B:650:GLY:HA3	1.88	0.55
1:B:304:THR:O	1:B:312:SER:HB3	2.06	0.55
1:B:42:THR:HG23	1:B:570:THR:OG1	2.06	0.55
1:B:422:TYR:CE2	1:B:423:LYS:HD2	2.41	0.55
1:A:44:THR:HG22	1:A:46:THR:H	1.71	0.54
1:B:386:TYR:HB2	1:B:397:ILE:CD1	2.37	0.54
1:A:377:ASN:ND2	1:A:379:GLU:H	2.05	0.54
1:A:658:ARG:HG3	1:A:687:THR:HG22	1.90	0.54
1:A:594:ILE:HD11	1:A:602:GLU:OE1	2.08	0.53
1:A:289:ALA:HB3	1:A:294:LEU:HD13	1.90	0.53
1:A:325:MET:HE1	1:A:371:PHE:CE2	2.43	0.53
1:B:154:TRP:CE2	1:B:212:SER:HB2	2.44	0.53
1:A:514:LEU:HD12	1:A:557:THR:HG22	1.90	0.53
1:B:327:ILE:HB	1:B:343:ARG:HG3	1.91	0.53
1:A:169:ASN:O	1:A:170:ASN:HB2	2.07	0.53
1:B:544:LEU:HD23	1:B:626:ILE:HD12	1.90	0.52
1:A:726:VAL:HG12	1:A:728:VAL:HG23	1.90	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:416:TYR:CE2	1:A:433:LYS:HG3	2.45	0.52
1:B:377:ASN:C	1:B:377:ASN:HD22	2.12	0.52
1:A:461:PHE:CD1	1:A:468:TYR:HB3	2.45	0.51
1:B:384:ILE:HG13	1:B:404:VAL:HG21	1.93	0.51
1:B:461:PHE:CE1	1:B:468:TYR:HB3	2.46	0.51
1:A:76:ILE:HD12	1:A:90:LEU:HB3	1.92	0.51
1:B:594:ILE:HD11	1:B:602:GLU:H	1.75	0.51
1:A:105:TYR:HA	1:A:115:LEU:O	2.11	0.51
1:B:137:LEU:O	1:B:139:LYS:N	2.37	0.51
1:A:626:ILE:O	1:A:650:GLY:HA2	2.12	0.50
1:B:626:ILE:HG23	1:B:636:THR:HG23	1.91	0.50
1:B:356:ARG:NH2	1:B:403:GLU:OE1	2.42	0.50
1:A:119:ASN:HB2	1:A:131:SER:HB2	1.94	0.50
1:A:693:GLU:HA	1:A:726:VAL:HG11	1.94	0.50
1:B:420:ASN:H	1:B:420:ASN:ND2	2.09	0.50
1:A:258:LYS:HD2	1:B:247:GLN:HG2	1.94	0.50
1:A:651:ILE:HD13	1:A:755:MET:HG2	1.94	0.50
1:B:660:GLU:OE2	1:B:684:ARG:NH2	2.39	0.49
1:A:234:PRO:HB2	1:B:248:TYR:CZ	2.47	0.49
1:B:402:TRP:CD1	1:B:421:GLU:HG3	2.48	0.49
1:A:386:TYR:O	1:A:394:CYS:HB2	2.12	0.49
1:B:320:GLN:OE1	1:B:669:ARG:HD3	2.12	0.49
1:A:155:VAL:HG13	1:A:166:TYR:HB3	1.95	0.48
1:A:648:LYS:NZ	1:A:762:CYS:O	2.39	0.48
1:A:356:ARG:HD2	4:A:23:HOH:O	2.12	0.48
1:A:377:ASN:C	1:A:377:ASN:ND2	2.65	0.48
1:A:659:TRP:HB3	1:A:667:THR:CG2	2.44	0.48
1:B:472:CYS:O	1:B:478:PRO:HA	2.13	0.48
1:A:403:GLU:H	1:A:420:ASN:ND2	2.06	0.48
1:A:258:LYS:HG3	1:B:248:TYR:CZ	2.48	0.48
1:B:163:LYS:NZ	1:B:273:THR:HG22	2.29	0.48
1:B:418:ILE:HA	1:B:430:ASN:O	2.14	0.47
1:A:364:PHE:CD1	1:A:371:PHE:HB3	2.49	0.47
1:A:703:ILE:HG12	1:A:733:MET:HB3	1.96	0.47
1:B:163:LYS:HZ3	1:B:273:THR:HG22	1.79	0.47
1:B:549:GLY:O	1:B:552:SER:HB2	2.14	0.47
1:B:62:TRP:CE3	1:B:462:SER:HB3	2.50	0.47
1:B:90:LEU:HD11	1:B:95:PHE:HE2	1.80	0.47
1:B:277:SER:HB3	1:B:280:THR:HB	1.97	0.46
1:B:296:GLY:O	1:B:298:HIS:HD2	1.98	0.46
1:B:614:SER:HA	1:B:619:VAL:CG2	2.45	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:217:SER:HB3	1:B:222:PHE:HB2	1.97	0.46
1:A:327:ILE:HB	1:A:343:ARG:HG3	1.97	0.46
1:B:85:ASN:HD21	2:B:794:NAG:C2	2.21	0.46
1:A:384:ILE:HG12	1:A:407:ILE:HD11	1.97	0.46
1:A:463:LYS:O	1:A:464:GLU:CB	2.64	0.46
1:A:416:TYR:HE2	1:A:433:LYS:HG3	1.81	0.46
1:A:531:PRO:HD2	1:A:534:PHE:HD1	1.81	0.46
1:B:310:ARG:NH2	1:B:368:GLY:O	2.49	0.45
1:B:640:LEU:HD11	1:B:650:GLY:CA	2.46	0.45
1:A:302:ASP:HB3	1:A:314:GLN:HB2	1.97	0.45
1:A:627:TRP:HB2	1:A:651:ILE:HB	1.98	0.45
1:A:217:SER:HB3	1:A:222:PHE:HB2	1.98	0.45
1:A:611:ARG:O	1:A:614:SER:HB2	2.15	0.45
1:A:629:TRP:HZ2	1:A:742:ILE:HG13	1.82	0.45
1:B:205:GLU:OE2	3:B:1:23Q:N17	2.49	0.45
1:A:248:TYR:CZ	1:B:234:PRO:HB2	2.51	0.44
1:B:109:PRO:HG2	1:B:158:SER:O	2.16	0.44
1:A:193:ILE:HG22	1:A:194:ILE:HG12	1.98	0.44
1:B:459:VAL:HG22	1:B:460:SER:N	2.32	0.44
1:A:136:ASP:O	1:A:139:LYS:O	2.35	0.44
1:A:259:ALA:HB3	1:A:660:GLU:HA	1.99	0.44
1:B:143:ILE:HD13	1:B:179:ASN:HA	2.00	0.44
1:A:340:LEU:HB2	1:A:343:ARG:HD2	1.99	0.44
1:A:659:TRP:HB3	1:A:667:THR:HG21	1.99	0.44
1:A:696:LYS:HG3	1:A:696:LYS:H	1.62	0.44
1:A:703:ILE:HA	1:A:733:MET:O	2.18	0.44
1:A:728:VAL:O	1:B:750:HIS:HE1	2.01	0.44
1:B:158:SER:HA	1:B:216:TRP:CD1	2.53	0.44
1:B:519:LEU:O	1:B:520:ASN:C	2.56	0.44
1:B:675:THR:C	1:B:680:LEU:HB2	2.38	0.44
1:B:288:THR:HG23	1:B:294:LEU:HD11	2.00	0.43
1:A:369:ASN:O	1:A:389:ILE:HB	2.18	0.43
1:A:375:ILE:HG22	1:A:376:SER:O	2.18	0.43
1:B:481:THR:OG1	1:B:483:HIS:HE1	2.00	0.43
1:A:39:SER:HB3	1:A:505:GLN:O	2.19	0.43
1:A:526:TYR:CD2	1:A:526:TYR:C	2.91	0.43
1:A:425:MET:HA	1:A:426:PRO:HD3	1.83	0.43
1:A:712:HIS:O	1:A:713:PHE:C	2.57	0.43
1:B:138:ASN:O	1:B:139:LYS:HG3	2.19	0.43
1:B:414:TYR:HA	1:B:434:ILE:O	2.19	0.43
1:A:594:ILE:HD12	1:A:594:ILE:HA	1.80	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:306:ALA:HB3	1:A:310:ARG:HB3	2.02	0.42
1:B:236:ILE:HD12	1:B:712:HIS:CD2	2.54	0.42
1:B:471:ARG:HG3	1:B:480:TYR:CE2	2.54	0.42
1:B:125:ARG:HD2	1:B:126:HIS:CE1	2.54	0.42
1:B:594:ILE:CD1	1:B:601:PHE:HB2	2.49	0.42
1:A:301:CYS:HB3	1:A:314:GLN:HB3	2.01	0.42
1:B:377:ASN:HD21	1:B:381:TYR:H	1.67	0.42
1:B:434:ILE:HG12	1:B:442:VAL:HG22	2.01	0.42
1:A:383:HIS:HB3	1:A:398:THR:OG1	2.20	0.42
1:B:137:LEU:C	1:B:139:LYS:N	2.70	0.42
1:A:381:TYR:CZ	1:A:401:THR:HG23	2.55	0.42
1:A:372:TYR:CE1	1:A:410:LEU:HD11	2.54	0.41
1:B:455:GLN:HB2	1:B:475:PRO:HD3	2.01	0.41
1:A:40:ARG:HD3	1:A:40:ARG:HA	1.45	0.41
1:A:177:GLU:HB2	1:A:180:LEU:HB2	2.03	0.41
1:B:106:SER:HB3	1:B:115:LEU:HB2	2.01	0.41
1:A:114:ILE:CG2	1:A:135:TYR:HB3	2.50	0.41
1:A:403:GLU:OE1	1:A:585:TYR:HA	2.20	0.41
1:A:234:PRO:HB2	1:B:248:TYR:CE2	2.56	0.41
1:B:269:PHE:CE1	1:B:286:GLN:HB2	2.56	0.41
1:A:48:TYR:CD1	1:A:562:ASN:HA	2.55	0.41
1:B:431:LEU:HD13	1:B:459:VAL:HG11	2.03	0.41
1:B:684:ARG:O	1:B:687:THR:HG23	2.21	0.41
1:B:534:PHE:HZ	1:B:618:PHE:CD1	2.38	0.41
1:A:60:LEU:HD11	1:A:469:GLN:CD	2.41	0.41
1:A:519:LEU:HD23	1:A:519:LEU:HA	1.81	0.41
1:B:742:ILE:HG22	1:B:742:ILE:O	2.20	0.41
1:A:45:LEU:HG	1:A:49:LEU:HD22	2.03	0.41
1:B:259:ALA:HB3	1:B:660:GLU:HA	2.02	0.41
1:A:285:ILE:HG21	1:A:336:ARG:HA	2.03	0.40
1:B:485:SER:O	1:B:486:VAL:C	2.59	0.40
1:B:481:THR:CB	1:B:483:HIS:HE1	2.35	0.40
1:A:410:LEU:HD23	1:A:410:LEU:HA	1.98	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	726/728 (100%)	671 (92%)	50 (7%)	5 (1%)	22 53
1	B	726/728 (100%)	686 (94%)	38 (5%)	2 (0%)	41 72
All	All	1452/1456 (100%)	1357 (94%)	88 (6%)	7 (0%)	29 61

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	40	ARG
1	A	464	GLU
1	B	138	ASN
1	A	73	GLU
1	A	111	GLY
1	B	242	SER
1	A	486	VAL

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	653/653 (100%)	559 (86%)	94 (14%)	3 10
1	B	653/653 (100%)	578 (88%)	75 (12%)	5 17
All	All	1306/1306 (100%)	1137 (87%)	169 (13%)	4 13

All (169) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	39	SER
1	A	40	ARG
1	A	49	LEU
1	A	51	ASN
1	A	57	LEU
1	A	60	LEU
1	A	71	LYS
1	A	74	ASN
1	A	75	ASN
1	A	86	SER
1	A	88	VAL
1	A	90	LEU
1	A	91	GLU
1	A	97	GLU
1	A	101	SER
1	A	107	ILE
1	A	115	LEU
1	A	131	SER
1	A	137	LEU
1	A	142	LEU
1	A	144	THR
1	A	145	GLU
1	A	155	VAL
1	A	158	SER
1	A	160	VAL
1	A	175	LYS
1	A	190	LYS
1	A	202	VAL
1	A	223	LEU
1	A	246	LEU
1	A	279	VAL
1	A	280	THR
1	A	283	THR
1	A	294	LEU
1	A	300	LEU
1	A	301	CYS
1	A	311	ILE
1	A	314	GLN
1	A	316	LEU
1	A	326	ASP
1	A	336	ARG
1	A	340	LEU
1	A	343	ARG

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Mol	Chain	Res	Type
1	A	351	THR
1	A	367	ASP
1	A	376	SER
1	A	377	ASN
1	A	379	GLU
1	A	382	ARG
1	A	385	CYS
1	A	389	ILE
1	A	391	LYS
1	A	392	LYS
1	A	397	ILE
1	A	399	LYS
1	A	410	LEU
1	A	412	SER
1	A	419	SER
1	A	420	ASN
1	A	431	LEU
1	A	435	GLN
1	A	450	ASN
1	A	452	GLU
1	A	458	SER
1	A	463	LYS
1	A	472	CYS
1	A	479	LEU
1	A	482	LEU
1	A	484	SER
1	A	487	ASN
1	A	500	LEU
1	A	502	LYS
1	A	505	GLN
1	A	508	GLN
1	A	513	LYS
1	A	514	LEU
1	A	518	ILE
1	A	521	GLU
1	A	528	MET
1	A	536	LYS
1	A	543	LEU
1	A	544	LEU
1	A	566	TYR
1	A	583	SER
1	A	597	ARG

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Mol	Chain	Res	Type
1	A	608	GLU
1	A	621	ASN
1	A	630	SER
1	A	679	ASN
1	A	684	ARG
1	A	696	LYS
1	A	715	GLN
1	A	726	VAL
1	A	736	THR
1	B	39	SER
1	B	40	ARG
1	B	49	LEU
1	B	50	LYS
1	B	54	ARG
1	B	56	LYS
1	B	60	LEU
1	B	66	HIS
1	B	86	SER
1	B	90	LEU
1	B	91	GLU
1	B	108	SER
1	B	120	TYR
1	B	129	THR
1	B	137	LEU
1	B	138	ASN
1	B	140	ARG
1	B	155	VAL
1	B	156	THR
1	B	180	LEU
1	B	191	GLU
1	B	202	VAL
1	B	214	LEU
1	B	217	SER
1	B	219	ASN
1	B	223	LEU
1	B	230	ASP
1	B	236	ILE
1	B	246	LEU
1	B	250	LYS
1	B	263	ASN
1	B	267	LYS
1	B	273	THR

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Mol	Chain	Res	Type
1	B	278	SER
1	B	295	ILE
1	B	300	LEU
1	B	311	ILE
1	B	326	ASP
1	B	332	GLU
1	B	336	ARG
1	B	340	LEU
1	B	343	ARG
1	B	361	GLU
1	B	375	ILE
1	B	377	ASN
1	B	385	CYS
1	B	389	ILE
1	B	392	LYS
1	B	397	ILE
1	B	420	ASN
1	B	452	GLU
1	B	466	LYS
1	B	479	LEU
1	B	489	LYS
1	B	500	LEU
1	B	507	VAL
1	B	514	LEU
1	B	536	LYS
1	B	543	LEU
1	B	552	SER
1	B	562	ASN
1	B	566	TYR
1	B	594	ILE
1	B	597	ARG
1	B	600	THR
1	B	614	SER
1	B	619	VAL
1	B	677	GLU
1	B	679	ASN
1	B	680	LEU
1	B	684	ARG
1	B	704	HIS
1	B	715	GLN
1	B	731	GLN
1	B	764	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (32) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	150	ASN
1	A	169	ASN
1	A	229	ASN
1	A	247	GLN
1	A	263	ASN
1	A	377	ASN
1	A	420	ASN
1	A	435	GLN
1	A	483	HIS
1	A	621	ASN
1	A	679	ASN
1	A	715	GLN
1	A	748	HIS
1	A	749	GLN
1	A	750	HIS
1	B	51	ASN
1	B	66	HIS
1	B	85	ASN
1	B	123	GLN
1	B	126	HIS
1	B	263	ASN
1	B	298	HIS
1	B	377	ASN
1	B	383	HIS
1	B	420	ASN
1	B	483	HIS
1	B	562	ASN
1	B	679	ASN
1	B	682	HIS
1	B	715	GLN
1	B	750	HIS
1	B	757	HIS

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)

6 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	23Q	A	1	-	28,30,30	0.97	1 (3%)	35,43,43	1.92	6 (17%)
2	NAG	B	794	-	14,14,15	0.62	0	17,19,21	1.06	1 (5%)
3	23Q	B	1	-	28,30,30	0.96	1 (3%)	35,43,43	1.86	9 (25%)
2	NAG	A	794	1	14,14,15	0.52	0	17,19,21	1.53	3 (17%)
2	NAG	A	796	-	14,14,15	0.60	0	17,19,21	0.83	0
2	NAG	B	796	1	14,14,15	0.55	0	17,19,21	1.16	2 (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
3	23Q	A	1	-	-	2/8/35/35	0/4/4/4
2	NAG	B	794	-	-	2/6/23/26	0/1/1/1
3	23Q	B	1	-	-	0/8/35/35	0/4/4/4
2	NAG	A	794	1	-	2/6/23/26	0/1/1/1
2	NAG	A	796	-	-	3/6/23/26	0/1/1/1
2	NAG	B	796	1	-	0/6/23/26	0/1/1/1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	1	23Q	C10-C4	-2.47	1.48	1.51

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	1	23Q	C12-C13	2.23	1.42	1.38

All (21) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	A	1	23Q	C6-N1-C2	5.63	118.33	110.12
3	A	1	23Q	C26-O20-C13	5.15	125.06	117.51
3	B	1	23Q	C26-O20-C13	4.77	124.51	117.51
3	B	1	23Q	C6-N1-C2	4.69	116.96	110.12
3	B	1	23Q	O19-C11-C13	4.15	121.04	115.40
2	A	794	NAG	O5-C1-C2	-3.58	105.75	111.29
3	A	1	23Q	C27-O19-C11	3.47	122.60	117.51
3	A	1	23Q	C5-C8-C4	-3.03	107.15	111.45
2	B	796	NAG	C1-O5-C5	3.02	116.23	112.19
2	A	794	NAG	C2-N2-C7	-2.88	119.03	122.90
3	B	1	23Q	C27-O19-C11	2.77	121.58	117.51
3	A	1	23Q	O19-C11-C13	2.77	119.16	115.40
2	B	794	NAG	O5-C1-C2	-2.69	107.13	111.29
3	B	1	23Q	C9-C3-C7	-2.66	116.49	119.39
3	A	1	23Q	C5-C2-C3	-2.60	109.37	113.07
3	B	1	23Q	O19-C11-C9	-2.53	119.72	124.08
3	B	1	23Q	C14-N1-C6	2.41	114.95	110.32
2	A	794	NAG	O5-C5-C6	2.35	112.23	107.66
2	B	796	NAG	O5-C1-C2	-2.25	107.81	111.29
3	B	1	23Q	C11-C9-C3	2.24	124.19	119.44
3	B	1	23Q	O20-C13-C11	2.11	118.27	115.40

There are no chirality outliers.

All (9) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	1	23Q	C13-C11-O19-C27
2	B	794	NAG	O5-C5-C6-O6
2	B	794	NAG	C4-C5-C6-O6
3	A	1	23Q	C9-C11-O19-C27
2	A	794	NAG	O5-C5-C6-O6
2	A	796	NAG	O5-C5-C6-O6
2	A	796	NAG	C8-C7-N2-C2
2	A	794	NAG	C4-C5-C6-O6
2	A	796	NAG	O7-C7-N2-C2

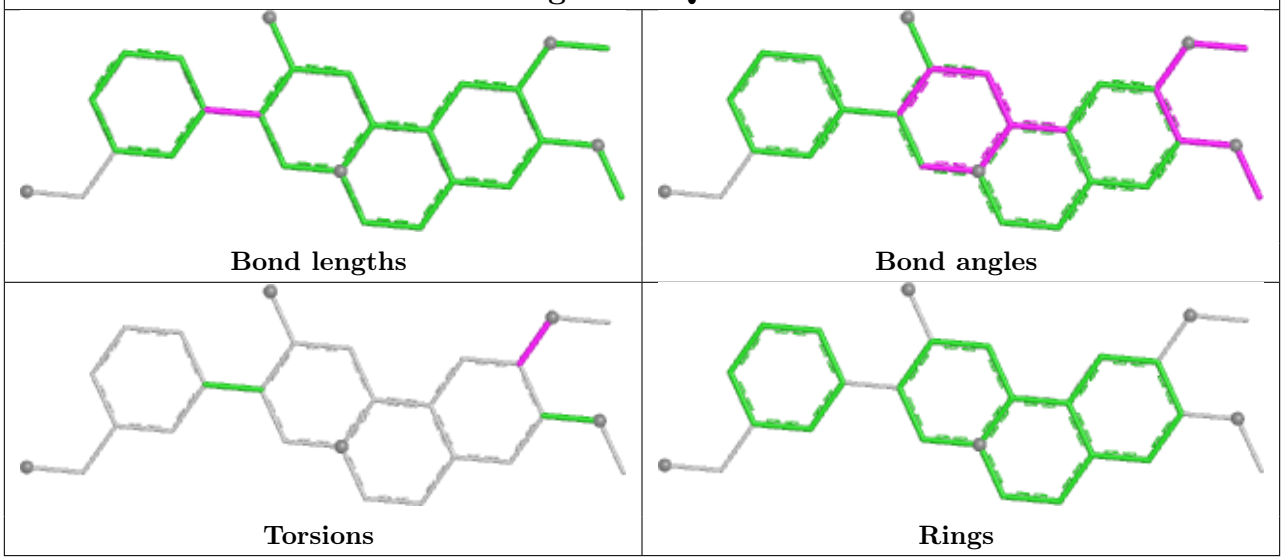
There are no ring outliers.

3 monomers are involved in 6 short contacts:

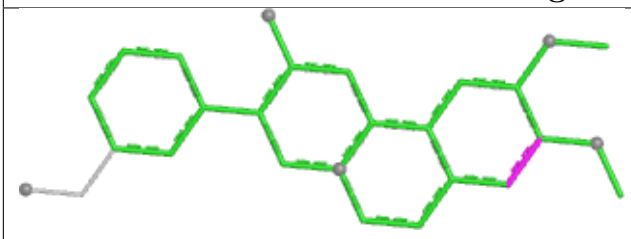
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	794	NAG	3	0
3	B	1	23Q	1	0
2	A	796	NAG	2	0

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.

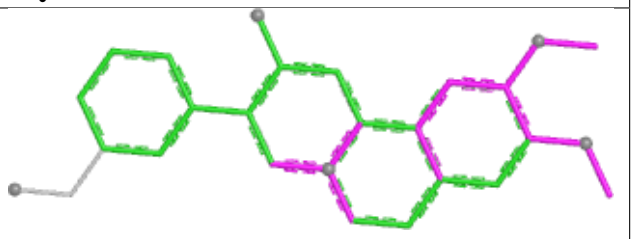
Ligand 23Q A 1



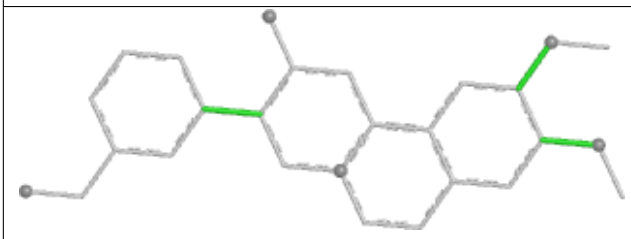
Ligand 23Q B 1



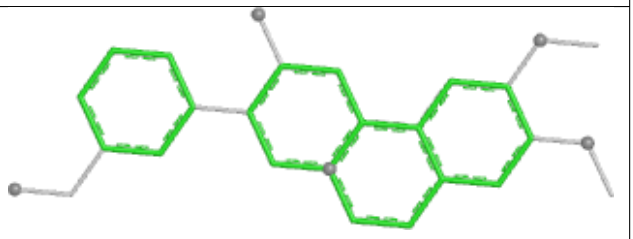
Bond lengths



Bond angles



Torsions



Rings

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	728/728 (100%)	0.01	12 (1%)	72	66	36, 56, 77, 91	0
1	B	728/728 (100%)	-0.17	15 (2%)	63	54	26, 44, 64, 80	0
All	All	1456/1456 (100%)	-0.08	27 (1%)	66	59	26, 50, 72, 91	0

All (27) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	279	VAL	4.8
1	A	333	SER	4.6
1	A	278	SER	4.6
1	B	97	GLU	3.8
1	B	278	SER	3.8
1	B	96	ASP	3.5
1	A	279	VAL	3.4
1	B	766	PRO	3.1
1	B	333	SER	3.0
1	A	96	ASP	2.9
1	B	280	THR	2.8
1	B	332	GLU	2.7
1	B	696	LYS	2.7
1	A	89	PHE	2.4
1	A	280	THR	2.4
1	A	74	ASN	2.3
1	B	140	ARG	2.3
1	B	101	SER	2.3
1	A	378	GLU	2.3
1	A	272	ASN	2.2
1	B	95	PHE	2.2
1	A	99	GLY	2.2
1	A	539	LYS	2.2
1	A	97	GLU	2.1

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Mol	Chain	Res	Type	RSRZ
1	B	597	ARG	2.1
1	B	277	SER	2.1
1	B	334	SER	2.0

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

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

6.3 Carbohydrates (i)

There are no monosaccharides in this entry.

6.4 Ligands (i)

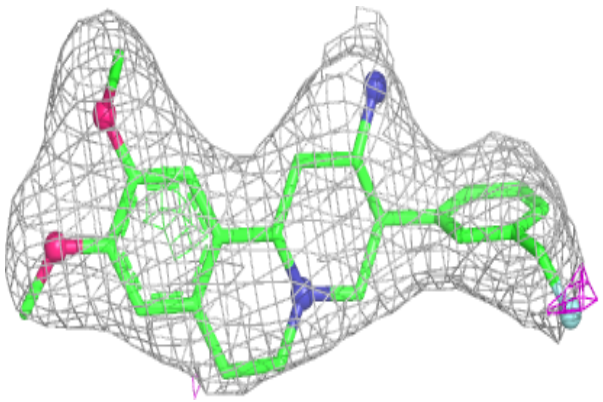
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9'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

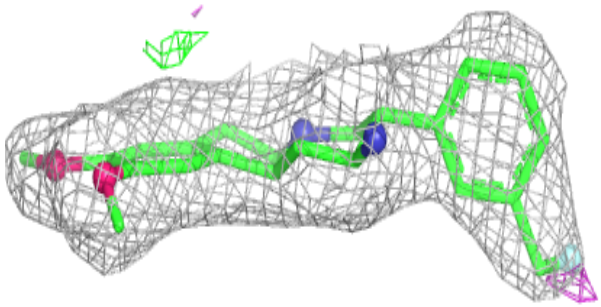
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	NAG	A	796	14/15	0.83	0.21	55,62,63,63	0
2	NAG	A	794	14/15	0.85	0.39	73,74,75,75	0
2	NAG	B	796	14/15	0.91	0.23	49,53,56,58	0
2	NAG	B	794	14/15	0.93	0.17	49,50,53,54	0
3	23Q	A	1	27/27	0.94	0.17	35,39,41,45	0
3	23Q	B	1	27/27	0.95	0.15	26,29,33,38	0

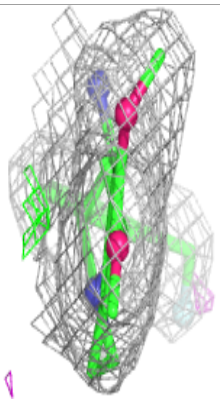
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around 23Q A 1:

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

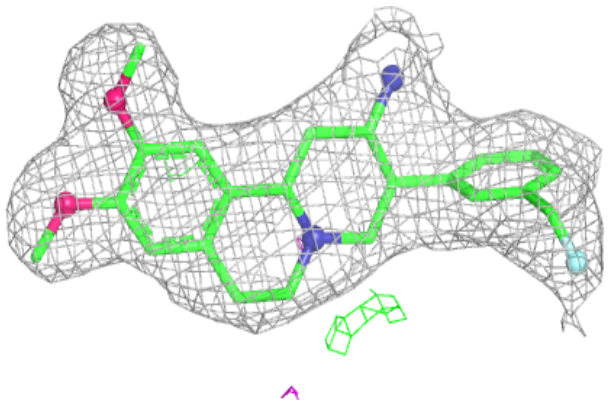


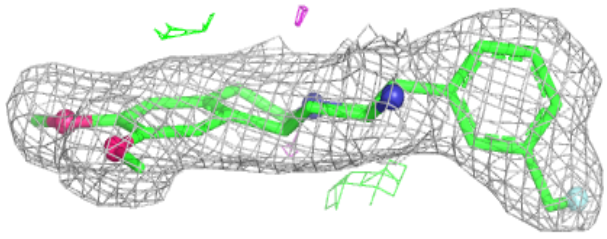


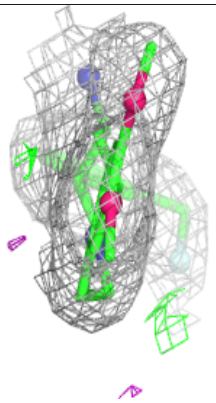


Electron density around 23Q B 1:

$2mF_o$-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.