



# Full wwPDB X-ray Structure Validation Report ⓘ

Oct 4, 2023 – 07:00 PM EDT

PDB ID : 6OYT  
Title : ASK1 kinase domain in complex with GS-4997  
Authors : Marcotte, D.J.  
Deposited on : 2019-05-15  
Resolution : 2.82 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](mailto: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>.

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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 : 2.35.1  
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) : 2.35.1

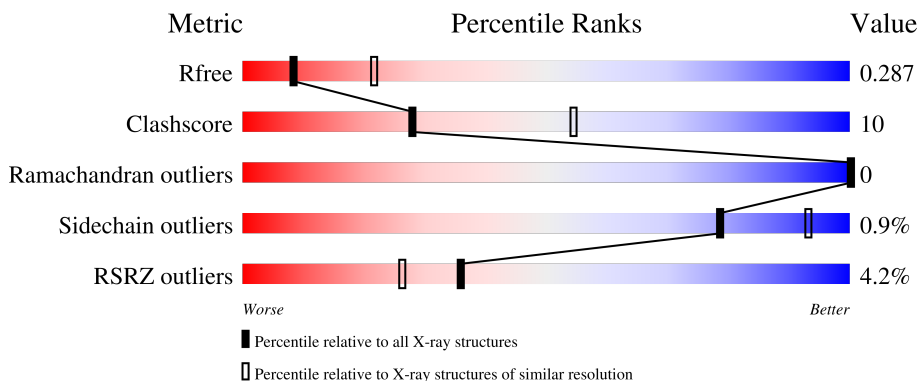
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*


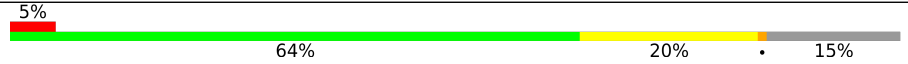
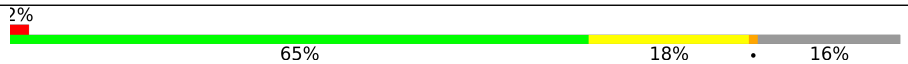

The reported resolution of this entry is 2.82 Å.

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	3617 (2.84-2.80)
Clashscore	141614	4060 (2.84-2.80)
Ramachandran outliers	138981	3978 (2.84-2.80)
Sidechain outliers	138945	3980 (2.84-2.80)
RSRZ outliers	127900	3552 (2.84-2.80)

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  $\geq 3$ , 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  $\leq 5\%$ . 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	280	
1	B	280	
1	C	280	
1	D	280	

## 2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 7556 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 Mitogen-activated protein kinase kinase kinase 5.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	222	Total 1718	C 1099	N 290	O 323	S 6	0	0	0
1	B	238	Total 1830	C 1171	N 306	O 345	S 8	0	0	0
1	C	236	Total 1803	C 1152	N 300	O 344	S 7	0	0	0
1	D	253	Total 1958	C 1252	N 324	O 374	S 8	0	0	0

There are 28 discrepancies between the modelled and reference sequences:

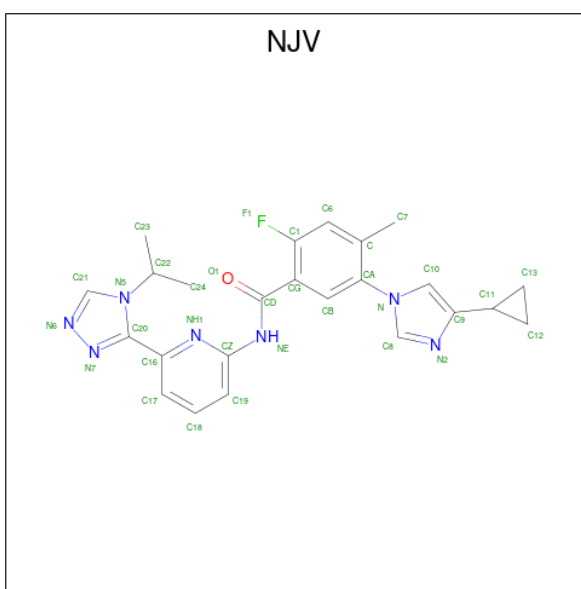
Chain	Residue	Modelled	Actual	Comment	Reference
A	666	MET	-	initiating methionine	UNP Q99683
A	940	HIS	-	expression tag	UNP Q99683
A	941	HIS	-	expression tag	UNP Q99683
A	942	HIS	-	expression tag	UNP Q99683
A	943	HIS	-	expression tag	UNP Q99683
A	944	HIS	-	expression tag	UNP Q99683
A	945	HIS	-	expression tag	UNP Q99683
B	666	MET	-	initiating methionine	UNP Q99683
B	940	HIS	-	expression tag	UNP Q99683
B	941	HIS	-	expression tag	UNP Q99683
B	942	HIS	-	expression tag	UNP Q99683
B	943	HIS	-	expression tag	UNP Q99683
B	944	HIS	-	expression tag	UNP Q99683
B	945	HIS	-	expression tag	UNP Q99683
C	666	MET	-	initiating methionine	UNP Q99683
C	940	HIS	-	expression tag	UNP Q99683
C	941	HIS	-	expression tag	UNP Q99683
C	942	HIS	-	expression tag	UNP Q99683
C	943	HIS	-	expression tag	UNP Q99683
C	944	HIS	-	expression tag	UNP Q99683
C	945	HIS	-	expression tag	UNP Q99683

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Chain	Residue	Modelled	Actual	Comment	Reference
D	666	MET	-	initiating methionine	UNP Q99683
D	940	HIS	-	expression tag	UNP Q99683
D	941	HIS	-	expression tag	UNP Q99683
D	942	HIS	-	expression tag	UNP Q99683
D	943	HIS	-	expression tag	UNP Q99683
D	944	HIS	-	expression tag	UNP Q99683
D	945	HIS	-	expression tag	UNP Q99683

- Molecule 2 is 5-(4-cyclopropyl-1H-imidazol-1-yl)-2-fluoro-4-methyl-N-{6-[4-(propan-2-yl)-4H-1,2,4-triazol-3-yl]pyridin-2-yl}benzamide (three-letter code: NJV) (formula: C<sub>24</sub>H<sub>24</sub>FN<sub>7</sub>O).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
			Total	C	F	N			O
2	A	1	33	24	1	7	1	0	0
2	B	1	33	24	1	7	1	0	0
2	C	1	33	24	1	7	1	0	0
2	D	1	33	24	1	7	1	0	0

- Molecule 3 is ACETATE ION (three-letter code: ACT) (formula: C<sub>2</sub>H<sub>3</sub>O<sub>2</sub>).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	C	1	Total C O 4 2 2	0	0
3	D	1	Total C O 4 2 2	0	0
3	D	1	Total C O 4 2 2	0	0
3	D	1	Total C O 4 2 2	0	0
3	D	1	Total C O 4 2 2	0	0

- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	20	Total O 20 20	0	0
4	B	13	Total O 13 13	0	0
4	C	9	Total O 9 9	0	0

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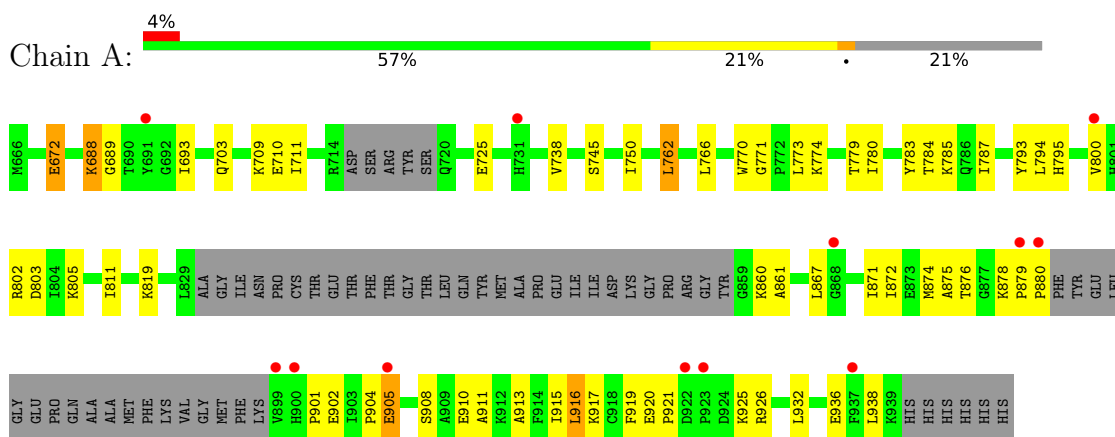
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<b>Mol</b>	<b>Chain</b>	<b>Residues</b>	<b>Atoms</b>		<b>ZeroOcc</b>	<b>AltConf</b>
4	D	37	Total	O	0	0
			37	37		

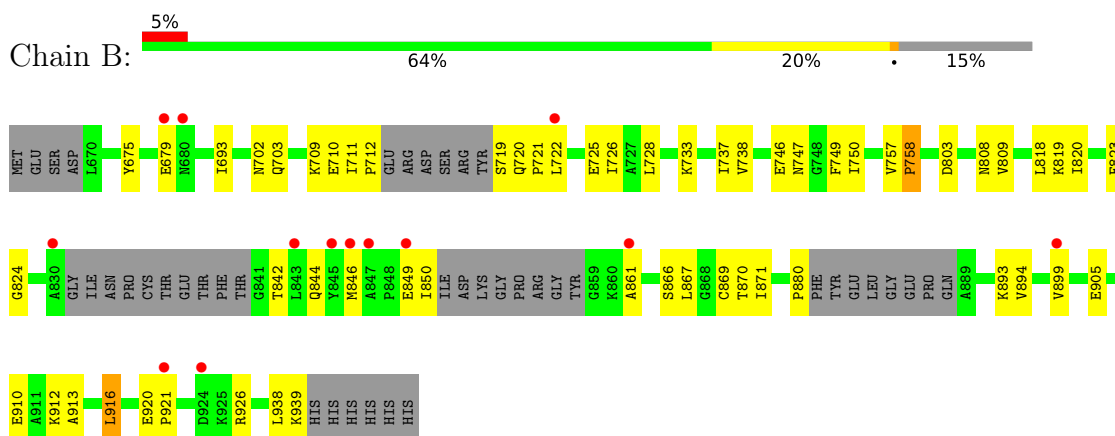
### 3 Residue-property plots [i](#)

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.

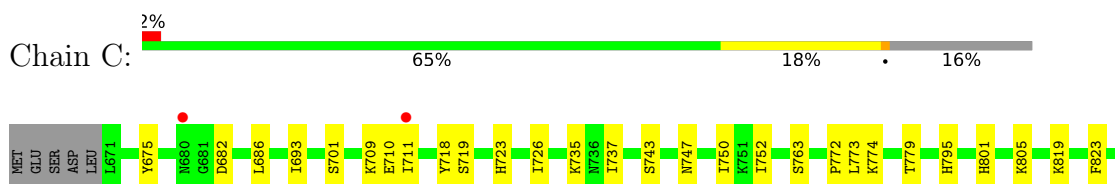
- Molecule 1: Mitogen-activated protein kinase kinase kinase 5

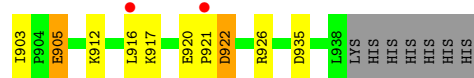


- Molecule 1: Mitogen-activated protein kinase kinase kinase 5

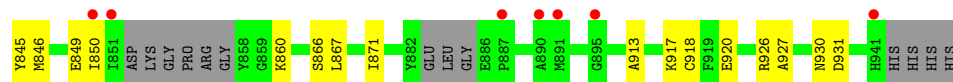
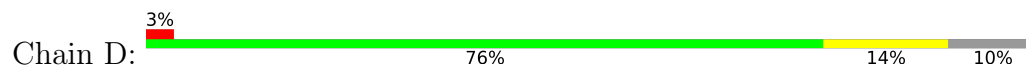


- Molecule 1: Mitogen-activated protein kinase kinase kinase 5





● Molecule 1: Mitogen-activated protein kinase kinase kinase 5





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	86.51Å 73.59Å 95.14Å 90.00° 97.77° 90.00°	Depositor
Resolution (Å)	47.13 – 2.82 47.13 – 2.82	Depositor EDS
% Data completeness (in resolution range)	97.4 (47.13-2.82) 97.4 (47.13-2.82)	Depositor EDS
$R_{merge}$	0.10	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.33 (at 2.81Å)	Xtrriage
Refinement program	PHENIX 1.14_3260	Depositor
R, $R_{free}$	0.232 , 0.290 0.234 , 0.287	Depositor DCC
$R_{free}$ test set	1398 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	59.0	Xtrriage
Anisotropy	0.081	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.29 , 65.0	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.91	EDS
Total number of atoms	7556	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	74.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 24.38 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 3.8769e-03. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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: NJV, ACT

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	0.55	6/1751 (0.3%)	0.71	5/2363 (0.2%)
1	B	0.45	2/1865 (0.1%)	0.59	4/2518 (0.2%)
1	C	0.46	3/1841 (0.2%)	0.72	5/2493 (0.2%)
1	D	0.40	0/1997	0.57	2/2698 (0.1%)
All	All	0.47	11/7454 (0.1%)	0.65	16/10072 (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	D	0	1

All (11) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	758	PRO	N-CA	12.68	1.68	1.47
1	A	905	GLU	CG-CD	9.29	1.65	1.51
1	C	921	PRO	C-N	8.48	1.53	1.34
1	C	905	GLU	CD-OE1	6.65	1.32	1.25
1	A	905	GLU	CD-OE2	6.39	1.32	1.25
1	C	905	GLU	CD-OE2	5.67	1.31	1.25
1	A	905	GLU	CB-CG	5.57	1.62	1.52
1	B	757	VAL	C-N	5.41	1.44	1.34
1	A	688	LYS	CB-CG	-5.26	1.38	1.52
1	A	910	GLU	CG-CD	5.07	1.59	1.51
1	A	936	GLU	CB-CG	-5.02	1.42	1.52

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	922	ASP	CB-CG-OD2	-13.96	105.73	118.30
1	C	905	GLU	CA-CB-CG	10.86	137.29	113.40
1	A	688	LYS	CD-CE-NZ	-9.71	89.36	111.70
1	B	758	PRO	CA-N-CD	-8.31	99.87	111.50
1	A	916	LEU	CA-CB-CG	7.74	133.11	115.30
1	D	670	LEU	CB-CA-C	-7.51	95.94	110.20
1	D	738	VAL	CG1-CB-CG2	7.19	122.41	110.90
1	C	922	ASP	CB-CG-OD1	6.70	124.33	118.30
1	B	916	LEU	CA-CB-CG	6.24	129.66	115.30
1	A	688	LYS	CA-CB-CG	-5.97	100.26	113.40
1	C	773	LEU	CA-CB-CG	5.52	127.99	115.30
1	A	921	PRO	C-N-CA	-5.25	108.57	121.70
1	B	679	GLU	CA-CB-CG	5.22	124.88	113.40
1	A	905	GLU	CG-CD-OE1	-5.20	107.89	118.30
1	C	916	LEU	CA-CB-CG	5.19	127.23	115.30
1	B	719	SER	C-N-CA	-5.13	108.88	121.70

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	D	930	ASN	Mainchain

## 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	1718	0	1678	37	1
1	B	1830	0	1789	47	0
1	C	1803	0	1721	31	0
1	D	1958	0	1891	30	1
2	A	33	0	0	1	0
2	B	33	0	0	1	0
2	C	33	0	0	2	0
2	D	33	0	0	1	0
3	A	4	0	3	0	0
3	B	12	0	9	0	0
3	C	4	0	3	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	D	16	0	12	0	0
4	A	20	0	0	0	0
4	B	13	0	0	2	0
4	C	9	0	0	0	0
4	D	37	0	0	1	0
All	All	7556	0	7106	144	1

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 10.

All (144) 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:B:758:PRO:N	1:B:758:PRO:CA	1.68	1.30
1:B:912:LYS:O	1:B:916:LEU:HD22	1.64	0.97
1:A:766:LEU:HD23	1:A:770:TRP:HB2	1.54	0.90
1:C:801:HIS:HA	1:C:826:SER:HB3	1.54	0.88
1:B:746:GLU:HG2	1:B:747:ASN:HD22	1.44	0.82
1:B:844:GLN:HB3	1:B:880:PRO:HG2	1.64	0.78
1:B:893:LYS:HG2	1:B:899:VAL:HG21	1.64	0.76
1:D:698:ARG:NH2	4:D:1101:HOH:O	2.18	0.75
1:D:846:MET:HB3	1:D:850:ILE:HG21	1.70	0.74
1:B:920:GLU:HB3	1:B:926:ARG:HG3	1.70	0.72
1:B:920:GLU:O	1:B:926:ARG:NH1	2.24	0.70
1:B:758:PRO:HG3	1:D:814:TYR:CG	2.25	0.70
1:A:800:VAL:HG22	1:A:802:ARG:HG2	1.74	0.69
1:A:780:ILE:O	1:A:784:THR:HG23	1.92	0.69
1:B:703:GLN:HG2	1:D:779:THR:HG21	1.75	0.68
1:D:666:MET:HE3	1:D:753:PHE:CD1	2.29	0.68
1:A:745:SER:HB2	1:A:750:ILE:HG12	1.77	0.66
1:C:735:LYS:O	1:C:819:LYS:NZ	2.28	0.66
2:A:1001:NJV:F1	2:A:1001:NJV:NE	2.19	0.66
1:D:920:GLU:O	1:D:926:ARG:NH1	2.30	0.65
1:A:861:ALA:HB1	1:A:926:ARG:HE	1.61	0.65
1:B:746:GLU:HG2	1:B:747:ASN:ND2	2.11	0.65
1:C:726:ILE:HD12	1:C:743:SER:CB	2.27	0.65
1:C:675:TYR:OH	1:C:710:GLU:OE2	2.11	0.64
1:A:872:ILE:O	1:A:876:THR:HG22	1.98	0.63
1:B:861:ALA:HB1	1:B:926:ARG:HE	1.64	0.63
1:D:708:ILE:CD1	1:D:753:PHE:CE2	2.81	0.63
1:B:711:ILE:HG22	1:B:722:LEU:HD22	1.82	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:667:GLU:N	1:D:667:GLU:OE2	2.32	0.62
1:A:709:LYS:NZ	1:A:725:GLU:OE2	2.26	0.62
1:B:905:GLU:HA	1:B:912:LYS:HZ1	1.64	0.62
1:B:912:LYS:O	1:B:916:LEU:CD2	2.46	0.62
1:D:666:MET:CE	1:D:753:PHE:CD1	2.82	0.61
1:B:758:PRO:N	1:B:758:PRO:C	2.52	0.61
1:B:720:GLN:N	1:B:721:PRO:HD2	2.15	0.60
1:B:675:TYR:OH	1:B:710:GLU:OE2	2.12	0.59
1:B:720:GLN:H	1:B:721:PRO:HD2	1.67	0.59
1:D:708:ILE:HD13	1:D:753:PHE:CD2	2.38	0.58
2:C:1001:NJV:F1	2:C:1001:NJV:NE	2.26	0.58
1:C:726:ILE:HD11	1:C:752:ILE:HB	1.86	0.58
1:A:766:LEU:HD22	1:A:771:GLY:O	2.04	0.57
1:B:905:GLU:HA	1:B:912:LYS:NZ	2.21	0.56
1:A:920:GLU:O	1:A:926:ARG:NH1	2.38	0.56
1:D:842:THR:O	1:D:846:MET:HG3	2.06	0.56
1:A:876:THR:HG23	1:A:878:LYS:H	1.70	0.56
1:D:713:GLU:OE1	1:D:745:SER:OG	2.24	0.55
1:C:905:GLU:OE2	1:C:912:LYS:HE2	2.06	0.55
2:B:1001:NJV:F1	2:B:1001:NJV:NE	2.28	0.55
1:B:913:ALA:HA	1:B:916:LEU:HD23	1.88	0.55
1:B:726:ILE:HD12	1:B:750:ILE:HD11	1.90	0.54
2:D:1002:NJV:F1	2:D:1002:NJV:NE	2.31	0.53
1:B:702:ASN:HA	1:D:779:THR:HG23	1.90	0.53
1:D:745:SER:HB2	1:D:750:ILE:HD13	1.89	0.53
1:B:725:GLU:HG3	1:B:824:GLY:HA2	1.91	0.52
1:D:843:LEU:H	1:D:843:LEU:HD22	1.73	0.52
1:C:763:SER:OG	1:C:873:GLU:OE2	2.25	0.52
1:B:711:ILE:HG13	1:B:712:PRO:HD2	1.91	0.52
1:A:911:ALA:O	1:A:915:ILE:HG13	2.09	0.52
1:A:916:LEU:HA	1:A:919:PHE:HB2	1.92	0.52
1:C:737:ILE:HG23	1:C:823:PHE:HZ	1.75	0.51
1:D:770:TRP:HB3	1:D:773:LEU:HD21	1.93	0.51
1:B:720:GLN:O	1:B:720:GLN:HG3	2.11	0.50
1:A:913:ALA:O	1:A:917:LYS:HG3	2.11	0.50
1:A:738:VAL:HG13	1:A:819:LYS:HB3	1.93	0.50
1:D:720:GLN:N	1:D:721:PRO:HD2	2.27	0.50
1:C:709:LYS:HB3	1:C:752:ILE:HG23	1.94	0.50
1:C:711:ILE:HG12	1:C:718:TYR:HB3	1.92	0.50
1:D:845:TYR:O	1:D:866:SER:OG	2.17	0.50
1:D:708:ILE:CD1	1:D:753:PHE:CD2	2.95	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:893:LYS:CG	1:B:899:VAL:HG21	2.39	0.49
1:A:762:LEU:HD12	1:A:811:ILE:HD11	1.95	0.49
1:C:917:LYS:NZ	1:C:935:ASP:OD2	2.30	0.49
1:B:866:SER:O	1:B:870:THR:HG23	2.13	0.49
1:A:766:LEU:HD21	1:A:773:LEU:HD11	1.95	0.48
1:B:803:ASP:O	1:B:808:ASN:ND2	2.42	0.48
1:C:805:LYS:HD3	1:C:843:LEU:HD21	1.95	0.48
1:B:720:GLN:N	1:B:721:PRO:CD	2.77	0.47
1:B:910:GLU:HA	1:B:913:ALA:HB3	1.96	0.47
1:A:783:TYR:O	1:A:787:ILE:HG13	2.15	0.47
1:C:726:ILE:CD1	1:C:752:ILE:HB	2.44	0.47
1:C:726:ILE:HD12	1:C:743:SER:HB2	1.97	0.47
1:D:738:VAL:HG22	1:D:755:GLU:HG2	1.96	0.47
1:C:709:LYS:HB3	1:C:752:ILE:CG2	2.46	0.46
1:B:809:VAL:HG13	1:B:818:LEU:HD21	1.98	0.46
1:C:845:TYR:HD2	1:C:869:CYS:HB2	1.81	0.46
1:C:920:GLU:OE1	1:C:922:ASP:N	2.48	0.46
1:A:795:HIS:HB3	1:A:860:LYS:HD3	1.97	0.45
1:B:737:ILE:HG23	1:B:823:PHE:HZ	1.81	0.45
1:D:849:GLU:OE2	1:D:926:ARG:NH2	2.49	0.45
1:C:774:LYS:HB3	1:C:875:ALA:O	2.16	0.45
1:A:902:GLU:OE2	1:A:905:GLU:OE2	2.35	0.45
1:A:875:ALA:HB1	1:A:904:PRO:HG2	1.97	0.45
1:C:861:ALA:HB1	1:C:926:ARG:HD2	1.99	0.45
1:A:766:LEU:CD1	1:A:874:MET:HA	2.46	0.45
1:A:774:LYS:HG3	1:A:875:ALA:O	2.17	0.45
1:C:857:GLY:O	1:C:859:GLY:N	2.50	0.45
1:B:738:VAL:HG22	1:B:820:ILE:O	2.16	0.45
1:D:920:GLU:HB3	1:D:926:ARG:HG3	1.98	0.45
1:A:762:LEU:HD21	1:A:874:MET:HG2	1.99	0.45
1:B:842:THR:O	1:B:846:MET:HG3	2.17	0.44
1:C:693:ILE:O	1:C:709:LYS:HA	2.18	0.44
1:D:795:HIS:HB3	1:D:860:LYS:HD3	1.99	0.44
1:B:894:VAL:HG12	1:B:899:VAL:HG23	2.00	0.44
1:A:785:LYS:HB2	1:A:938:LEU:HD22	1.99	0.44
1:C:772:PRO:O	1:C:874:MET:O	2.36	0.44
1:D:708:ILE:HD13	1:D:753:PHE:CE2	2.53	0.44
1:D:913:ALA:O	1:D:917:LYS:HG3	2.18	0.44
1:A:872:ILE:HD12	1:A:901:PRO:HG2	1.99	0.43
1:D:918:CYS:O	1:D:926:ARG:HD3	2.19	0.43
1:A:793:TYR:HD2	1:A:794:LEU:HD23	1.84	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:867:LEU:O	1:B:871:ILE:HG13	2.19	0.43
1:C:795:HIS:HB3	1:C:860:LYS:HD3	2.00	0.43
1:A:779:THR:HG22	1:C:701:SER:O	2.19	0.43
1:A:879:PRO:HA	1:A:880:PRO:HD3	1.90	0.43
1:B:733:LYS:NZ	4:B:1101:HOH:O	2.49	0.43
1:C:872:ILE:HD11	1:C:903:ILE:HG12	2.01	0.42
1:A:703:GLN:HG2	1:C:779:THR:HG21	2.01	0.42
1:C:723:HIS:NE2	1:C:750:ILE:HD12	2.34	0.42
1:B:920:GLU:HB3	1:B:926:ARG:CG	2.45	0.42
1:A:932:LEU:O	1:A:938:LEU:HD12	2.19	0.42
1:C:843:LEU:HD12	1:C:844:GLN:OE1	2.20	0.42
1:A:875:ALA:CB	1:A:904:PRO:HG2	2.50	0.42
1:B:850:ILE:HD11	4:B:1105:HOH:O	2.20	0.42
1:B:869:CYS:HB3	1:B:880:PRO:HG3	2.00	0.42
1:B:938:LEU:HB2	1:B:939:LYS:H	1.71	0.41
1:A:688:LYS:HG3	1:A:693:ILE:HG22	2.00	0.41
1:D:867:LEU:O	1:D:871:ILE:HG13	2.20	0.41
1:B:920:GLU:OE1	1:B:921:PRO:HD2	2.20	0.41
1:A:867:LEU:O	1:A:871:ILE:HG13	2.20	0.41
1:D:739:GLN:N	1:D:755:GLU:OE2	2.40	0.41
1:D:783:TYR:O	1:D:787:ILE:HG13	2.20	0.41
1:A:925:LYS:HA	1:A:925:LYS:HD3	1.86	0.41
1:B:693:ILE:O	1:B:709:LYS:HA	2.21	0.41
1:A:710:GLU:C	1:A:711:ILE:HG13	2.41	0.41
1:B:738:VAL:HG13	1:B:819:LYS:HB3	2.02	0.41
1:A:688:LYS:HG2	1:A:689:GLY:N	2.36	0.41
1:B:712:PRO:HG3	1:B:749:PHE:CE1	2.56	0.41
1:D:927:ALA:HB1	1:D:931:ASP:HB2	2.03	0.41
1:B:728:LEU:HD12	1:B:728:LEU:HA	1.93	0.40
1:C:867:LEU:O	1:C:871:ILE:HG13	2.22	0.40
1:B:849:GLU:OE1	1:B:926:ARG:NH2	2.55	0.40
1:A:803:ASP:OD2	1:A:805:LYS:NZ	2.54	0.40
1:C:686:LEU:HB3	2:C:1001:NJV:C1	2.52	0.40
1:C:737:ILE:HG23	1:C:823:PHE:CZ	2.54	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:672:GLU:OE2	1:D:713:GLU:OE2[2_545]	2.06	0.14

## 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	214/280 (76%)	203 (95%)	11 (5%)	0	100	100
1	B	228/280 (81%)	213 (93%)	15 (7%)	0	100	100
1	C	228/280 (81%)	218 (96%)	10 (4%)	0	100	100
1	D	243/280 (87%)	231 (95%)	12 (5%)	0	100	100
All	All	913/1120 (82%)	865 (95%)	48 (5%)	0	100	100

There are no Ramachandran outliers to report.

### 5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	180/240 (75%)	177 (98%)	3 (2%)	60	86
1	B	191/240 (80%)	191 (100%)	0	100	100
1	C	186/240 (78%)	183 (98%)	3 (2%)	62	87
1	D	204/240 (85%)	203 (100%)	1 (0%)	88	96
All	All	761/960 (79%)	754 (99%)	7 (1%)	78	93

All (7) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	672	GLU
1	A	762	LEU

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Mol	Chain	Res	Type
1	A	908	SER
1	C	682	ASP
1	C	719	SER
1	C	747	ASN
1	D	722	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	747	ASN

### 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](#)

13 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
2	NJV	C	1001	-	32,37,37	1.44	3 (9%)	38,54,54	2.38	11 (28%)
3	ACT	D	1004	-	3,3,3	1.24	0	3,3,3	1.55	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	ACT	D	1003	-	3,3,3	1.37	1 (33%)	3,3,3	1.39	0
3	ACT	D	1005	-	3,3,3	1.34	0	3,3,3	1.38	0
3	ACT	B	1002	-	3,3,3	1.37	0	3,3,3	1.34	0
3	ACT	B	1003	-	3,3,3	1.34	0	3,3,3	1.33	0
2	NJV	A	1001	-	32,37,37	1.49	3 (9%)	38,54,54	2.51	11 (28%)
2	NJV	B	1001	-	32,37,37	1.44	3 (9%)	38,54,54	2.39	11 (28%)
3	ACT	B	1004	-	3,3,3	1.29	0	3,3,3	1.51	0
3	ACT	C	1002	-	3,3,3	1.34	0	3,3,3	1.50	0
3	ACT	D	1001	-	3,3,3	1.36	1 (33%)	3,3,3	1.37	0
3	ACT	A	1002	-	3,3,3	1.29	0	3,3,3	1.42	0
2	NJV	D	1002	-	32,37,37	1.44	3 (9%)	38,54,54	2.25	10 (26%)

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
2	NJV	A	1001	-	-	5/22/26/26	0/5/5/5
2	NJV	D	1002	-	-	6/22/26/26	0/5/5/5
2	NJV	C	1001	-	-	6/22/26/26	0/5/5/5
2	NJV	B	1001	-	-	5/22/26/26	0/5/5/5

All (14) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1001	NJV	CA-N	-6.39	1.38	1.45
2	D	1002	NJV	CA-N	-6.12	1.38	1.45
2	C	1001	NJV	CA-N	-6.11	1.38	1.45
2	B	1001	NJV	CA-N	-5.95	1.38	1.45
2	A	1001	NJV	C10-N	-2.69	1.36	1.39
2	B	1001	NJV	C22-N5	-2.53	1.45	1.49
2	C	1001	NJV	C22-N5	-2.40	1.45	1.49
2	B	1001	NJV	C10-N	-2.34	1.36	1.39
2	C	1001	NJV	C10-N	-2.34	1.36	1.39
2	D	1002	NJV	C10-N	-2.33	1.37	1.39
2	D	1002	NJV	C22-N5	-2.28	1.45	1.49
2	A	1001	NJV	C22-N5	-2.16	1.45	1.49
3	D	1003	ACT	CH3-C	2.05	1.57	1.49
3	D	1001	ACT	CH3-C	2.01	1.57	1.49

All (43) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	1001	NJV	CB-CA-C	-7.70	114.53	123.32
2	B	1001	NJV	CB-CA-C	-7.33	114.94	123.32
2	A	1001	NJV	CB-CA-C	-7.09	115.22	123.32
2	D	1002	NJV	CB-CA-C	-7.01	115.31	123.32
2	A	1001	NJV	C10-C9-C11	-6.20	120.71	129.26
2	B	1001	NJV	C10-C9-C11	-5.84	121.20	129.26
2	B	1001	NJV	C21-N5-C22	-5.53	119.98	125.42
2	A	1001	NJV	C21-N5-C22	-5.50	120.01	125.42
2	D	1002	NJV	C10-C9-C11	-5.46	121.72	129.26
2	C	1001	NJV	C21-N5-C22	-5.36	120.15	125.42
2	C	1001	NJV	C10-C9-C11	-5.34	121.89	129.26
2	D	1002	NJV	C21-N5-C22	-5.25	120.25	125.42
2	A	1001	NJV	C6-C1-CG	-4.52	118.71	123.53
2	B	1001	NJV	C6-C1-CG	-4.24	119.01	123.53
2	C	1001	NJV	C6-C1-CG	-4.15	119.11	123.53
2	D	1002	NJV	C6-C1-CG	-4.00	119.27	123.53
2	A	1001	NJV	O1-CD-NE	3.34	131.34	123.71
2	B	1001	NJV	C6-C-CA	3.24	120.29	116.07
2	C	1001	NJV	C6-C-CA	3.24	120.29	116.07
2	A	1001	NJV	CG-CD-NE	-3.14	110.08	116.06
2	C	1001	NJV	C23-C22-N5	2.98	115.18	110.30
2	A	1001	NJV	C23-C22-N5	2.96	115.14	110.30
2	A	1001	NJV	CB-CG-C1	2.95	120.25	116.66
2	A	1001	NJV	C8-N-CA	2.94	128.75	125.38
2	A	1001	NJV	C6-C-CA	2.90	119.85	116.07
2	A	1001	NJV	C1-CG-CD	-2.88	118.42	125.09
2	B	1001	NJV	CB-CG-C1	2.84	120.11	116.66
2	B	1001	NJV	C8-N-CA	2.80	128.59	125.38
2	B	1001	NJV	O1-CD-NE	2.79	130.07	123.71
2	D	1002	NJV	CG-CD-NE	-2.63	111.05	116.06
2	D	1002	NJV	O1-CD-NE	2.61	129.67	123.71
2	D	1002	NJV	C6-C-CA	2.61	119.47	116.07
2	C	1001	NJV	C1-CG-CD	-2.55	119.19	125.09
2	C	1001	NJV	CG-CD-NE	-2.51	111.27	116.06
2	D	1002	NJV	C23-C22-N5	2.50	114.38	110.30
2	C	1001	NJV	C8-N-CA	2.47	128.21	125.38
2	B	1001	NJV	CG-CD-NE	-2.45	111.39	116.06
2	C	1001	NJV	O1-CD-NE	2.35	129.08	123.71
2	B	1001	NJV	C1-CG-CD	-2.33	119.70	125.09
2	C	1001	NJV	CB-CG-C1	2.28	119.44	116.66
2	D	1002	NJV	C8-N-CA	2.21	127.91	125.38
2	B	1001	NJV	C23-C22-N5	2.20	113.89	110.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	1002	NJV	C1-CG-CD	-2.05	120.34	125.09

There are no chirality outliers.

All (22) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	1001	NJV	C12-C11-C9-C10
2	A	1001	NJV	C13-C11-C9-C10
2	A	1001	NJV	C24-C22-N5-C20
2	A	1001	NJV	C24-C22-N5-C21
2	B	1001	NJV	C12-C11-C9-C10
2	B	1001	NJV	C13-C11-C9-C10
2	C	1001	NJV	C12-C11-C9-C10
2	C	1001	NJV	C13-C11-C9-C10
2	D	1002	NJV	C12-C11-C9-C10
2	D	1002	NJV	C13-C11-C9-C10
2	B	1001	NJV	C24-C22-N5-C21
2	C	1001	NJV	C23-C22-N5-C21
2	D	1002	NJV	C23-C22-N5-C21
2	A	1001	NJV	C23-C22-N5-C21
2	B	1001	NJV	C23-C22-N5-C21
2	C	1001	NJV	C24-C22-N5-C21
2	D	1002	NJV	C24-C22-N5-C21
2	B	1001	NJV	C24-C22-N5-C20
2	C	1001	NJV	C23-C22-N5-C20
2	C	1001	NJV	C24-C22-N5-C20
2	D	1002	NJV	C23-C22-N5-C20
2	D	1002	NJV	C24-C22-N5-C20

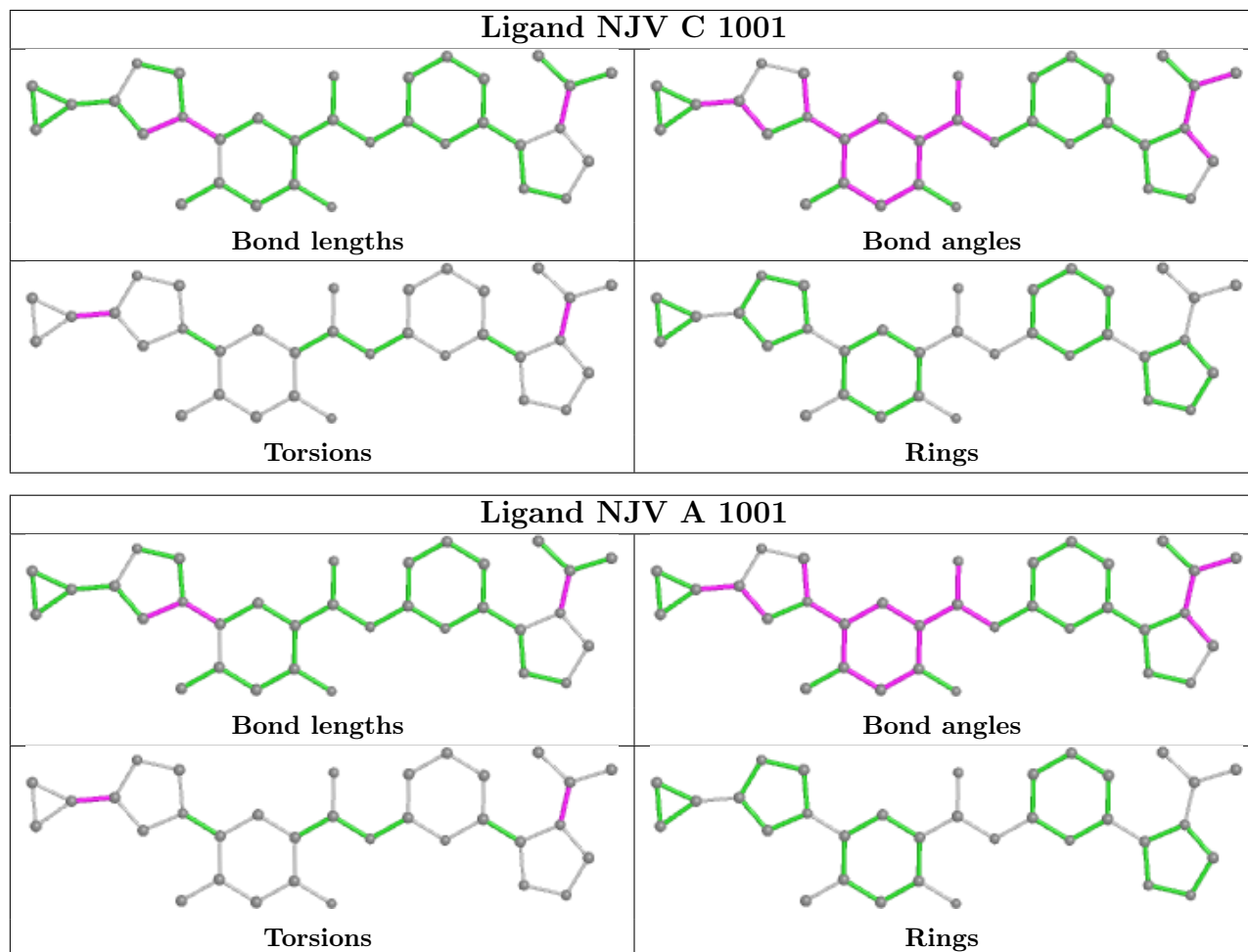
There are no ring outliers.

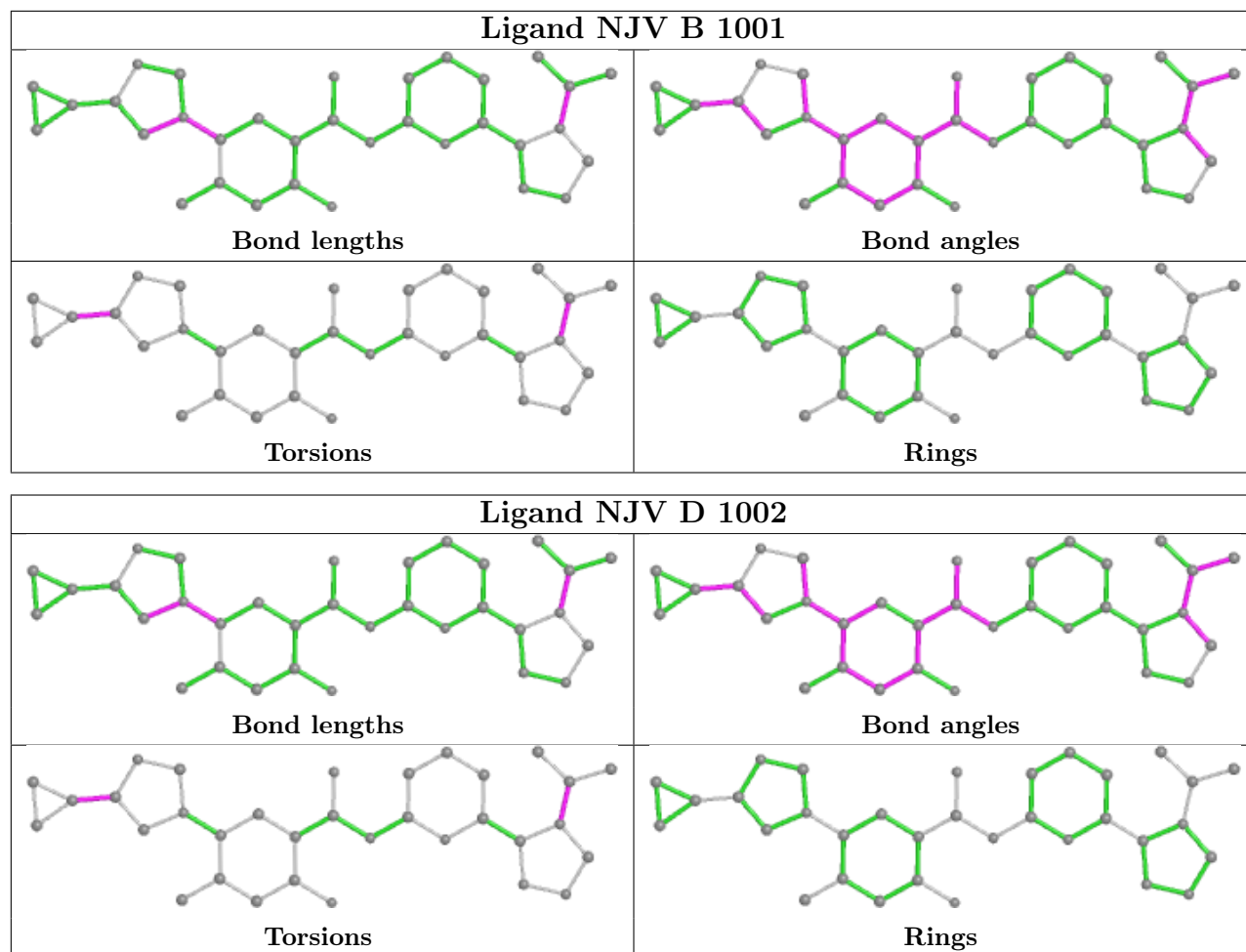
4 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	1001	NJV	2	0
2	A	1001	NJV	1	0
2	B	1001	NJV	1	0
2	D	1002	NJV	1	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

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<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	222/280 (79%)	0.17	12 (5%) 25 17	37, 77, 121, 156	0
1	B	238/280 (85%)	0.30	13 (5%) 25 16	33, 77, 134, 171	0
1	C	236/280 (84%)	0.18	7 (2%) 50 40	33, 78, 137, 186	0
1	D	253/280 (90%)	0.00	8 (3%) 47 37	33, 53, 116, 170	0
All	All	949/1120 (84%)	0.16	40 (4%) 36 26	33, 69, 129, 186	0

All (40) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	830	ALA	4.6
1	A	922	ASP	4.4
1	B	846	MET	3.9
1	B	845	TYR	3.9
1	D	890	ALA	3.9
1	D	941	HIS	3.5
1	B	679	GLU	3.5
1	D	851	ILE	3.4
1	A	923	PRO	3.3
1	C	916	LEU	3.2
1	D	891	MET	3.2
1	D	887	PRO	3.2
1	B	861	ALA	3.1
1	B	899	VAL	3.0
1	A	905	GLU	3.0
1	A	879	PRO	2.9
1	A	800	VAL	2.8
1	B	722	LEU	2.6
1	D	850	ILE	2.6
1	C	854	GLY	2.5
1	A	731	HIS	2.5

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Mol	Chain	Res	Type	RSRZ
1	B	847	ALA	2.4
1	A	691	TYR	2.4
1	C	826	SER	2.4
1	B	921	PRO	2.4
1	B	843	LEU	2.3
1	A	880	PRO	2.3
1	A	937	PHE	2.2
1	A	900	HIS	2.2
1	A	899	VAL	2.2
1	B	680	ASN	2.2
1	B	924	ASP	2.2
1	B	849	GLU	2.2
1	D	843	LEU	2.2
1	A	868	GLY	2.2
1	D	895	GLY	2.2
1	C	921	PRO	2.1
1	C	856	ARG	2.1
1	C	711	ILE	2.0
1	C	680	ASN	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<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
3	ACT	D	1005	4/4	0.65	0.28	96,96,96,96	0
3	ACT	A	1002	4/4	0.71	0.27	85,86,86,86	0
3	ACT	D	1003	4/4	0.78	0.24	74,74,74,74	0
3	ACT	B	1002	4/4	0.83	0.16	77,77,77,77	0

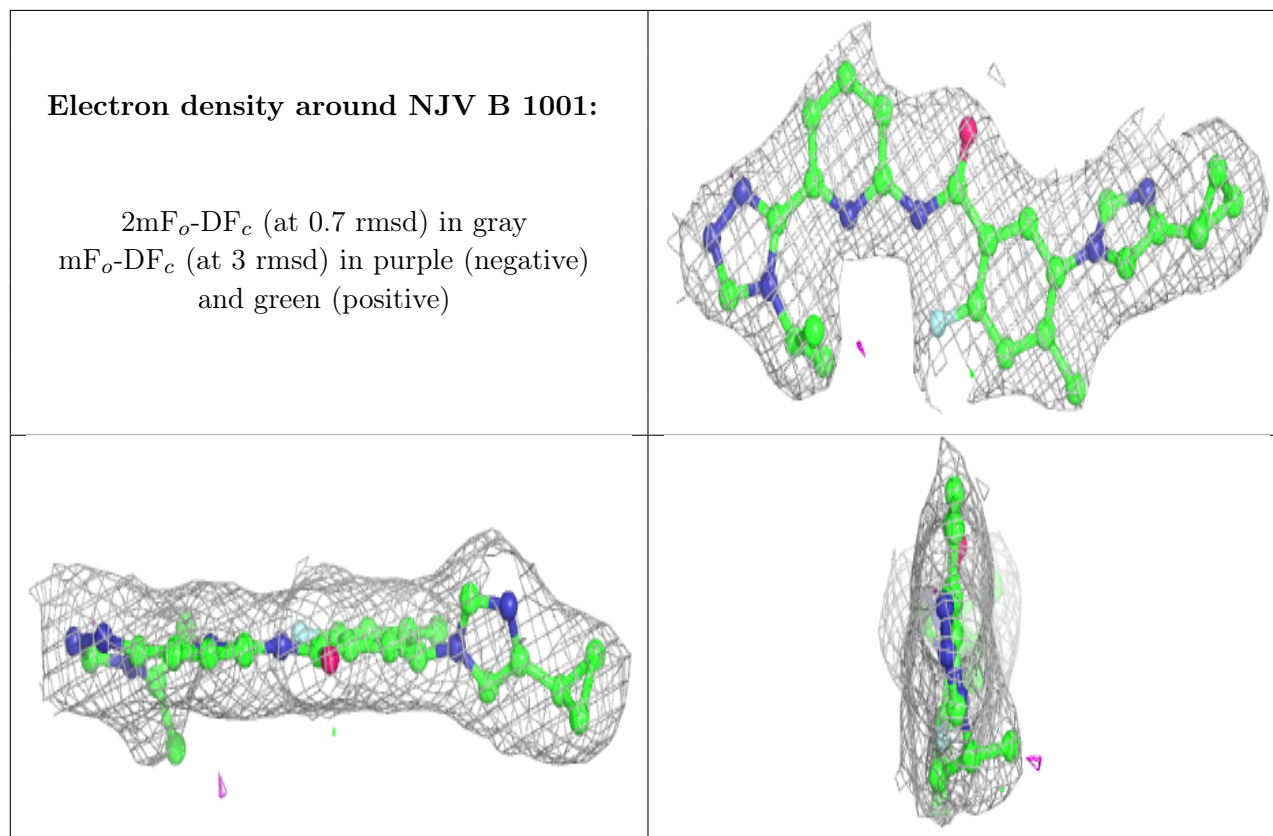
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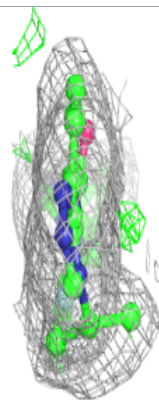
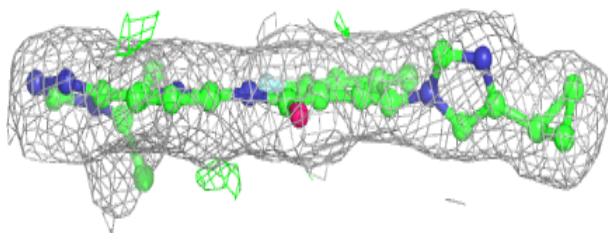
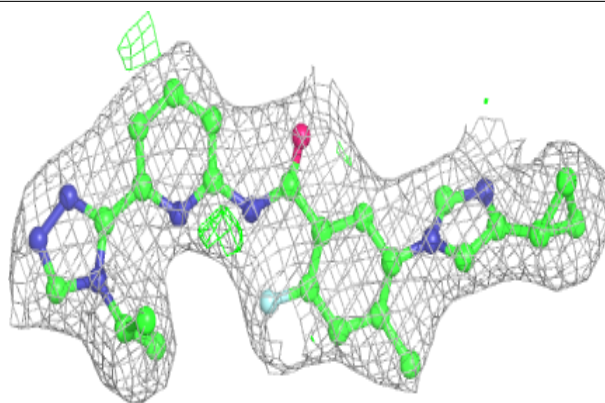
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
3	ACT	B	1003	4/4	0.84	0.34	82,83,83,83	0
3	ACT	C	1002	4/4	0.85	0.26	92,92,93,93	0
3	ACT	B	1004	4/4	0.87	0.34	74,74,75,75	0
3	ACT	D	1004	4/4	0.93	0.28	73,74,74,74	0
2	NJV	B	1001	33/33	0.93	0.20	41,45,49,52	0
3	ACT	D	1001	4/4	0.94	0.10	71,71,72,72	0
2	NJV	A	1001	33/33	0.95	0.14	32,39,46,47	0
2	NJV	D	1002	33/33	0.96	0.18	28,33,35,36	0
2	NJV	C	1001	33/33	0.97	0.18	37,40,45,47	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.

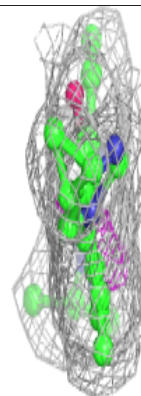
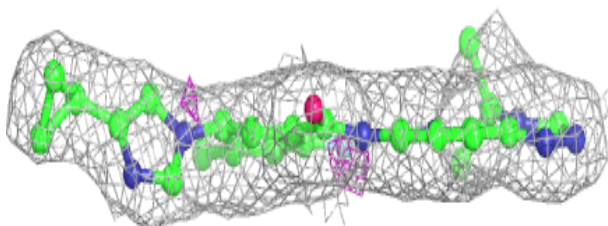
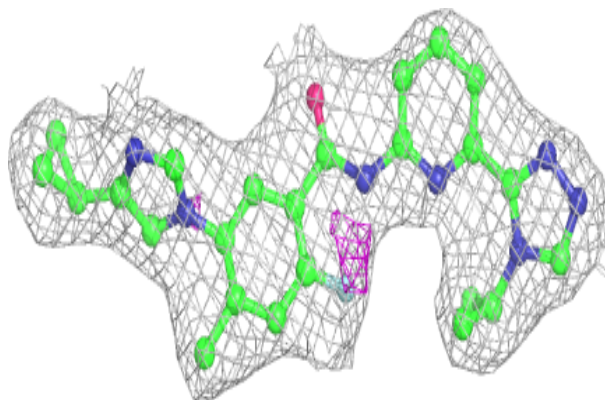


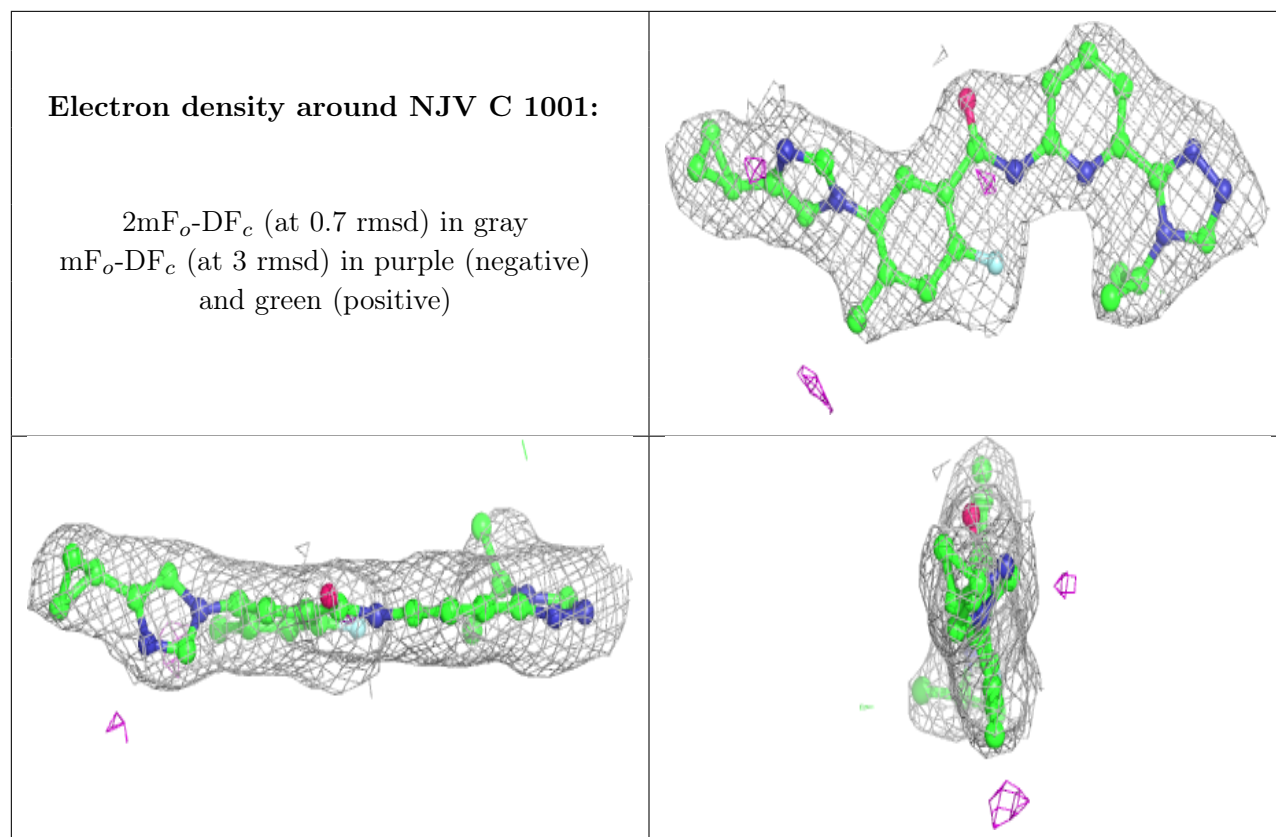
**Electron density around NJV A 1001:**

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

**Electron density around NJV D 1002:**

$2mF_o-DF_c$  (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.