Full wwPDB X-ray Structure Validation Report (i)

Nov 4, 2025 – 03:37 pm GMT

PDB ID	:	9R0D / pdb_00009r0d
Title	:	Human CD73 (ecto 5'-nucleotidase) in complex with compound 7
Authors	:	Moore, J.T.; Ivic, N.; Lammens, A.; Krapp, S.; Maskos, K.
Deposited on	:	2025-04-24
Resolution	:	2.40 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 (i) 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 (i)) were used in the production of this report:

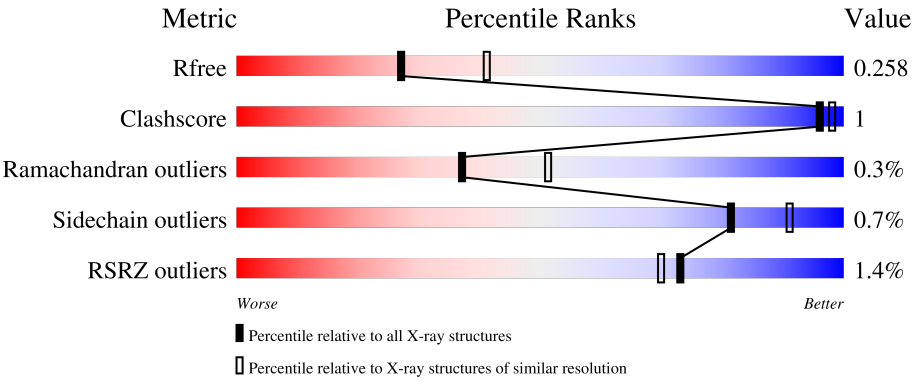
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.46

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 2.40 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}	164625	4642 (2.40-2.40)
Clashscore	180529	5218 (2.40-2.40)
Ramachandran outliers	177936	5158 (2.40-2.40)
Sidechain outliers	177891	5159 (2.40-2.40)
RSRZ outliers	164620	4642 (2.40-2.40)

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	533	2% 96%
1	B	533	% 96%

2 Entry composition (i)

There are 7 unique types of molecules in this entry. The entry contains 8809 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 5'-nucleotidase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	527	Total	C	N	O	S	44	5	0
			4163	2642	715	786	20			
1	B	526	Total	C	N	O	S	62	5	0
			4154	2636	712	786	20			

There are 26 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	23	LEU	-	expression tag	UNP P21589
A	24	ALA	-	expression tag	UNP P21589
A	25	SER	-	expression tag	UNP P21589
A	26	MET	-	expression tag	UNP P21589
A	53	ASP	ASN	engineered mutation	UNP P21589
A	333	ASP	ASN	engineered mutation	UNP P21589
A	403	ASP	ASN	engineered mutation	UNP P21589
A	550	HIS	-	expression tag	UNP P21589
A	551	HIS	-	expression tag	UNP P21589
A	552	HIS	-	expression tag	UNP P21589
A	553	HIS	-	expression tag	UNP P21589
A	554	HIS	-	expression tag	UNP P21589
A	555	HIS	-	expression tag	UNP P21589
B	23	LEU	-	expression tag	UNP P21589
B	24	ALA	-	expression tag	UNP P21589
B	25	SER	-	expression tag	UNP P21589
B	26	MET	-	expression tag	UNP P21589
B	53	ASP	ASN	engineered mutation	UNP P21589
B	333	ASP	ASN	engineered mutation	UNP P21589
B	403	ASP	ASN	engineered mutation	UNP P21589
B	550	HIS	-	expression tag	UNP P21589
B	551	HIS	-	expression tag	UNP P21589
B	552	HIS	-	expression tag	UNP P21589
B	553	HIS	-	expression tag	UNP P21589
B	554	HIS	-	expression tag	UNP P21589

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Chain	Residue	Modelled	Actual	Comment	Reference
B	555	HIS	-	expression tag	UNP P21589

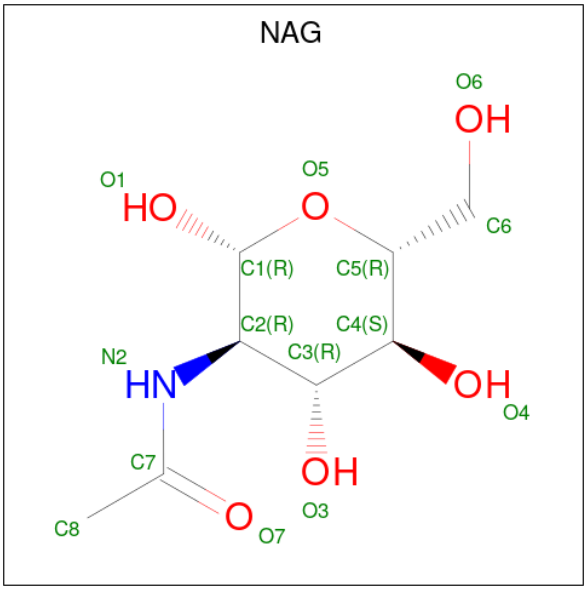
- Molecule 2 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	2	Total Zn 2 2	0	0
2	B	2	Total Zn 2 2	0	0

- Molecule 3 is CALCIUM ION (CCD ID: CA) (formula: Ca).

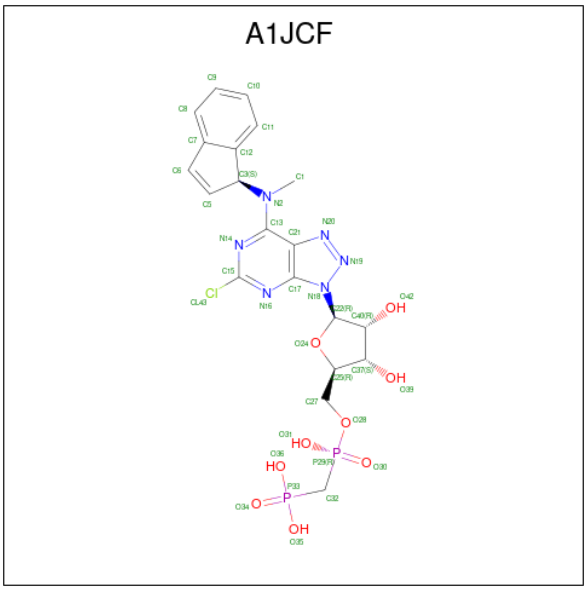
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total Ca 1 1	0	0
3	B	1	Total Ca 1 1	0	0

- Molecule 4 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: $C_8H_{15}NO_6$).



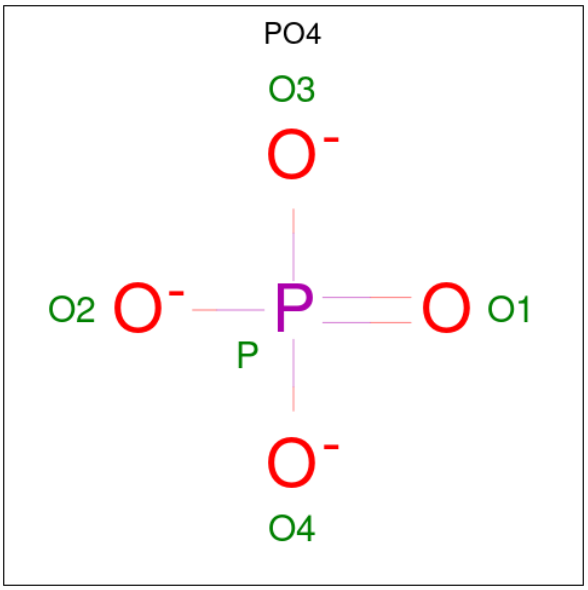
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C N O 14 8 1 5	0	0
4	B	1	Total C N O 14 8 1 5	0	0

- Molecule 5 is [[(2 {R},3 {S},4 {R},5 {R})-5-[5-chloranyl-7-[[(1 {S})-1 {H}-inden-1-yl]-methyl-amino]-[1,2,3]triazolo[4,5-d]pyrimidin-3-yl]-3,4-bis(oxidanyl)oxolan-2-yl]methoxy-oxidanyl-phosphoryl]methylphosphonic acid (CCD ID: A1JCF) (formula: $C_{20}H_{23}ClN_6O_9P_2$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
5	A	1	Total	C	Cl	N	O	P	0	0
			38	20	1	6	9	2		
5	B	1	Total	C	Cl	N	O	P	0	0
			38	20	1	6	9	2		

- Molecule 6 is PHOSPHATE ION (CCD ID: PO4) (formula: O_4P).



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

- Molecule 7 is water.

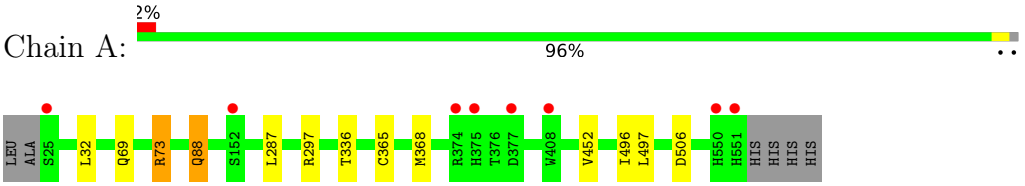
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	186	Total O 186 186	0	0
7	B	186	Total O 186 186	0	0

3 Residue-property plots (i)

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

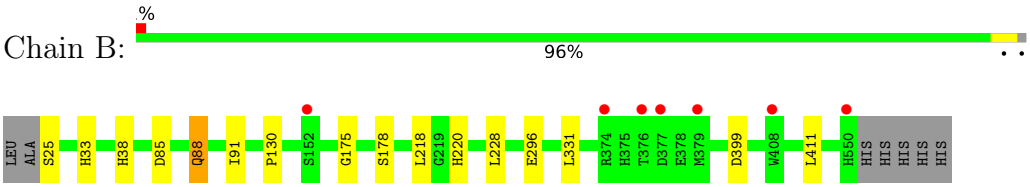
- Molecule 1: 5'-nucleotidase

Chain A:



- Molecule 1: 5'-nucleotidase

Chain B:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, α, β, γ	231.99Å 94.01Å 55.52Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	115.99 – 2.40 115.99 – 2.40	Depositor EDS
% Data completeness (in resolution range)	98.0 (115.99-2.40) 98.0 (115.99-2.40)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.74 (at 2.39Å)	Xtriage
Refinement program	REFMAC 5.8.0049	Depositor
R, R_{free}	0.214 , 0.255 0.219 , 0.258	Depositor DCC
R_{free} test set	1107 reflections (2.28%)	wwPDB-VP
Wilson B-factor (Å^2)	38.6	Xtriage
Anisotropy	0.593	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.33 , 36.6	EDS
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	8809	wwPDB-VP
Average B, all atoms (Å^2)	38.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 35.30 % 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 5.9655e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: NAG, ZN, CA, A1JCF, 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	0.69	0/4251	0.89	1/5755 (0.0%)
1	B	0.71	0/4241	0.87	1/5741 (0.0%)
All	All	0.70	0/8492	0.88	2/11496 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	33	HIS	N-CA-C	5.36	117.41	108.99
1	A	452	VAL	N-CA-C	5.28	116.30	108.65

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	4163	0	4130	9	0
1	B	4154	0	4120	6	0
2	A	2	0	0	0	0
2	B	2	0	0	0	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
4	A	14	0	13	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	B	14	0	13	0	0
5	A	38	0	0	1	0
5	B	38	0	0	0	0
6	A	5	0	0	0	0
6	B	5	0	0	0	0
7	A	186	0	0	3	0
7	B	186	0	0	1	0
All	All	8809	0	8276	16	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 1.

All (16) 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:88[B]:GLN:HE21	1:A:88[B]:GLN:C	1.91	0.79
1:A:88[B]:GLN:C	1:A:88[B]:GLN:NE2	2.62	0.55
1:A:32:LEU:HB3	1:A:287:LEU:HD11	1.93	0.49
1:A:69:GLN:O	1:A:73:ARG:HG2	2.13	0.49
1:B:91:ILE:HD12	1:B:331:LEU:HB3	1.96	0.48
1:A:506:ASP:OD1	5:A:605:A1JCF:O39	2.33	0.47
1:A:73:ARG:HD2	7:A:808:HOH:O	2.14	0.46
1:B:25:SER:HB2	1:B:296:GLU:HB3	1.97	0.46
1:B:175:GLY:HA2	1:B:218:LEU:O	2.17	0.45
1:A:368:MET:HE1	1:A:497:LEU:HA	1.99	0.45
1:A:297:ARG:NH2	7:A:703:HOH:O	2.48	0.44
1:B:88[B]:GLN:NE2	7:B:704:HOH:O	2.50	0.43
1:A:368:MET:HE2	1:A:496:ILE:HG12	2.02	0.42
4:A:604:NAG:H83	7:A:861:HOH:O	2.20	0.42
1:B:178:SER:N	1:B:220:HIS:O	2.49	0.42
1:B:38:HIS:CE1	1:B:85:ASP:HB3	2.56	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	530/533 (99%)	508 (96%)	20 (4%)	2 (0%)	30 44
1	B	529/533 (99%)	502 (95%)	24 (4%)	3 (1%)	22 33
All	All	1059/1066 (99%)	1010 (95%)	44 (4%)	5 (0%)	37 38

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	130	PRO
1	A	88[A]	GLN
1	A	88[B]	GLN
1	B	88[A]	GLN
1	B	88[B]	GLN

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	460/460 (100%)	457 (99%)	3 (1%)	81 91
1	B	459/460 (100%)	456 (99%)	3 (1%)	81 91
All	All	919/920 (100%)	913 (99%)	6 (1%)	81 91

All (6) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	73	ARG
1	A	336	THR
1	A	365	CYS
1	B	228	LEU
1	B	399	ASP
1	B	411	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such

sidechains are listed below:

Mol	Chain	Res	Type
1	A	70	GLN
1	A	337	GLN
1	A	425	GLN
1	B	252	ASN
1	B	526	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)

2 non-standard protein/DNA/RNA residues 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	NAG	A	604	1	14,14,15	0.46	0	17,19,21	2.14	6 (35%)
4	NAG	B	604	1	14,14,15	0.51	0	17,19,21	2.52	8 (47%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	NAG	A	604	1	-	4/6/23/26	0/1/1/1
4	NAG	B	604	1	-	2/6/23/26	0/1/1/1

There are no bond length outliers.

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	B	604	NAG	C1-O5-C5	5.87	120.15	112.19
4	A	604	NAG	C8-C7-N2	5.22	124.94	116.10
4	B	604	NAG	C8-C7-N2	4.73	124.10	116.10
4	A	604	NAG	C2-N2-C7	4.11	128.75	122.90
4	B	604	NAG	C2-N2-C7	3.68	128.15	122.90
4	B	604	NAG	O5-C1-C2	-3.22	106.21	111.29
4	A	604	NAG	O7-C7-C8	-3.07	116.36	122.06
4	A	604	NAG	C1-O5-C5	2.96	116.20	112.19
4	B	604	NAG	O7-C7-C8	-2.35	117.69	122.06
4	B	604	NAG	O5-C5-C4	2.08	115.89	110.83
4	A	604	NAG	O5-C1-C2	-2.08	108.01	111.29
4	A	604	NAG	O5-C5-C6	2.05	110.42	107.20
4	B	604	NAG	O7-C7-N2	-2.04	118.21	121.95
4	B	604	NAG	C6-C5-C4	-2.01	108.30	113.00

There are no chirality outliers.

All (6) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	604	NAG	C8-C7-N2-C2
4	A	604	NAG	O7-C7-N2-C2
4	B	604	NAG	C8-C7-N2-C2
4	B	604	NAG	O7-C7-N2-C2
4	A	604	NAG	O5-C5-C6-O6
4	A	604	NAG	C4-C5-C6-O6

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	604	NAG	1	0

5.5 Carbohydrates (i)

There are no oligosaccharides in this entry.

5.6 Ligand geometry (i)

Of 12 ligands modelled in this entry, 6 are monoatomic - leaving 6 for Mogul analysis.

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	$\#\|Z\| > 2$
6	PO4	A	606	-	4,4,4	0.71	0	6,6,6	0.80	0
5	A1JCF	B	605	2	37,42,42	1.74	8 (21%)	40,65,65	2.40	8 (20%)
6	PO4	B	606	-	4,4,4	0.79	0	6,6,6	0.99	0
4	NAG	B	604	1	14,14,15	0.51	0	17,19,21	2.52	8 (47%)
5	A1JCF	A	605	2	37,42,42	1.94	11 (29%)	40,65,65	2.62	13 (32%)
4	NAG	A	604	1	14,14,15	0.46	0	17,19,21	2.14	6 (35%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	NAG	A	604	1	-	4/6/23/26	0/1/1/1
4	NAG	B	604	1	-	2/6/23/26	0/1/1/1
5	A1JCF	A	605	2	-	0/17/49/49	0/5/5/5
5	A1JCF	B	605	2	-	0/17/49/49	0/5/5/5

All (19) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	605	A1JCF	C6-C5	7.25	1.56	1.34
5	B	605	A1JCF	C6-C5	6.53	1.54	1.34
5	A	605	A1JCF	N20-N19	-3.22	1.28	1.34
5	B	605	A1JCF	N20-N19	-3.08	1.28	1.34
5	A	605	A1JCF	P33-O35	2.77	1.61	1.54
5	A	605	A1JCF	C7-C6	2.76	1.52	1.43
5	B	605	A1JCF	C17-N16	-2.69	1.31	1.35
5	A	605	A1JCF	N19-N18	2.61	1.39	1.34
5	A	605	A1JCF	C17-N16	-2.56	1.31	1.35
5	B	605	A1JCF	N19-N18	2.54	1.39	1.34
5	B	605	A1JCF	C7-C6	2.50	1.51	1.43
5	B	605	A1JCF	P33-O35	2.40	1.60	1.54
5	A	605	A1JCF	O24-C22	2.39	1.44	1.41

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	605	A1JCF	P29-O31	2.34	1.61	1.56
5	A	605	A1JCF	C15-N16	2.33	1.32	1.30
5	B	605	A1JCF	P29-O31	2.29	1.61	1.56
5	B	605	A1JCF	C3-N2	2.22	1.49	1.48
5	A	605	A1JCF	P29-O28	2.20	1.60	1.57
5	A	605	A1JCF	C3-N2	2.07	1.49	1.48

All (35) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
5	A	605	A1JCF	N16-C15-N14	-8.03	122.53	130.62
5	B	605	A1JCF	N16-C15-N14	-7.97	122.60	130.62
5	B	605	A1JCF	C15-N16-C17	6.97	119.61	114.09
5	A	605	A1JCF	C15-N16-C17	6.97	119.61	114.09
5	A	605	A1JCF	C21-C13-N14	-6.68	115.26	120.81
5	B	605	A1JCF	C21-C13-N14	-5.98	115.85	120.81
4	B	604	NAG	C1-O5-C5	5.87	120.15	112.19
4	A	604	NAG	C8-C7-N2	5.22	124.94	116.10
4	B	604	NAG	C8-C7-N2	4.73	124.10	116.10
5	A	605	A1JCF	C15-N14-C13	4.19	123.47	111.04
5	B	605	A1JCF	C15-N14-C13	4.16	123.38	111.04
5	A	605	A1JCF	O35-P33-C32	4.13	116.41	106.40
4	A	604	NAG	C2-N2-C7	4.11	128.75	122.90
5	B	605	A1JCF	CL43-C15-N16	3.96	119.08	115.70
4	B	604	NAG	C2-N2-C7	3.68	128.15	122.90
4	B	604	NAG	O5-C1-C2	-3.22	106.21	111.29
5	B	605	A1JCF	O35-P33-O34	-3.11	104.18	112.39
5	A	605	A1JCF	O34-P33-C32	-3.08	104.61	111.24
5	A	605	A1JCF	O35-P33-O34	-3.07	104.27	112.39
4	A	604	NAG	O7-C7-C8	-3.07	116.36	122.06
5	A	605	A1JCF	CL43-C15-N14	3.04	119.50	115.15
4	A	604	NAG	C1-O5-C5	2.96	116.20	112.19
5	A	605	A1JCF	CL43-C15-N16	2.66	117.97	115.70
5	A	605	A1JCF	O31-P29-C32	2.56	117.05	106.58
5	A	605	A1JCF	O36-P33-C32	-2.54	100.25	106.40
5	A	605	A1JCF	N14-C13-N2	2.41	119.36	115.61
5	A	605	A1JCF	O36-P33-O34	2.40	118.73	112.39
4	B	604	NAG	O7-C7-C8	-2.35	117.69	122.06
5	B	605	A1JCF	CL43-C15-N14	2.22	118.32	115.15
5	B	605	A1JCF	C8-C7-C6	-2.12	129.13	135.08
4	B	604	NAG	O5-C5-C4	2.08	115.89	110.83
4	A	604	NAG	O5-C1-C2	-2.08	108.01	111.29

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	A	604	NAG	O5-C5-C6	2.05	110.42	107.20
4	B	604	NAG	O7-C7-N2	-2.04	118.21	121.95
4	B	604	NAG	C6-C5-C4	-2.01	108.30	113.00

There are no chirality outliers.

All (6) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	604	NAG	C8-C7-N2-C2
4	A	604	NAG	O7-C7-N2-C2
4	B	604	NAG	C8-C7-N2-C2
4	B	604	NAG	O7-C7-N2-C2
4	A	604	NAG	O5-C5-C6-O6
4	A	604	NAG	C4-C5-C6-O6

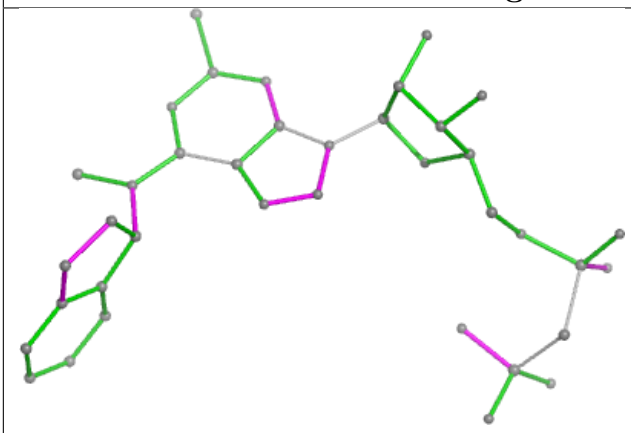
There are no ring outliers.

2 monomers are involved in 2 short contacts:

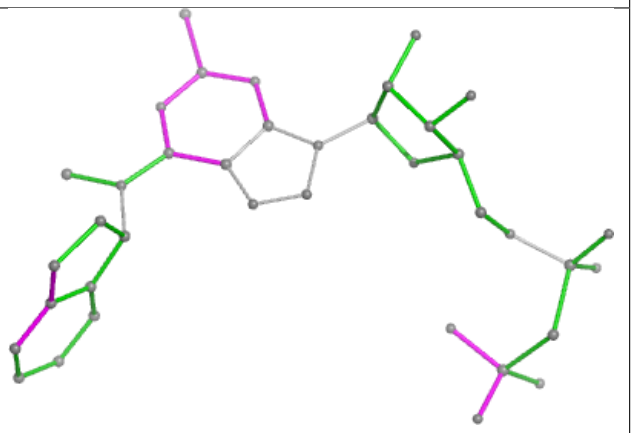
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	605	A1JCF	1	0
4	A	604	NAG	1	0

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 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.

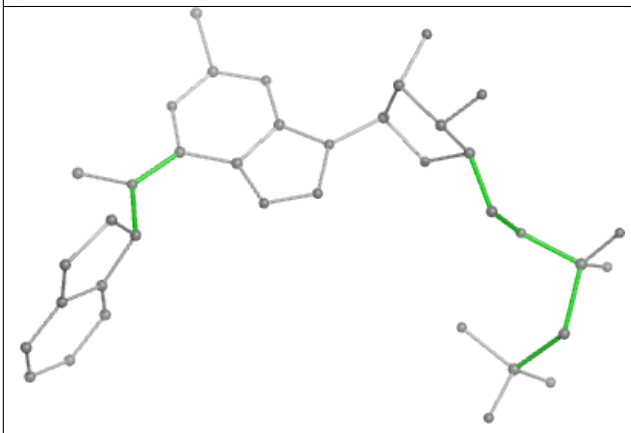
Ligand A1JCF B 605



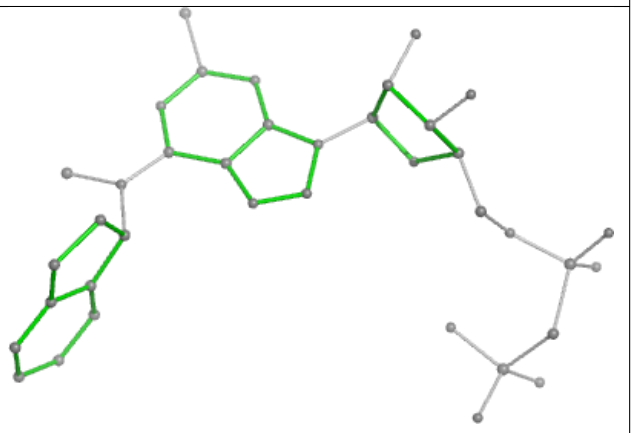
Bond lengths



Bond angles

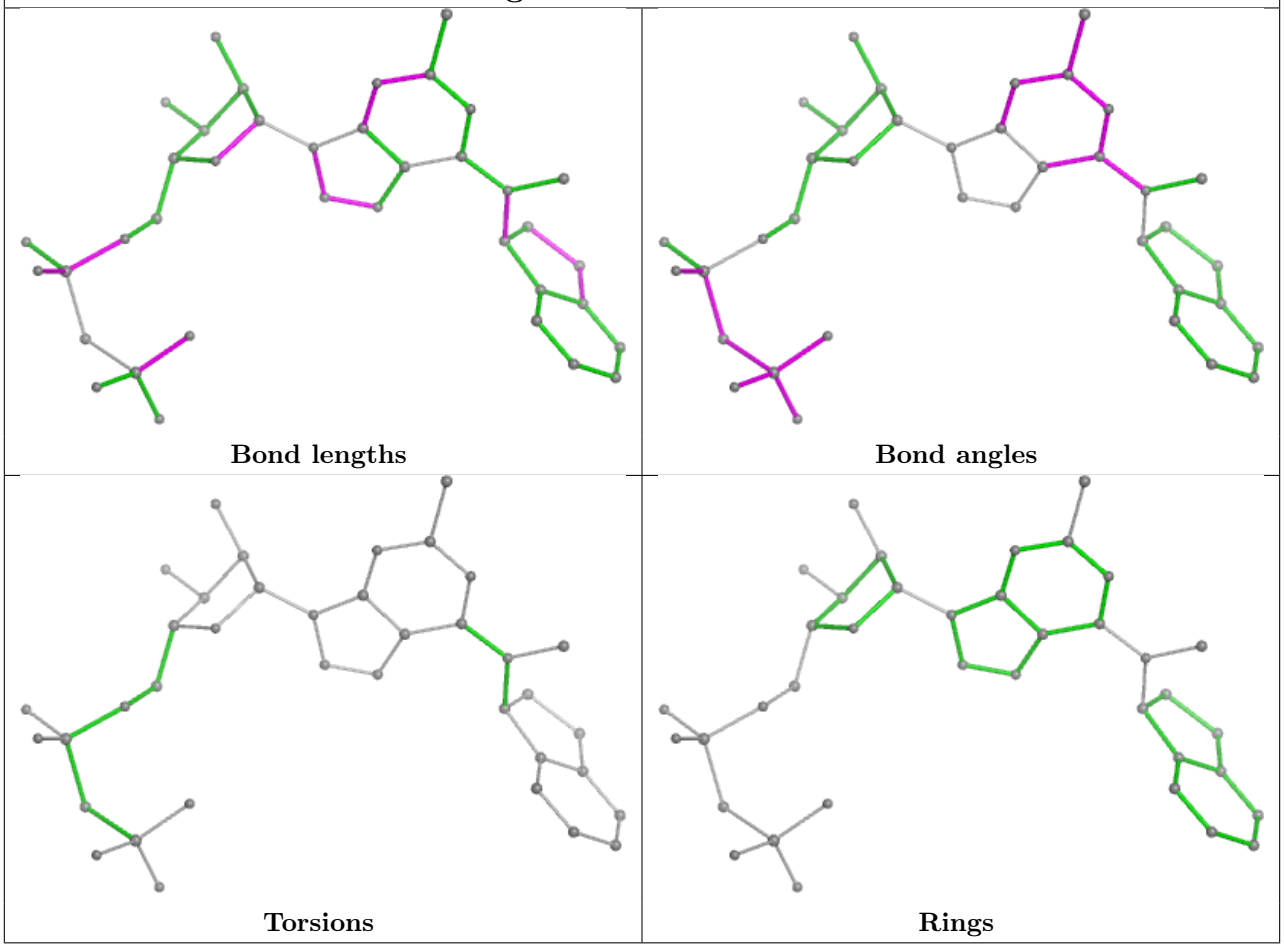


Torsions



Rings

Ligand A1JCF A 605



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	527/533 (98%)	-0.31	8 (1%)	71	68	15, 35, 61, 112	25 (4%)
1	B	526/533 (98%)	-0.27	7 (1%)	74	71	15, 35, 59, 102	31 (5%)
All	All	1053/1066 (98%)	-0.29	15 (1%)	73	70	15, 35, 60, 112	56 (5%)

All (15) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	551	HIS	5.9
1	B	550	HIS	4.9
1	B	377	ASP	4.2
1	A	550	HIS	3.0
1	B	379	MET	2.8
1	B	152	SER	2.5
1	B	374	ARG	2.5
1	A	375	HIS	2.5
1	B	408	TRP	2.4
1	B	376	THR	2.4
1	A	374	ARG	2.4
1	A	408	TRP	2.2
1	A	25	SER	2.2
1	A	377	ASP	2.1
1	A	152	SER	2.0

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

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
4	NAG	B	604	14/15	0.83	0.12	41,54,67,78	0
4	NAG	A	604	14/15	0.85	0.12	43,60,73,85	0

6.3 Carbohydrates (i)

There are no oligosaccharides in this entry.

6.4 Ligands (i)

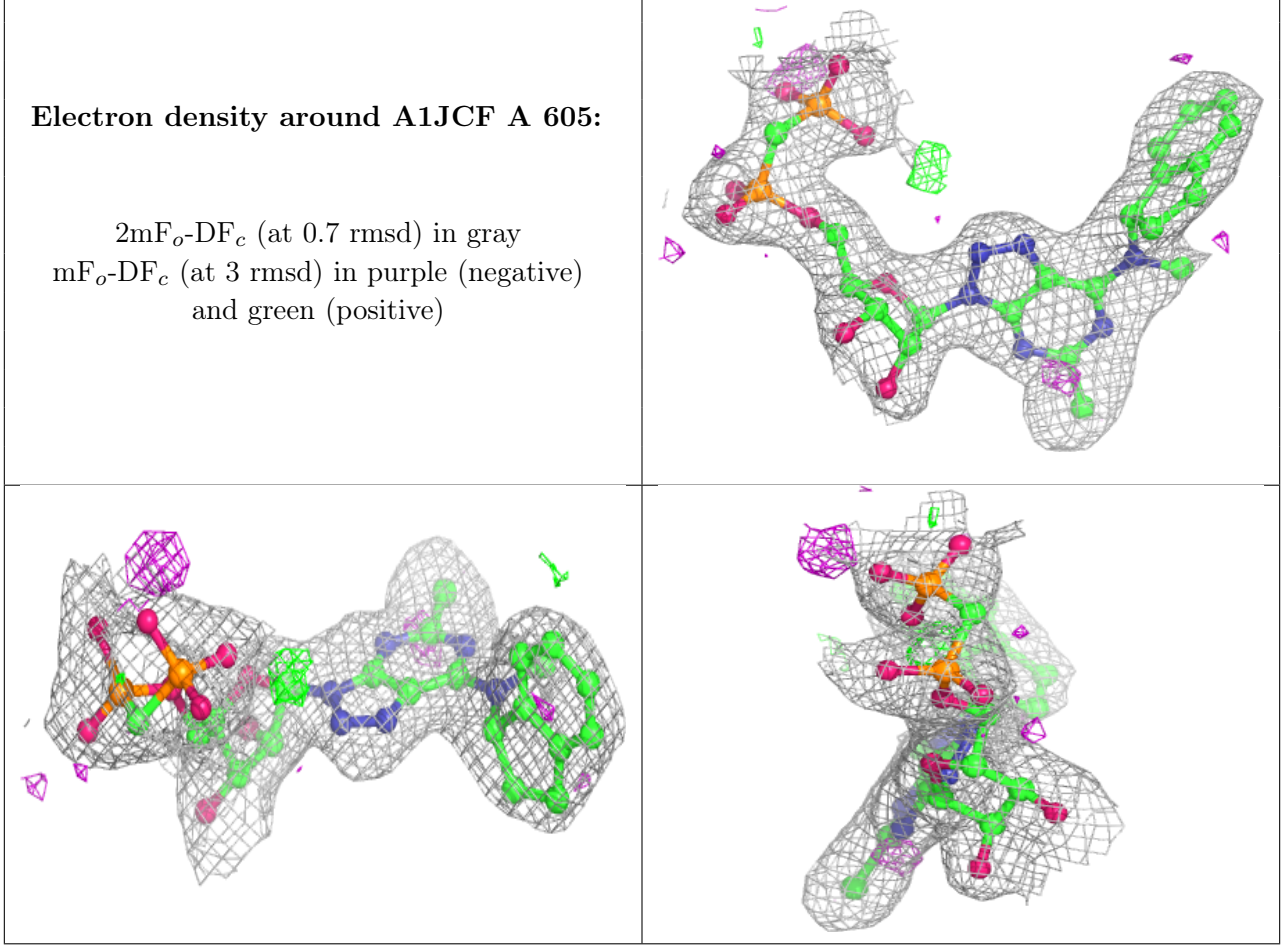
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' 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
4	NAG	B	604	14/15	0.83	0.12	41,54,67,78	0
4	NAG	A	604	14/15	0.85	0.12	43,60,73,85	0
6	PO4	B	606	5/5	0.90	0.14	42,53,69,78	0
2	ZN	A	601	1/1	0.91	0.12	67,67,67,67	0
2	ZN	B	601	1/1	0.92	0.12	69,69,69,69	0
6	PO4	A	606	5/5	0.93	0.10	45,48,67,76	0
3	CA	A	603	1/1	0.94	0.13	38,38,38,38	1
3	CA	B	603	1/1	0.95	0.07	32,32,32,32	1
5	A1JCF	A	605	38/38	0.96	0.07	20,31,41,49	0
5	A1JCF	B	605	38/38	0.97	0.07	19,32,42,53	0
2	ZN	A	602	1/1	0.98	0.03	40,40,40,40	0
2	ZN	B	602	1/1	0.99	0.03	37,37,37,37	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.

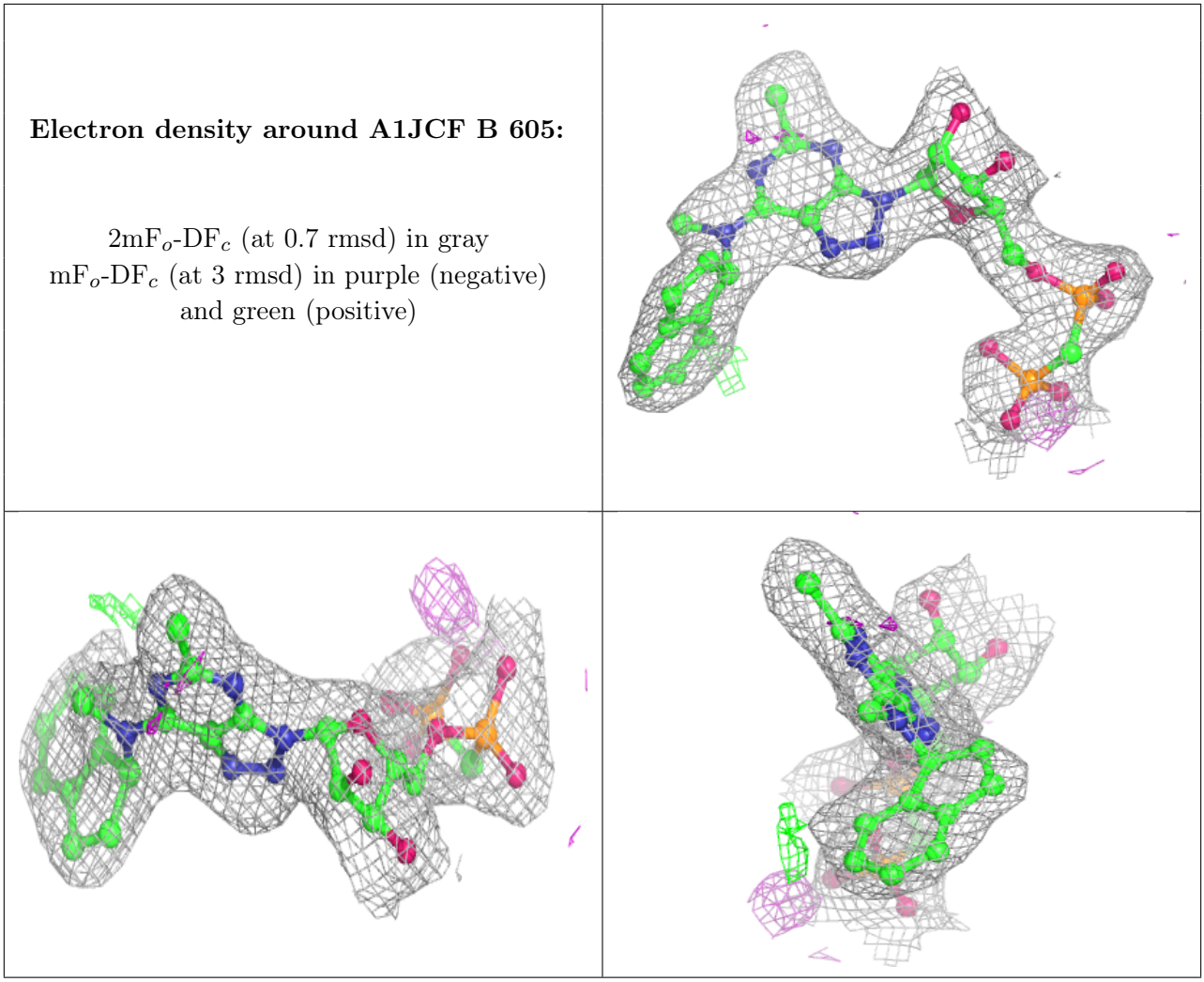
Electron density around A1JCF A 605:

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



Electron density around A1JCF B 605:

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



6.5 Other polymers

There are no such residues in this entry.