Full wwPDB X-ray Structure Validation Report (i)

Nov 5, 2023 – 06:49 PM EST

PDB ID	:	6D5E
Title	:	Ras:SOS:Ras in complex with a small molecule activator
Authors	:	Phan, J.; Hodges, T.; Fesik, S.W.
Deposited on	:	2018-04-19
Resolution	:	1.75 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:

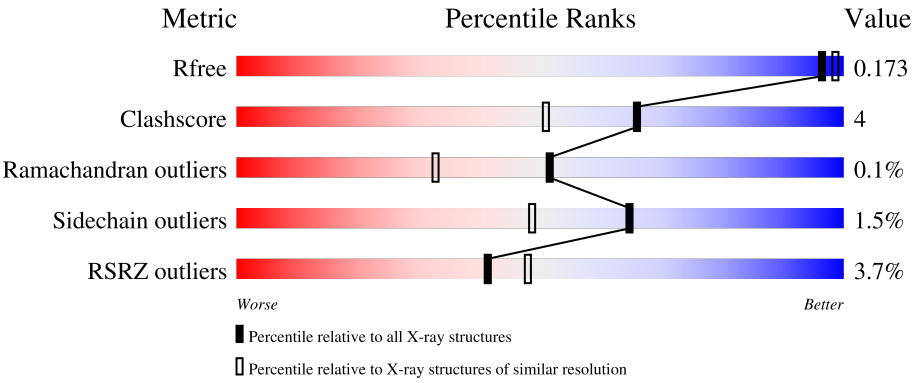
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 1.75 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	2340 (1.76-1.76)
Clashscore	141614	2466 (1.76-1.76)
Ramachandran outliers	138981	2437 (1.76-1.76)
Sidechain outliers	138945	2437 (1.76-1.76)
RSRZ outliers	127900	2298 (1.76-1.76)

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	167	3% 90% 9%
2	B	482	2% 90% 8%
3	C	167	10% 87% 11%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
6	CL	C	202	-	-	X	-
8	FMT	B	2005	-	-	X	-

2 Entry composition (i)

There are 11 unique types of molecules in this entry. The entry contains 8061 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 GTPase HRas.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	166	Total	C	N	O	S	0	11	0
			1414	871	249	287	7			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	0	GLY	-	expression tag	UNP P01112
A	64	ALA	TYR	conflict	UNP P01112

- Molecule 2 is a protein called Son of sevenless homolog 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	469	Total	C	N	O	S	0	22	0
			4083	2608	710	752	13			

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	565	GLY	-	expression tag	UNP Q07889

- Molecule 3 is a protein called GTPase HRas.

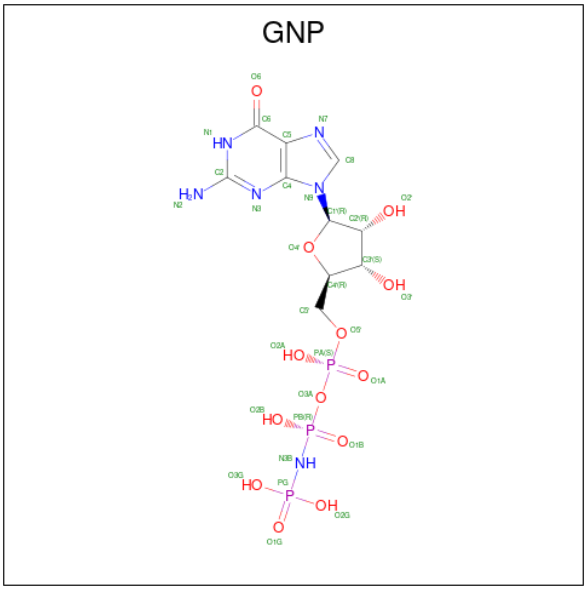
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	C	167	Total	C	N	O	S	0	10	0
			1407	874	245	281	7			

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	0	GLY	-	expression tag	UNP P01112

- Molecule 4 is PHOSPHOAMINOPHOSPHONIC ACID-GUANYLATE ESTER (three-letter

code: GNP) (formula: $C_{10}H_{17}N_6O_{13}P_3$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total	C	N	O	P	0	0
			32	10	6	13	3		

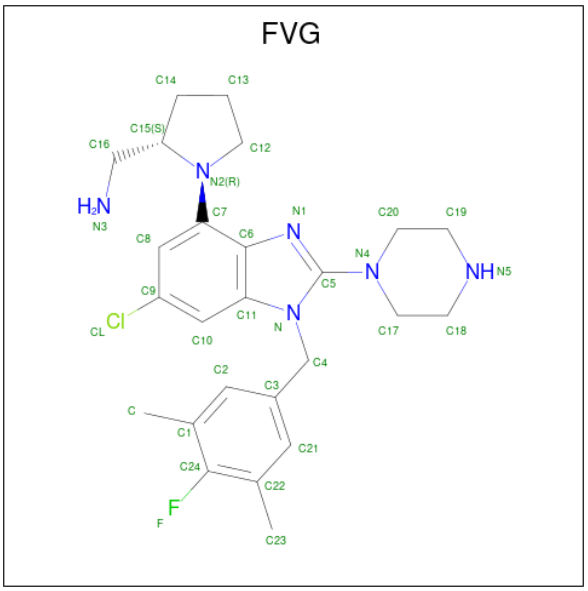
- Molecule 5 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total	Mg	0	0
			1	1		

- Molecule 6 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

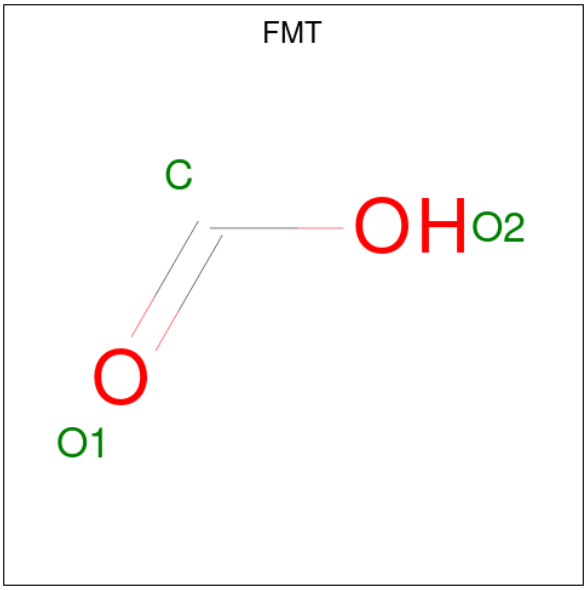
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	1	Total	Cl	0	0
			1	1		
6	B	1	Total	Cl	0	0
			1	1		
6	C	2	Total	Cl	0	0
			2	2		

- Molecule 7 is 1-[(2S)-1-{6-chloro-1-[(4-fluoro-3,5-dimethylphenyl)methyl]-2-(piperazin-1-yl)-1H-benzimidazol-4-yl}pyrrolidin-2-yl]methanamine (three-letter code: FVG) (formula: $C_{25}H_{32}ClFN_6$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
7	B	1	Total	C	Cl	F	N	0	0
			33	25	1	1	6		

- Molecule 8 is FORMIC ACID (three-letter code: FMT) (formula: CH_2O_2).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	B	1	Total	C	O	0	0
			3	1	2		
8	B	1	Total	C	O	0	0
			3	1	2		
8	B	1	Total	C	O	0	0
			3	1	2		

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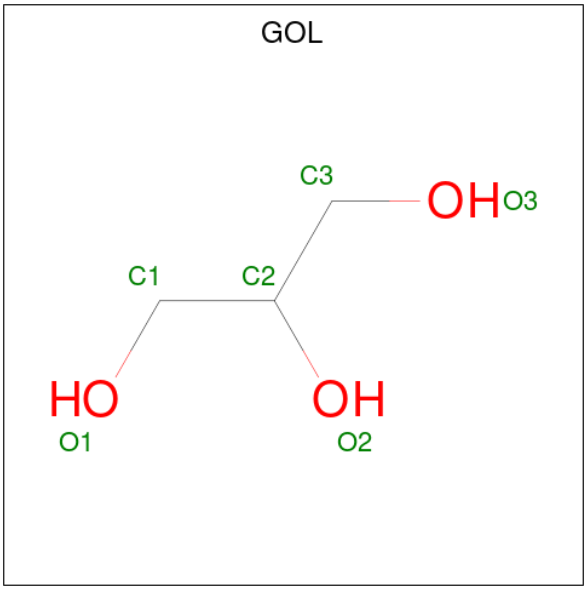
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	B	1	Total C O 3 1 2	0	0
8	B	1	Total C O 3 1 2	0	0
8	B	1	Total C O 3 1 2	0	0

- Molecule 9 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
9	B	1	Total C O 6 3 3	0	0
9	B	1	Total C O 6 3 3	0	0
9	B	1	Total C O 6 3 3	0	0

- Molecule 10 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
10	C	1	Total Na 1 1	0	0

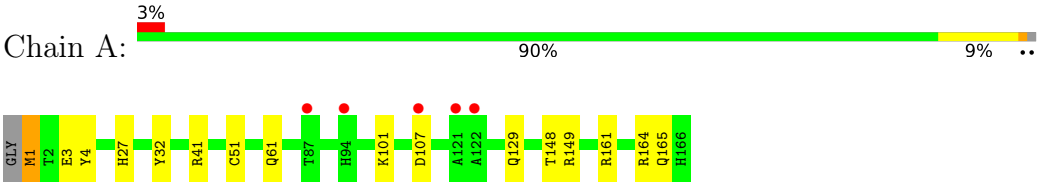
- Molecule 11 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
11	A	161	Total O 161 161	0	0
11	B	691	Total O 691 691	0	0
11	C	198	Total O 198 198	0	0

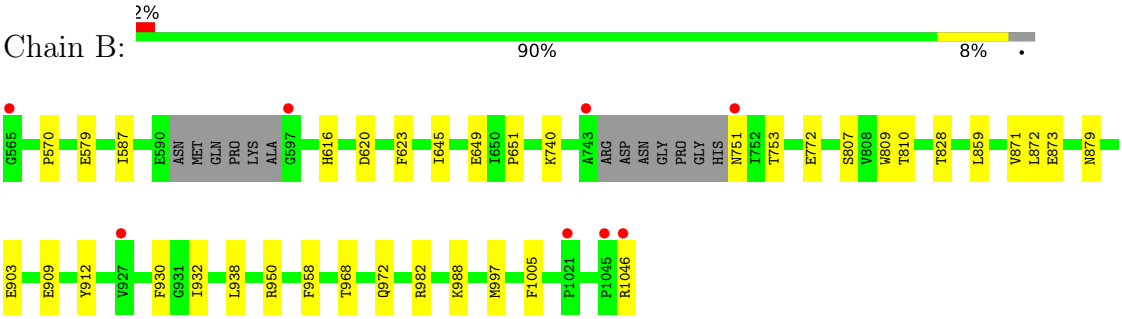
3 Residue-property plots (i)

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.

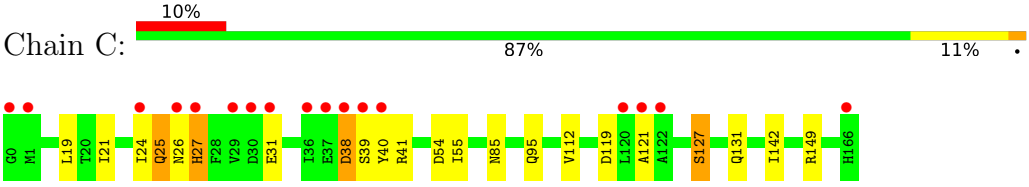
• Molecule 1: GTPase HRas



• Molecule 2: Son of sevenless homolog 1



• Molecule 3: GTPase HRas



4 Data and refinement statistics (i)

Property	Value	Source
Space group	I 4 2 2	Depositor
Cell constants a, b, c, α, β, γ	183.61Å 183.61Å 179.18Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.73 – 1.75 48.73 – 1.75	Depositor EDS
% Data completeness (in resolution range)	100.0 (48.73-1.75) 100.0 (48.73-1.75)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.03	Depositor
$< I/\sigma(I) >$ [1]	2.63 (at 1.75Å)	Xtriage
Refinement program	PHENIX (1.11.1_2575: ???)	Depositor
R, R_{free}	0.160 , 0.174 0.160 , 0.173	Depositor DCC
R_{free} test set	7684 reflections (5.04%)	wwPDB-VP
Wilson B-factor (Å^2)	23.9	Xtriage
Anisotropy	0.144	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.35 , 49.2	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.34$	Xtriage
Estimated twinning fraction	0.002 for l,-k,h 0.003 for -h,-l,-k	Xtriage
F_o,F_c correlation	0.97	EDS
Total number of atoms	8061	wwPDB-VP
Average B, all atoms (Å^2)	28.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.00% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: MG, NA, GNP, CL, CSO, FMT, GOL, FVG

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	0.35	0/1425	0.55	0/1919
2	B	0.36	0/4176	0.50	0/5641
3	C	0.36	0/1426	0.56	0/1921
All	All	0.36	0/7027	0.53	0/9481

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
3	C	0	1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
3	C	25	GLN	Peptide

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	1414	0	1360	11	0
2	B	4083	0	4089	25	0
3	C	1407	0	1378	14	0
4	A	32	0	13	0	0
5	A	1	0	0	0	0
6	A	1	0	0	0	0
6	B	1	0	0	1	0
6	C	2	0	0	2	0
7	B	33	0	0	2	0
8	B	18	0	6	2	0
9	B	18	0	24	3	0
10	C	1	0	0	0	0
11	A	161	0	0	4	0
11	B	691	0	0	12	3
11	C	198	0	0	7	1
All	All	8061	0	6870	55	3

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 4.

All (55) 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)
9:B:2009:GOL:O3	11:B:2101:HOH:O	1.60	1.17
1:A:165:GLN:NE2	11:A:301:HOH:O	2.00	0.92
6:C:202:CL:CL	11:C:1010:HOH:O	2.25	0.91
2:B:620:ASP:OD1	11:B:2102:HOH:O	1.88	0.89
6:B:2010:CL:CL	11:B:2648:HOH:O	2.29	0.87
1:A:129:GLN:OE1	11:A:302:HOH:O	2.00	0.78
1:A:51:CSO:OD	1:A:164[B]:ARG:NH2	2.17	0.77
3:C:24:ILE:HD11	3:C:55:ILE:HD12	1.67	0.77
2:B:909:GLU:OE2	11:B:2103:HOH:O	2.05	0.72
11:B:2128:HOH:O	6:C:202:CL:CL	2.43	0.72
2:B:903:GLU:OE1	11:B:2104:HOH:O	2.06	0.72
2:B:1046:ARG:OXT	11:B:2105:HOH:O	2.07	0.72
7:B:2001:FVG:C15	9:B:2009:GOL:H31	2.21	0.70
2:B:988[B]:LYS:NZ	11:B:2107:HOH:O	2.18	0.69
3:C:85:ASN:HD22	3:C:121:ALA:HB3	1.60	0.67
2:B:579:GLU:HB2	11:B:2145:HOH:O	1.96	0.66
3:C:39[B]:SER:HA	11:C:904:HOH:O	1.96	0.65
3:C:39[A]:SER:HA	11:C:904:HOH:O	1.97	0.63
3:C:41:ARG:NH1	3:C:54:ASP:OD2	2.32	0.63

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:938[A]:LEU:HD12	11:B:2365:HOH:O	2.02	0.58
2:B:616:HIS:ND1	8:B:2005:FMT:O2	2.38	0.56
2:B:740[A]:LYS:NZ	11:B:2106:HOH:O	2.14	0.55
3:C:21:ILE:O	3:C:25:GLN:HB2	2.08	0.54
1:A:27[B]:HIS:HB2	2:B:751:ASN:O	2.09	0.52
2:B:828:THR:HG23	2:B:873:GLU:HG2	1.93	0.51
2:B:623:PHE:HE1	2:B:958:PHE:CE2	2.30	0.50
2:B:587:ILE:HD11	2:B:950:ARG:HG3	1.95	0.48
3:C:127[B]:SER:O	3:C:131[B]:GLN:HG3	2.14	0.48
3:C:27:HIS:N	11:C:908:HOH:O	2.46	0.47
2:B:645:ILE:O	2:B:649[A]:GLU:HG2	2.15	0.47
2:B:623:PHE:HE1	2:B:958:PHE:CZ	2.33	0.46
1:A:4:TYR:OH	1:A:164[B]:ARG:HG3	2.16	0.46
1:A:61:GLN:HG2	11:A:364:HOH:O	2.16	0.46
2:B:912:TYR:CG	2:B:932:ILE:HD11	2.52	0.45
2:B:570:PRO:HB3	2:B:651:PRO:HG2	1.98	0.45
3:C:40:TYR:HB3	11:C:1010:HOH:O	2.16	0.44
1:A:161:ARG:NH2	11:A:303:HOH:O	2.25	0.44
7:B:2001:FVG:C15	9:B:2009:GOL:H11	2.48	0.44
2:B:982:ARG:NH2	11:B:2108:HOH:O	2.21	0.43
2:B:997:MET:HG2	2:B:1005:PHE:CD2	2.53	0.43
3:C:119:ASP:HB2	11:C:1029:HOH:O	2.18	0.43
1:A:101:LYS:HD2	1:A:107:ASP:HA	2.00	0.43
3:C:38:ASP:OD1	3:C:38:ASP:N	2.50	0.43
2:B:807:SER:HA	2:B:809:TRP:CZ3	2.54	0.43
3:C:112[B]:VAL:HG11	3:C:142:ILE:HD13	2.01	0.42
1:A:148:THR:O	1:A:149:ARG:HB2	2.19	0.42
2:B:810:THR:HG21	2:B:938[B]:LEU:HD12	2.01	0.42
3:C:27:HIS:CE1	3:C:149:ARG:HD3	2.54	0.42
2:B:616:HIS:HD1	8:B:2005:FMT:C	2.32	0.41
1:A:1:MET:HG2	1:A:51:CSO:HA	2.03	0.41
1:A:3:GLU:OE2	1:A:41:ARG:NH2	2.52	0.41
2:B:968:THR:O	2:B:972:GLN:HG3	2.21	0.41
2:B:859:LEU:HD11	2:B:871:VAL:HG13	2.03	0.40
3:C:95:GLN:OE1	11:C:901:HOH:O	2.22	0.40
2:B:872:LEU:HD23	2:B:872:LEU:HA	1.96	0.40

All (3) 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)
11:B:2248:HOH:O	11:C:1033:HOH:O[3_555]	1.97	0.23
11:B:2480:HOH:O	11:B:2644:HOH:O[4_555]	1.97	0.23
11:B:2735:HOH:O	11:B:2789:HOH:O[7_556]	2.12	0.08

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	174/167 (104%)	171 (98%)	3 (2%)	0	100 100
2	B	486/482 (101%)	481 (99%)	5 (1%)	0	100 100
3	C	175/167 (105%)	169 (97%)	5 (3%)	1 (1%)	25 10
All	All	835/816 (102%)	821 (98%)	13 (2%)	1 (0%)	51 33

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	C	26	ASN

5.3.2 Protein sidechains (i)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	153/142 (108%)	151 (99%)	2 (1%)	69 54
2	B	460/447 (103%)	456 (99%)	4 (1%)	78 67
3	C	154/144 (107%)	148 (96%)	6 (4%)	32 11

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
All	All	767/733 (105%)	755 (98%)	12 (2%)	65 45

All (12) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1	MET
1	A	32	TYR
2	B	753	THR
2	B	772	GLU
2	B	879	ASN
2	B	930	PHE
3	C	19	LEU
3	C	27	HIS
3	C	31	GLU
3	C	38	ASP
3	C	127[A]	SER
3	C	127[B]	SER

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

Mol	Chain	Res	Type
3	C	85	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)

1 non-standard protein/DNA/RNA residue is 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	$\#\|Z\|>2$
1	CSO	A	51	1	3,6,7	1.03	0	0,6,8	-	-

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
1	CSO	A	51	1	-	0/1/5/7	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	A	51	CSO	2	0

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

Of 17 ligands modelled in this entry, 6 are monoatomic - leaving 11 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	$\#\|Z\|>2$
8	FMT	B	2005	-	2,2,2	0.64	0	1,1,1	0.36	0
7	FVG	B	2001	-	30,37,37	1.27	2 (6%)	38,54,54	1.67	11 (28%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\|>2$	Counts	RMSZ	$\#\|Z\|>2$
9	GOL	B	2008	-	5,5,5	0.33	0	5,5,5	0.32	0
8	FMT	B	2002	-	2,2,2	0.70	0	1,1,1	0.24	0
8	FMT	B	2004	-	2,2,2	0.72	0	1,1,1	0.23	0
9	GOL	B	2007	-	5,5,5	0.40	0	5,5,5	0.43	0
9	GOL	B	2009	-	5,5,5	0.40	0	5,5,5	0.70	0
4	GNP	A	201	5	29,34,34	1.55	5 (17%)	33,54,54	2.04	7 (21%)
8	FMT	B	2006	-	2,2,2	0.70	0	1,1,1	0.24	0
8	FMT	B	2003	-	2,2,2	0.70	0	1,1,1	0.19	0
8	FMT	B	2011	-	2,2,2	0.67	0	1,1,1	0.23	0

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
7	FVG	B	2001	-	-	7/10/32/32	0/5/5/5
9	GOL	B	2008	-	-	0/4/4/4	-
9	GOL	B	2007	-	-	2/4/4/4	-
9	GOL	B	2009	-	-	4/4/4/4	-
4	GNP	A	201	5	-	3/14/38/38	0/3/3/3

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
7	B	2001	FVG	C15-N2	4.63	1.53	1.47
4	A	201	GNP	C6-N1	4.28	1.40	1.33
4	A	201	GNP	PB-O3A	-3.73	1.54	1.59
4	A	201	GNP	PG-O1G	3.04	1.51	1.46
4	A	201	GNP	PB-O2B	-3.04	1.48	1.56
7	B	2001	FVG	C12-N2	2.82	1.51	1.46
4	A	201	GNP	PG-O3G	-2.14	1.51	1.56

All (18) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	A	201	GNP	C5-C6-N1	-8.14	112.30	123.43
4	A	201	GNP	C2-N1-C6	5.17	124.14	115.93
7	B	2001	FVG	C10-C11-C6	3.54	123.90	120.55
7	B	2001	FVG	C2-C1-C24	3.23	118.52	116.21
4	A	201	GNP	O2B-PB-O1B	3.12	116.46	109.92

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
7	B	2001	FVG	C10-C9-CL	-2.95	115.94	119.64
7	B	2001	FVG	C4-C3-C21	-2.89	115.77	120.25
7	B	2001	FVG	C21-C22-C24	2.83	118.24	116.21
4	A	201	GNP	O1G-PG-N3B	-2.64	107.88	111.77
7	B	2001	FVG	C9-C10-C11	-2.54	114.51	118.62
7	B	2001	FVG	C22-C21-C3	-2.52	119.29	122.21
4	A	201	GNP	N3-C2-N1	-2.45	123.96	127.22
4	A	201	GNP	C2-N3-C4	-2.43	112.58	115.36
7	B	2001	FVG	C17-N4-C5	-2.31	117.09	122.03
7	B	2001	FVG	C8-C7-C6	-2.24	116.59	120.12
7	B	2001	FVG	C1-C2-C3	-2.22	119.64	122.21
4	A	201	GNP	O1B-PB-N3B	-2.05	108.76	111.77
7	B	2001	FVG	C10-C9-C8	2.03	124.20	121.66

There are no chirality outliers.

All (16) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	201	GNP	PB-N3B-PG-O1G
4	A	201	GNP	PG-N3B-PB-O1B
7	B	2001	FVG	C14-C15-C16-N3
7	B	2001	FVG	N2-C15-C16-N3
9	B	2007	GOL	C1-C2-C3-O3
9	B	2007	GOL	O2-C2-C3-O3
9	B	2009	GOL	O1-C1-C2-C3
9	B	2009	GOL	C1-C2-C3-O3
9	B	2009	GOL	O2-C2-C3-O3
9	B	2009	GOL	O1-C1-C2-O2
7	B	2001	FVG	C8-C7-N2-C12
7	B	2001	FVG	C8-C7-N2-C15
7	B	2001	FVG	C21-C3-C4-N
7	B	2001	FVG	C2-C3-C4-N
7	B	2001	FVG	C6-C7-N2-C15
4	A	201	GNP	PG-N3B-PB-O3A

There are no ring outliers.

3 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
8	B	2005	FMT	2	0
7	B	2001	FVG	2	0

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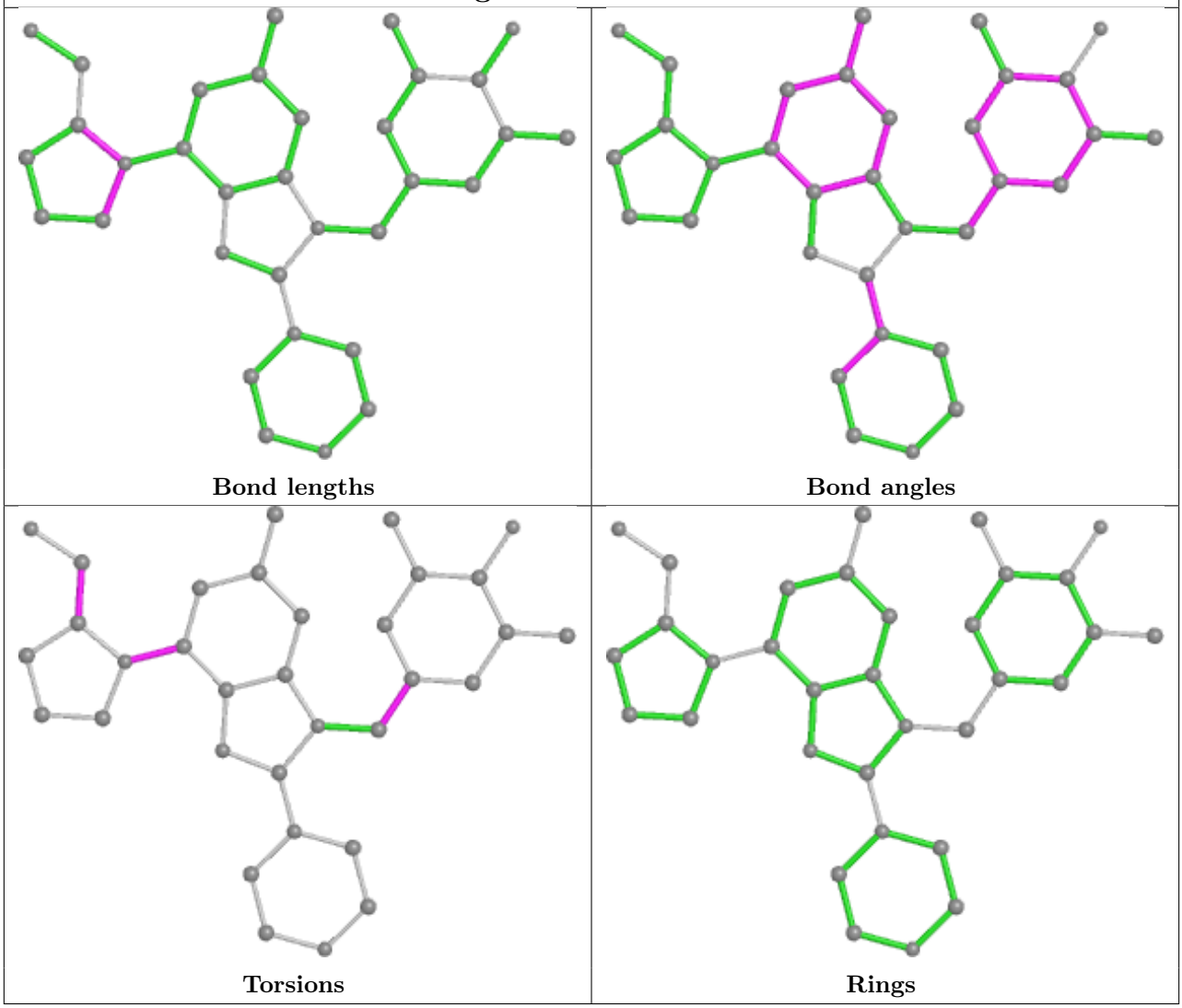
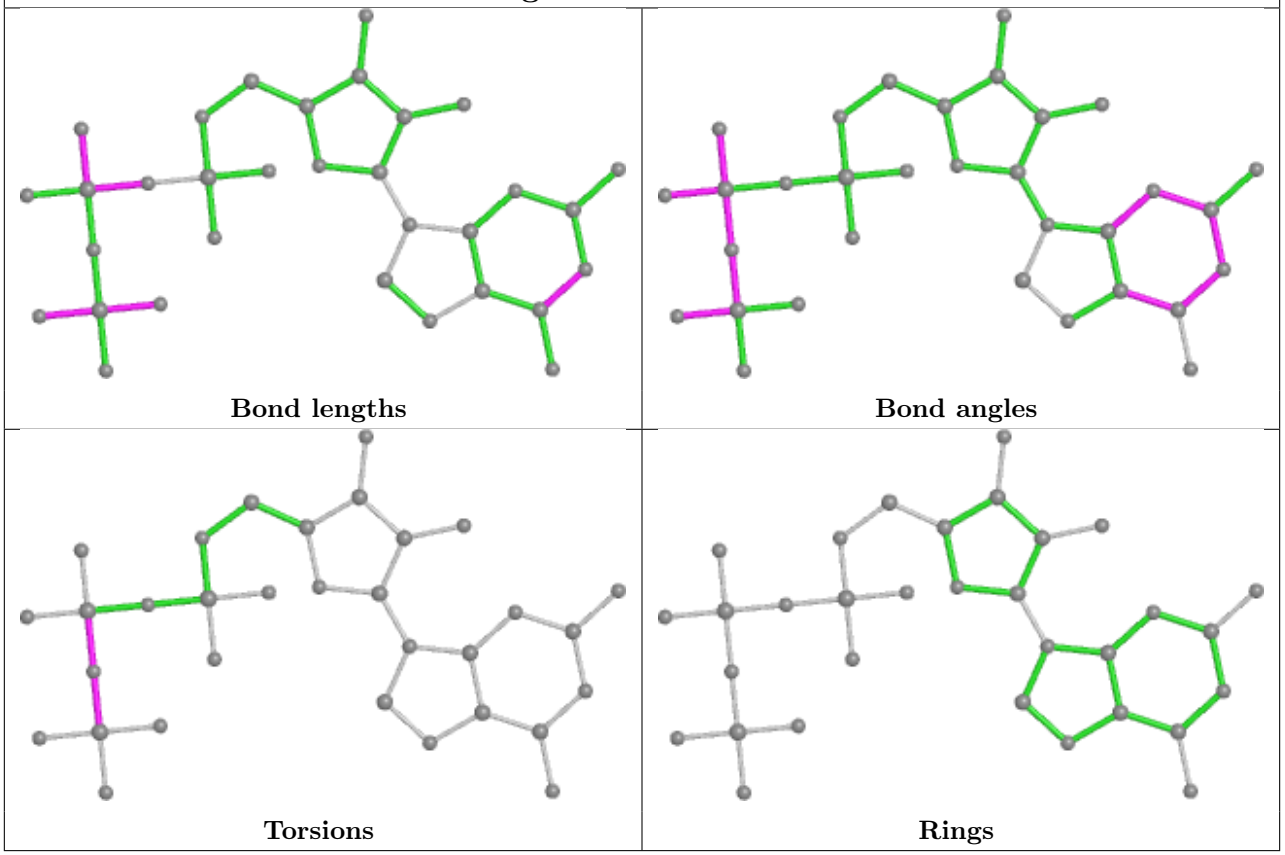
Mol	Chain	Res	Type	Clashes	Symm-Clashes
9	B	2009	GOL	3	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

Ligand FVG B 2001



Ligand GNP A 201



5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 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	165/167 (98%)	-0.02	5 (3%) 50 56	17, 24, 46, 63	0
2	B	469/482 (97%)	-0.06	8 (1%) 70 77	14, 22, 43, 77	0
3	C	167/167 (100%)	0.12	17 (10%) 6 9	15, 24, 57, 91	0
All	All	801/816 (98%)	-0.02	30 (3%) 41 48	14, 23, 49, 91	0

All (30) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	C	0	GLY	7.8
3	C	26	ASN	6.3
3	C	27	HIS	5.9
3	C	29	VAL	4.4
3	C	37	GLU	4.3
3	C	38	ASP	4.2
2	B	565	GLY	4.1
3	C	120	LEU	3.8
1	A	122	ALA	3.0
2	B	1046	ARG	2.9
2	B	751	ASN	2.9
2	B	597	GLY	2.7
1	A	87[A]	THR	2.5
3	C	31	GLU	2.4
2	B	1021	PRO	2.4
3	C	39[A]	SER	2.3
1	A	121	ALA	2.3
3	C	40	TYR	2.3
3	C	121	ALA	2.2
2	B	927	VAL	2.2
3	C	30	ASP	2.2
3	C	166	HIS	2.2
3	C	122	ALA	2.2

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Mol	Chain	Res	Type	RSRZ
3	C	36	ILE	2.2
3	C	24	ILE	2.1
1	A	107	ASP	2.1
2	B	743	ALA	2.1
2	B	1045	PRO	2.1
3	C	1	MET	2.1
1	A	94	HIS	2.1

6.2 Non-standard residues in protein, DNA, RNA chains (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
1	CSO	A	51	7/8	0.95	0.12	19,21,34,40	0

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
9	GOL	B	2009	6/6	0.68	0.29	45,67,68,81	0
8	FMT	B	2006	3/3	0.74	0.21	70,70,71,72	0
6	CL	A	203	1/1	0.79	0.11	59,59,59,59	0
8	FMT	B	2002	3/3	0.89	0.24	61,61,66,70	0
9	GOL	B	2008	6/6	0.90	0.12	27,42,53,61	0
8	FMT	B	2003	3/3	0.90	0.38	53,53,57,62	0
6	CL	B	2010	1/1	0.93	0.11	54,54,54,54	0
8	FMT	B	2005	3/3	0.94	0.21	28,28,29,37	0
8	FMT	B	2004	3/3	0.94	0.19	51,51,51,54	0
6	CL	C	201	1/1	0.95	0.07	69,69,69,69	0

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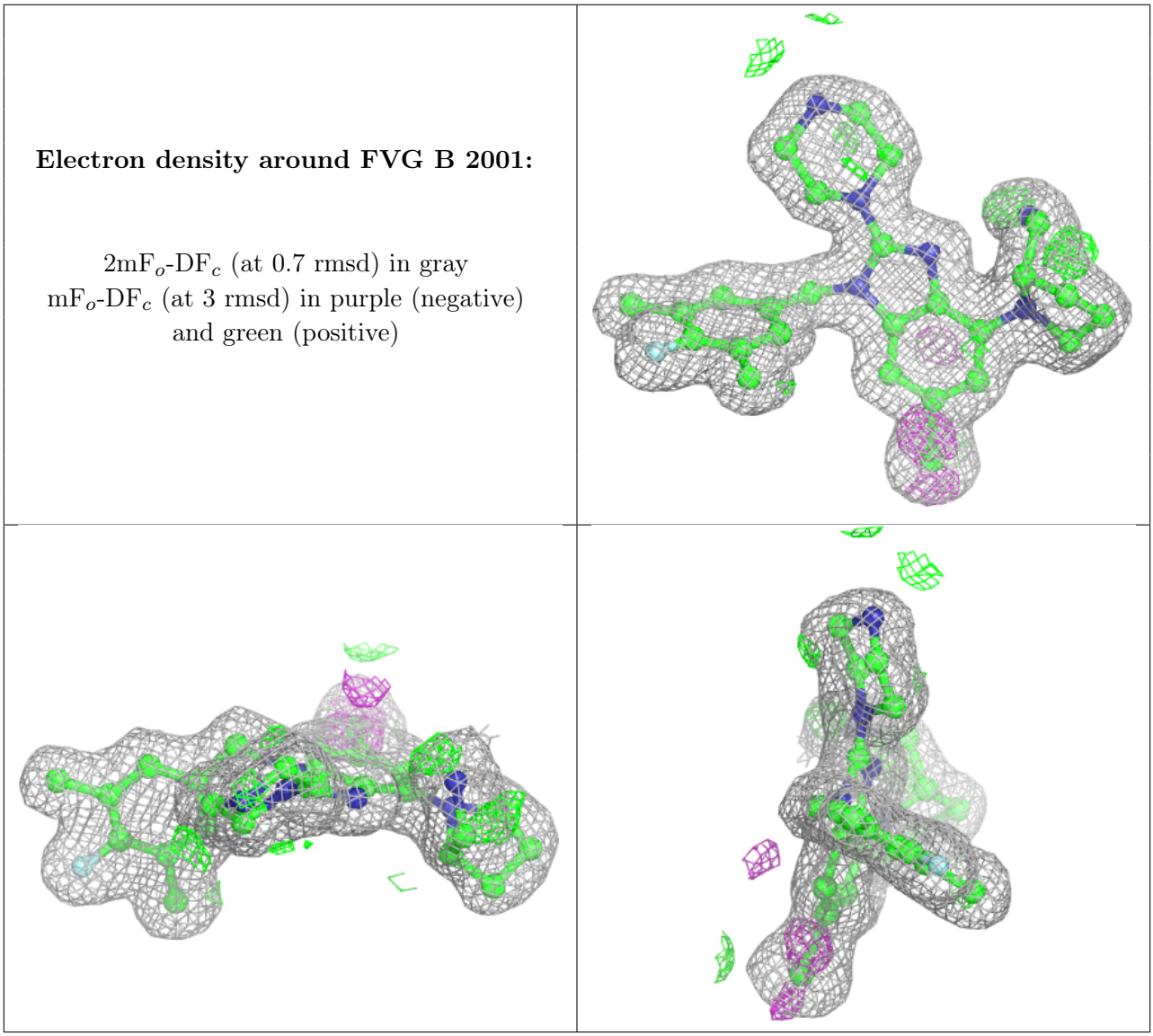
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
9	GOL	B	2007	6/6	0.95	0.12	29,45,52,56	0
10	NA	C	203	1/1	0.95	0.05	37,37,37,37	0
7	FVG	B	2001	33/33	0.96	0.07	16,22,38,42	0
8	FMT	B	2011	3/3	0.96	0.14	37,37,44,44	0
6	CL	C	202	1/1	0.97	0.12	57,57,57,57	0
5	MG	A	202	1/1	0.99	0.04	16,16,16,16	0
4	GNP	A	201	32/32	0.99	0.07	16,19,23,29	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.

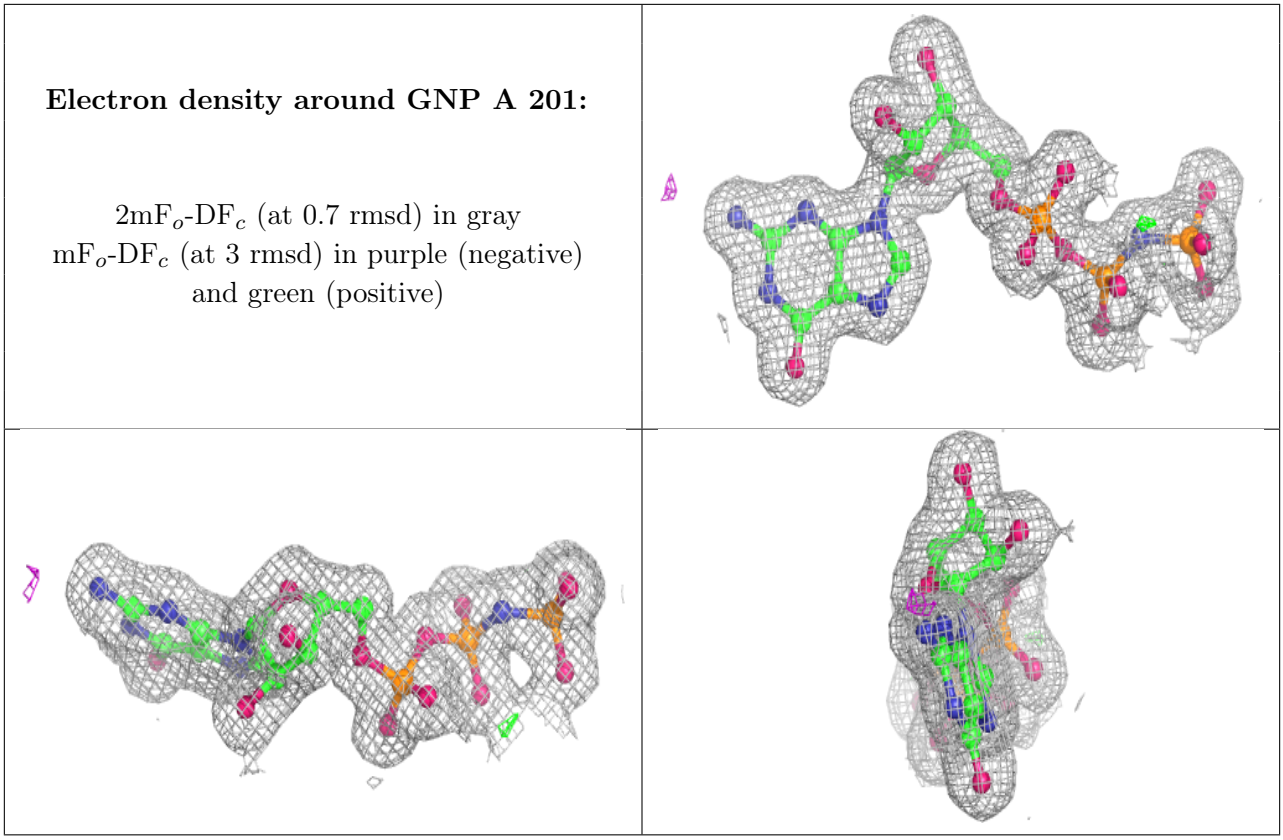
Electron density around FVG B 2001:

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



Electron density around GNP A 201:

$2mF_o$-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.