



Full wwPDB X-ray Structure Validation Report ⓘ

Jun 14, 2020 – 08:38 am BST

PDB ID : 1UU7
Title : Structure of human PDK1 kinase domain in complex with BIM-2
Authors : Komander, D.; Kular, G.S.; Schuttelkopf, A.W.; Deak, M.; Prakash, K.R.; Bain, J.; Elliot, M.; Garrido-Franco, M.; Kozikowski, A.P.; Alessi, D.R.; Van Aalten, D.M.F.
Deposited on : 2003-12-16
Resolution : 1.90 Å(reported)

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

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The 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 : 2.11
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) : 2.11

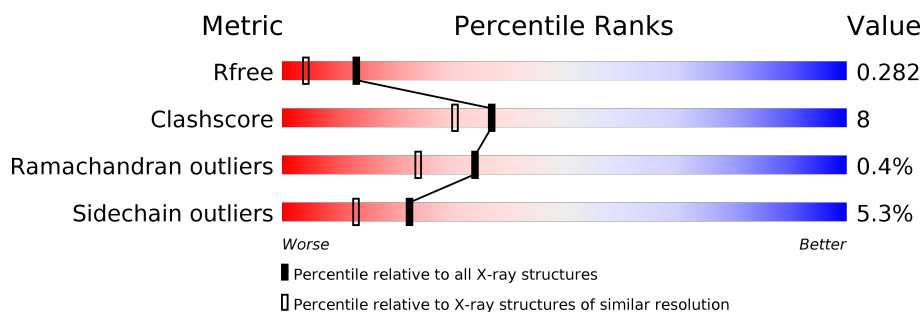
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.90 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	6207 (1.90-1.90)
Clashscore	141614	6847 (1.90-1.90)
Ramachandran outliers	138981	6760 (1.90-1.90)
Sidechain outliers	138945	6760 (1.90-1.90)

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 on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$.

Mol	Chain	Length	Quality of chain
1	A	310	

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
3	BI2	A	1364	-	-	X	-

2 Entry composition [i](#)

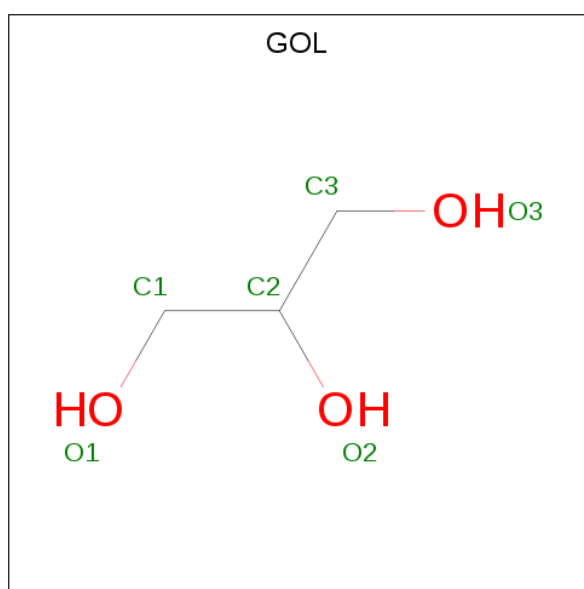
There are 5 unique types of molecules in this entry. The entry contains 2568 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 3-PHOSPHOINOSITIDE DEPENDENT PROTEIN KINASE-1.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	282	Total	C	N	O	P	S	0	0	1
			2297	1490	383	416	1	7			

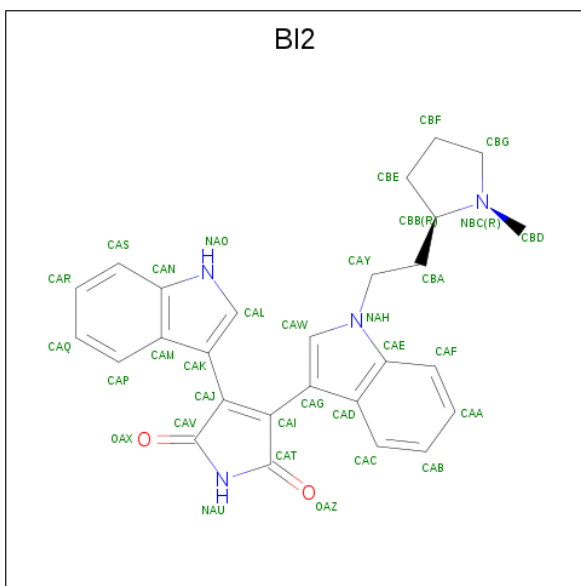
- Molecule 2 is GLYCEROL (three-letter code: GOL) (formula: C₃H₈O₃).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	0	0
			6	3	3		
2	A	1	Total	C	O	0	0
			6	3	3		
2	A	1	Total	C	O	0	0
			6	3	3		
2	A	1	Total	C	O	0	0
			6	3	3		

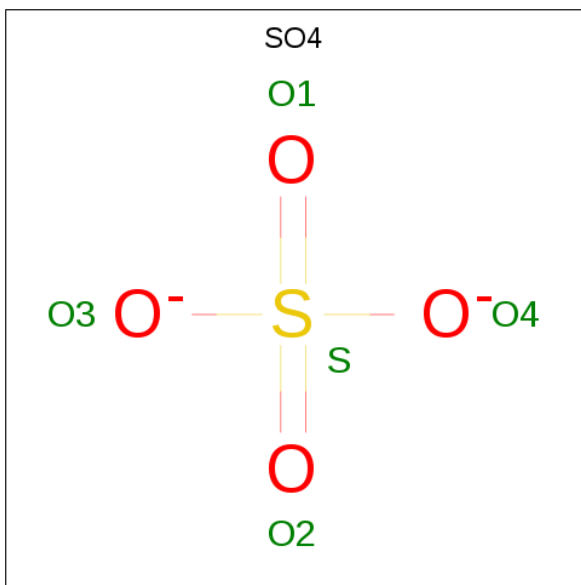
- Molecule 3 is 3-(1H-INDOL-3-YL)-4-(1-{2-[(2S)-1-METHYLPYRROLIDINYL]ETHYL}-1H

-INDOL-3-YL)-1H-PYRROLE-2,5-DIONE (three-letter code: BI2) (formula: C₂₇H₂₆N₄O₂).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			33	27	4	2		

- Molecule 4 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



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

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


- Molecule 5 is water.

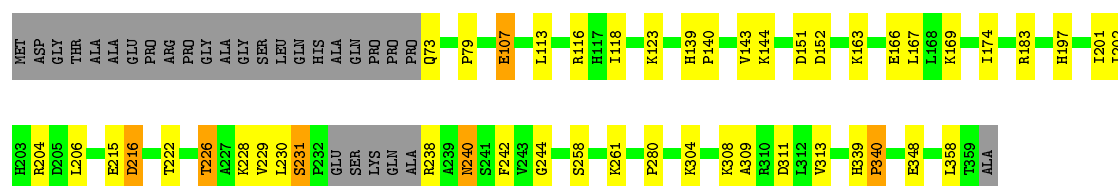
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	194	Total	O	0	0
			194	194		

3 Residue-property plots [i](#)

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

• Molecule 1: 3-PHOSPHOINOSITIDE DEPENDENT PROTEIN KINASE-1

Chain A: 



4 Data and refinement statistics

Property	Value	Source
Space group	P 32 2 1	Depositor
Cell constants a, b, c, α , β , γ	121.95Å 121.95Å 48.07Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	30.00 – 1.90 25.01 – 1.90	Depositor EDS
% Data completeness (in resolution range)	99.8 (30.00-1.90) 99.8 (25.01-1.90)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.35 (at 1.90Å)	Xtriage
Refinement program	REFMAC 5.1.24	Depositor
R, R_{free}	0.234 , 0.279 0.240 , 0.282	Depositor DCC
R_{free} test set	670 reflections (2.06%)	wwPDB-VP
Wilson B-factor (Å ²)	22.3	Xtriage
Anisotropy	0.237	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.38 , 28.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.39$, $\langle L^2 \rangle = 0.22$	Xtriage
Estimated twinning fraction	0.335 for -h,-k,l	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	2568	wwPDB-VP
Average B, all atoms (Å ²)	21.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.11% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: GOL, BI2, SO4, SEP

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	0.72	0/2342	0.87	6/3158 (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	A	0	1

There are no bond length outliers.

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
1	A	183	ARG	NE-CZ-NH2	-7.44	116.58	120.30
1	A	183	ARG	NE-CZ-NH1	6.32	123.46	120.30
1	A	216	ASP	CB-CG-OD2	5.78	123.50	118.30
1	A	311	ASP	CB-CG-OD2	5.61	123.35	118.30
1	A	152	ASP	CB-CG-OD2	5.48	123.23	118.30
1	A	151	ASP	CB-CG-OD2	5.46	123.22	118.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	231	SER	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	2297	0	2307	28	0
2	A	24	0	32	2	0
3	A	33	0	26	10	0
4	A	20	0	0	0	0
5	A	194	0	0	6	1
All	All	2568	0	2365	37	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 8.

All (37) 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)
3:A:1364:BI2:HAY2	3:A:1364:BI2:HBD2	1.09	1.09
3:A:1364:BI2:CBD	3:A:1364:BI2:HAY2	1.90	1.01
3:A:1364:BI2:HBD2	3:A:1364:BI2:CAY	2.01	0.84
1:A:240:ASN:HD22	1:A:240:ASN:N	1.81	0.79
3:A:1364:BI2:CAQ	3:A:1364:BI2:HBB	2.12	0.79
1:A:348:GLU:OE2	5:A:2183:HOH:O	2.05	0.74
1:A:339:HIS:CD2	1:A:340:PRO:HD2	2.21	0.74
1:A:113:LEU:HB3	1:A:118:ILE:HD11	1.69	0.74
1:A:166:GLU:OE2	3:A:1364:BI2:HBE2	1.87	0.73
1:A:204:ARG:HD3	1:A:226:THR:O	1.99	0.62
1:A:240:ASN:ND2	1:A:240:ASN:N	2.49	0.57
3:A:1364:BI2:CBD	3:A:1364:BI2:CAY	2.67	0.57
1:A:206:LEU:HD12	5:A:2102:HOH:O	2.05	0.56
1:A:197:HIS:HB3	1:A:261:LYS:HE2	1.88	0.55
1:A:304:LYS:CG	1:A:304:LYS:O	2.54	0.54
1:A:216:ASP:HB2	5:A:2113:HOH:O	2.07	0.53
1:A:201:ILE:HG12	1:A:229:VAL:HG22	1.89	0.53
1:A:202:ILE:HD11	1:A:230:LEU:HD11	1.93	0.51
1:A:79:PRO:HB3	2:A:1360:GOL:H32	1.92	0.51
3:A:1364:BI2:HBE1	3:A:1364:BI2:CAR	2.42	0.50
1:A:215:GLU:HG3	5:A:2110:HOH:O	2.12	0.50
1:A:240:ASN:HD22	1:A:240:ASN:H	1.59	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:163:LYS:HG3	1:A:215:GLU:CG	2.43	0.49
3:A:1364:BI2:CBF	5:A:2106:HOH:O	2.60	0.49
1:A:226:THR:HG21	1:A:242:PHE:CE1	2.49	0.48
1:A:280:PRO:HB2	5:A:2126:HOH:O	2.15	0.46
1:A:204:ARG:HD2	1:A:228:LYS:CB	2.47	0.46
1:A:308:LYS:O	1:A:339:HIS:HE1	2.00	0.44
3:A:1364:BI2:CAP	3:A:1364:BI2:HBB	2.47	0.44
1:A:139:HIS:CG	1:A:140:PRO:HD2	2.54	0.43
1:A:204:ARG:HD2	1:A:228:LYS:HB2	2.01	0.43
1:A:143:VAL:HG21	1:A:222:THR:HB	2.02	0.42
1:A:242:PHE:CZ	1:A:244:GLY:HA2	2.55	0.41
1:A:309:ALA:O	1:A:313:VAL:HG23	2.20	0.41
3:A:1364:BI2:CAQ	3:A:1364:BI2:CBB	2.92	0.41
1:A:118:ILE:HG23	1:A:123:LYS:HB2	2.03	0.41
1:A:107:GLU:O	2:A:1362:GOL:H2	2.21	0.41

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)
5:A:2067:HOH:O	5:A:2067:HOH:O[5_675]	2.17	0.03

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	277/310 (89%)	264 (95%)	12 (4%)	1 (0%)	34 24

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	231	SER

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	247/268 (92%)	234 (95%)	13 (5%)	22	13

All (13) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	73	GLN
1	A	107	GLU
1	A	116	ARG
1	A	144	LYS
1	A	167	LEU
1	A	169	LYS
1	A	174	ILE
1	A	226	THR
1	A	238	ARG
1	A	240	ASN
1	A	258	SER
1	A	340	PRO
1	A	358	LEU

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

Mol	Chain	Res	Type
1	A	240	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	SEP	A	241	1	8,9,10	1.45	1 (12%)	8,12,14	1.32	1 (12%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	SEP	A	241	1	-	2/5/8/10	-

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	241	SEP	P-O1P	3.15	1.60	1.50

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	241	SEP	OG-P-O1P	2.20	112.65	106.47

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	241	SEP	CA-CB-OG-P
1	A	241	SEP	CB-OG-P-O1P

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates

There are no carbohydrates in this entry.

5.6 Ligand geometry

9 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	GOL	A	1363	-	5,5,5	0.53	0	5,5,5	1.12	0
4	SO4	A	1366	-	4,4,4	0.27	0	6,6,6	0.47	0
3	BI2	A	1364	-	35,38,38	2.29	11 (31%)	35,56,56	1.77	5 (14%)
2	GOL	A	1362	-	5,5,5	0.12	0	5,5,5	0.50	0
2	GOL	A	1361	-	5,5,5	0.18	0	5,5,5	0.64	0
4	SO4	A	1367	-	4,4,4	0.19	0	6,6,6	0.29	0
4	SO4	A	1368	-	4,4,4	0.18	0	6,6,6	0.31	0
2	GOL	A	1360	-	5,5,5	0.65	0	5,5,5	0.32	0
4	SO4	A	1365	-	4,4,4	0.17	0	6,6,6	0.12	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
2	GOL	A	1363	-	-	2/4/4/4	-
3	BI2	A	1364	-	-	1/5/39/39	0/6/6/6
2	GOL	A	1362	-	-	2/4/4/4	-
2	GOL	A	1361	-	-	2/4/4/4	-
2	GOL	A	1360	-	-	1/4/4/4	-

All (11) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	1364	BI2	CAE-NAH	-6.32	1.31	1.39
3	A	1364	BI2	CAI-CAT	-4.55	1.40	1.50
3	A	1364	BI2	CAJ-CAV	-4.25	1.41	1.50
3	A	1364	BI2	CAW-NAH	-4.15	1.33	1.38
3	A	1364	BI2	CAK-CAJ	-3.56	1.42	1.50

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	1364	BI2	CAG-CAI	-3.54	1.42	1.50
3	A	1364	BI2	CAW-CAG	-3.24	1.33	1.38
3	A	1364	BI2	CAG-CAD	-2.66	1.40	1.42
3	A	1364	BI2	CAL-NAO	-2.50	1.31	1.36
3	A	1364	BI2	CAK-CAM	-2.42	1.40	1.42
3	A	1364	BI2	CAQ-CAP	2.26	1.41	1.36

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	1364	BI2	CAJ-CAV-NAU	6.06	110.29	106.62
3	A	1364	BI2	CAI-CAT-NAU	5.86	110.18	106.62
3	A	1364	BI2	OAZ-CAT-CAI	-3.52	123.39	128.17
3	A	1364	BI2	CAV-NAU-CAT	-3.40	107.70	111.29
3	A	1364	BI2	OAX-CAV-CAJ	-2.71	124.49	128.17

There are no chirality outliers.

All (8) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	1363	GOL	C1-C2-C3-O3
2	A	1361	GOL	O1-C1-C2-C3
2	A	1363	GOL	O2-C2-C3-O3
2	A	1361	GOL	O1-C1-C2-O2
2	A	1360	GOL	C1-C2-C3-O3
2	A	1362	GOL	O2-C2-C3-O3
3	A	1364	BI2	CBA-CAY-NAH-CAW
2	A	1362	GOL	C1-C2-C3-O3

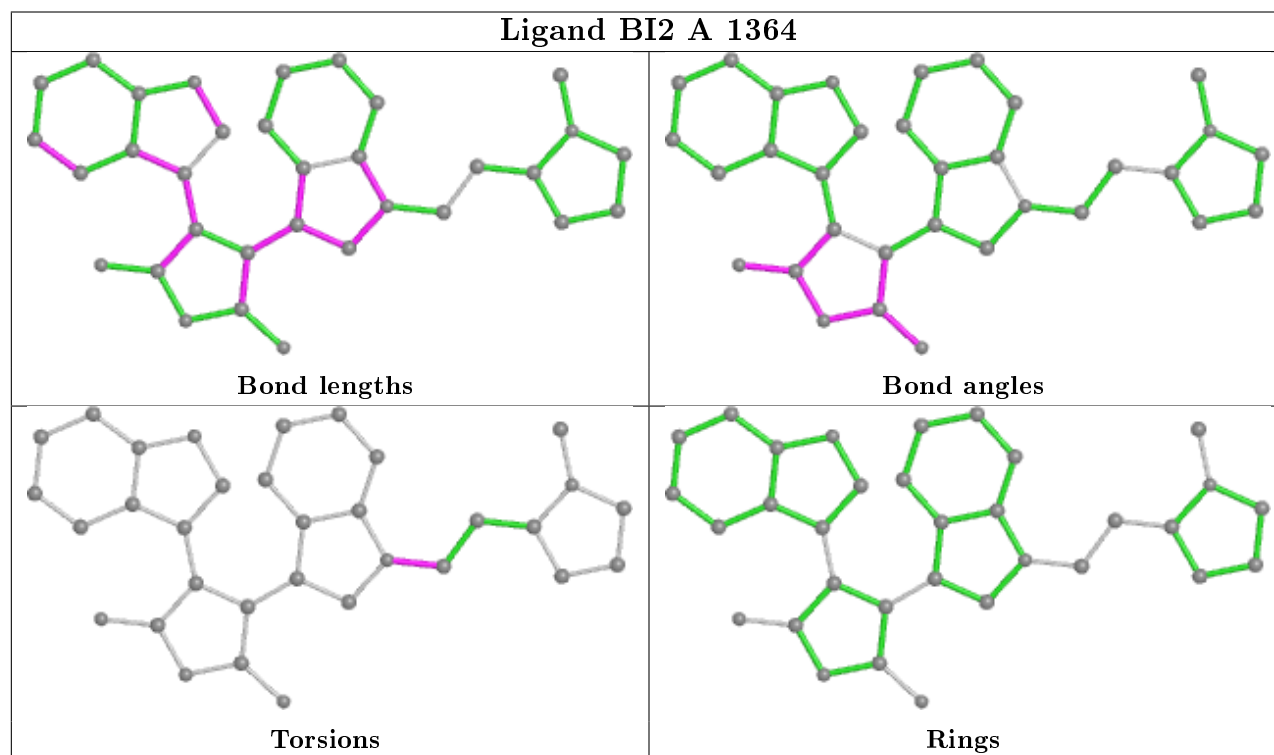
There are no ring outliers.

3 monomers are involved in 12 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	1364	BI2	10	0
2	A	1362	GOL	1	0
2	A	1360	GOL	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 ⓘ

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

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

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

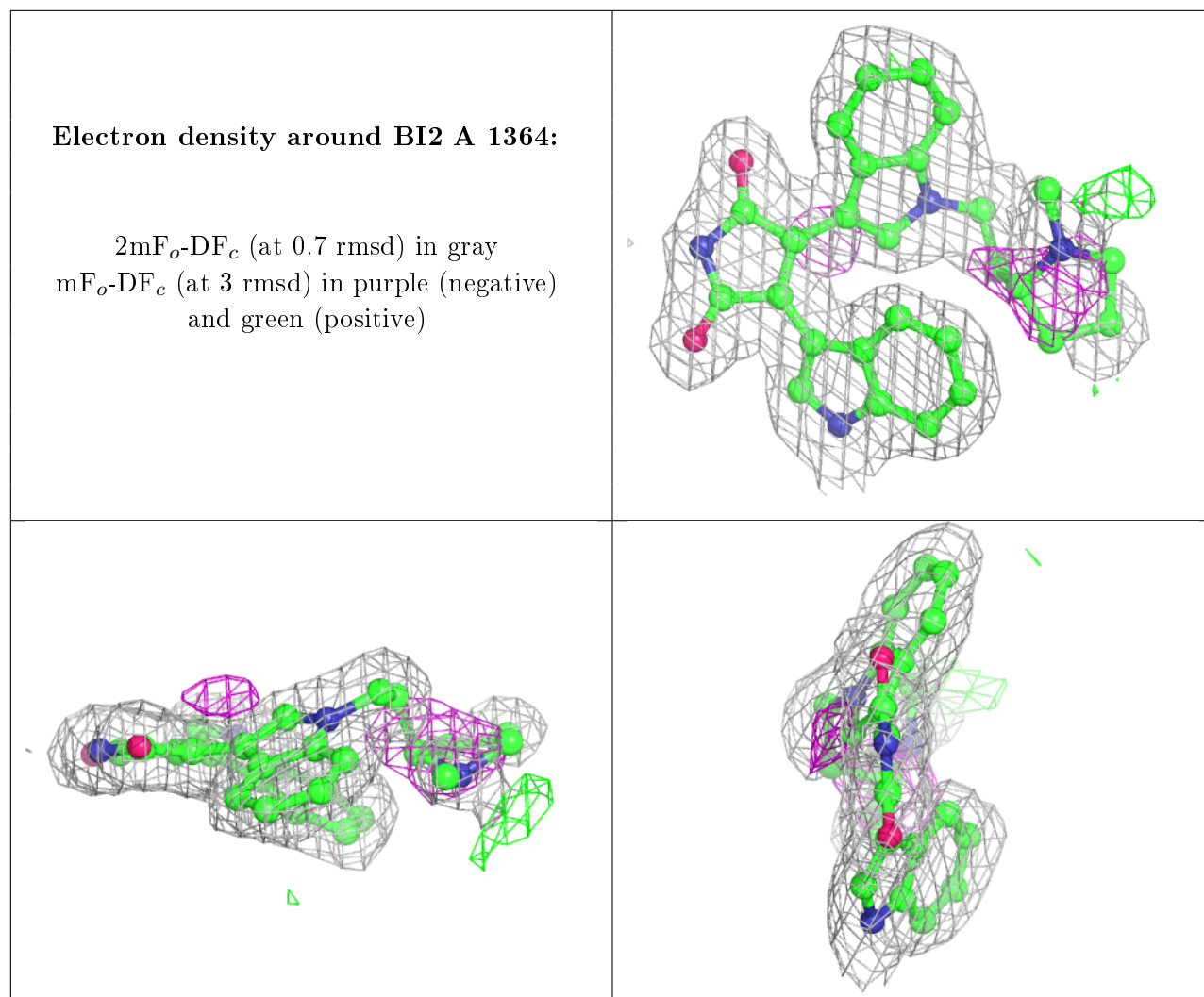
6.3 Carbohydrates ⓘ

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

6.4 Ligands ⓘ

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

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



6.5 Other polymers ⓘ

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