Full wwPDB X-ray Structure Validation Report (i)

Aug 7, 2023 – 10:49 PM EDT

PDB ID	:	1Q54
Title	:	STRUCTURE AND MECHANISM OF ACTION OF ISOPENTENYLPYROPHOSPHATE-DIMETHYLALLYLPYROPHOSPHATE ISOMERASE: COMPLEX WITH THE BROMOHYDRINE OF IPP
Authors	:	Wouters, J.; Oudjama, Y.; Ghosh, S.; Stalon, V.; Droogmans, L.
Deposited on	:	2003-08-06
Resolution	:	1.93 Å(reported)

The following versions of software and data (see references (i)) were used in the production of this report:

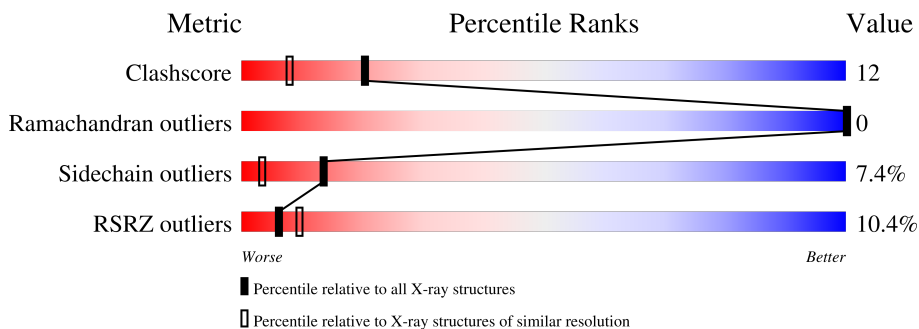|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.35
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.35

1 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 1.93 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	Percentile Ranks	Value
Clashscore		12
Ramachandran outliers		0
Sidechain outliers		7.4%
RSRZ outliers		10.4%

Worse   *Better*

▮ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	141614	1023 (1.94-1.94)
Ramachandran outliers	138981	1007 (1.94-1.94)
Sidechain outliers	138945	1007 (1.94-1.94)
RSRZ outliers	127900	4250 (1.96-1.92)

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	183	11% / 69% 22% 5% ∙ ∙
1	B	183	9% / 75% 20% ∙ ∙

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
4	BHI	A	301[A]	-	-	X	-
4	BHI	A	301[B]	X	-	-	-
4	BHI	B	302[B]	X	-	-	-

2 Entry composition ⓘ

There are 5 unique types of molecules in this entry. The entry contains 3062 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 ISOPENTENYL DIPHOSPHATE DELTA-ISOMERASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	176	Total	C	N	O	S	0	0	0
			1392	881	246	259	6			
1	B	180	Total	C	N	O	S	0	0	0
			1427	904	252	265	6			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	67	ALA	CYS	engineered mutation	UNP Q46822
A	183	LEU	-	cloning artifact	UNP Q46822
B	67	ALA	CYS	engineered mutation	UNP Q46822
B	183	LEU	-	cloning artifact	UNP Q46822

- Molecule 2 is MANGANESE (II) ION (three-letter code: MN) (formula: Mn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Mn	0	0
			1	1		
2	B	1	Total	Mn	0	0
			1	1		

- Molecule 3 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

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

- Molecule 4 is 4-BROMO-3-HYDROXY-3-METHYL BUTYL DIPHOSPHATE (three-letter code: BHI) (formula: $C_5H_{13}BrO_8P_2$).
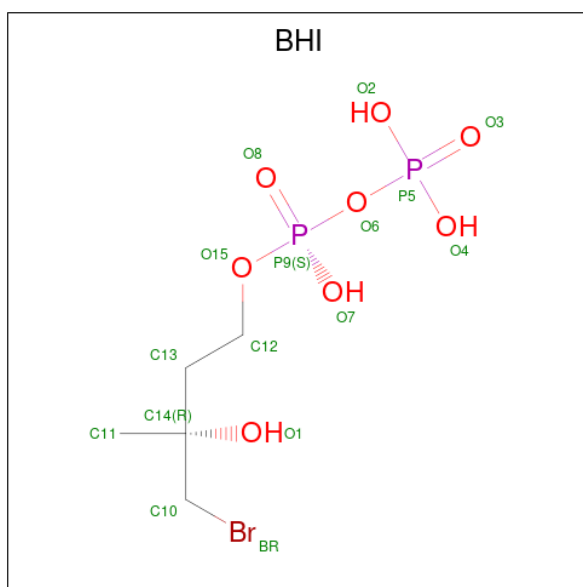
BHI

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total	Br	C	O	P	0	1
			32	2	10	16	4		
4	B	1	Total	Br	C	O	P	0	1
			32	2	10	16	4		

• Molecule 5 is water.

| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	89	Total	O	0	0
			89	89		
5	B	86	Total	O	0	0
			86	86		

3 Residue-property plots ⓘ

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: ISOPENTENYL DIPHOSPHATE DELTA-ISOMERASE
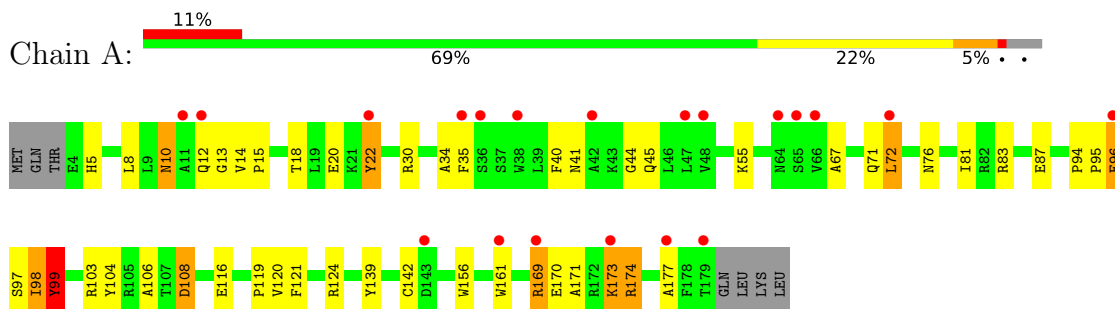
- Molecule 1: ISOPENTENYL DIPHOSPHATE DELTA-ISOMERASE
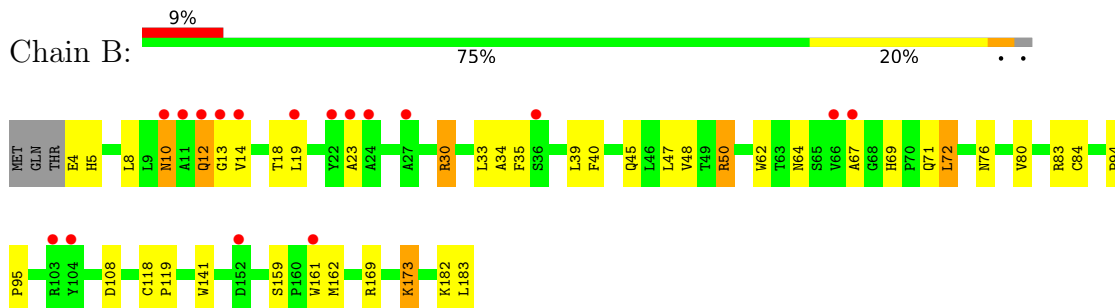
4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	68.83Å 71.35Å 91.49Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	10.00 – 1.93 23.91 – 1.93	Depositor EDS
% Data completeness (in resolution range)	95.2 (10.00-1.93) 94.5 (23.91-1.93)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	3.66 (at 1.93Å)	Xtriage
Refinement program	SHELXL-97	Depositor
R, R_{free}	0.210 , 0.266 0.215 , (Not available)	Depositor DCC
R_{free} test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å^2)	21.2	Xtriage
Anisotropy	0.353	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.42 , 78.4	EDS
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.31$	Xtriage
Estimated twinning fraction	0.027 for k,h,-l	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	3062	wwPDB-VP
Average B, all atoms (Å^2)	31.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.18% of the height of the origin peak. No significant pseudotranslation is detected.*

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[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: MN, MG, BHI

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	0.32	0/1429	0.94	6/1951 (0.3%)
1	B	0.47	1/1464 (0.1%)	0.91	1/1996 (0.1%)
All	All	0.40	1/2893 (0.0%)	0.92	7/3947 (0.2%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	183	LEU	C-OXT	13.49	1.49	1.23

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(º)	Ideal(º)
1	B	50	ARG	NE-CZ-NH1	6.98	123.79	120.30
1	A	174	ARG	NE-CZ-NH2	6.16	123.38	120.30
1	A	35	PHE	CB-CG-CD1	5.75	124.82	120.80
1	A	99	TYR	CB-CG-CD1	5.60	124.36	121.00
1	A	174	ARG	CD-NE-CZ	5.54	131.36	123.60
1	A	139	TYR	CB-CG-CD1	5.11	124.07	121.00
1	A	108	ASP	CB-CG-OD1	5.08	122.87	118.30

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	1392	0	1349	34	0
1	B	1427	0	1392	31	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
4	A	32	0	16	10	0
4	B	32	0	16	7	0
5	A	89	0	0	3	0
5	B	86	0	0	2	0
All	All	3062	0	2773	70	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 12.

All (70) 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)
4:A:301[B]:BHI:BR	5:A:501:HOH:O	2.32	1.00
1:B:5:HIS:H	1:B:71:GLN:HE22	1.10	0.97
1:A:5:HIS:H	1:A:71:GLN:HE22	1.09	0.95
4:A:301[A]:BHI:H112	5:A:501:HOH:O	1.73	0.87
1:B:67:ALA:HB1	4:B:302[B]:BHI:H131	1.56	0.87
1:B:18:THR:HG21	1:B:72:LEU:HD22	1.68	0.75
1:A:170:GLU:OE2	1:A:174:ARG:HD2	1.88	0.73
1:A:67:ALA:HB1	4:A:301[A]:BHI:H131	1.72	0.72
1:B:4:GLU:HG2	1:B:71:GLN:NE2	2.07	0.69
1:B:12:GLN:OE1	1:B:14:VAL:HG23	1.93	0.67
1:A:104:TYR:HB3	1:A:161:TRP:CZ3	2.32	0.64
1:A:173:LYS:HE2	1:A:177:ALA:HB2	1.79	0.64
4:B:302[B]:BHI:H121	4:B:302[B]:BHI:BR	2.49	0.64
1:A:5:HIS:N	1:A:71:GLN:HE22	1.91	0.63
1:A:81:ILE:HD13	5:A:627:HOH:O	2.00	0.62
1:A:34:ALA:O	1:A:119:PRO:HD2	1.99	0.61
4:A:301[A]:BHI:H113	4:A:301[A]:BHI:O7	2.03	0.59
1:A:98:ILE:HD12	1:A:171:ALA:HB1	1.86	0.58
1:B:35:PHE:CD1	1:B:80:VAL:HG22	2.39	0.57
1:A:98:ILE:HG13	1:A:99:TYR:N	2.23	0.54
1:B:161:TRP:CE3	4:B:302[B]:BHI:BR	3.17	0.54
4:A:301[B]:BHI:BR	4:A:301[B]:BHI:H121	2.64	0.53
1:B:161:TRP:CZ3	4:B:302[B]:BHI:BR	3.17	0.53
1:A:156:TRP:CH2	1:B:48:VAL:HG11	2.45	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:39:LEU:HD11	1:B:84:CYS:SG	2.50	0.51
1:B:118:CYS:HG	4:B:302[B]:BHI:H112	1.76	0.51
1:A:10:ASN:O	1:A:12:GLN:O	2.29	0.51
1:A:40:PHE:HA	1:A:45:GLN:O	2.11	0.51
1:B:10:ASN:O	1:B:12:GLN:O	2.30	0.49
1:B:47:LEU:HB2	1:B:141:TRP:CZ3	2.48	0.49
1:B:50:ARG:HD2	1:B:62:TRP:NE1	2.29	0.48
1:A:44:GLY:HA2	1:A:124:ARG:NH1	2.29	0.48
1:A:20:GLU:OE2	1:A:22:TYR:HD2	1.96	0.48
1:A:44:GLY:HA2	1:A:124:ARG:HH12	1.80	0.46
1:A:99:TYR:HB3	1:A:120:VAL:HB	1.97	0.46
1:A:12:GLN:HG3	1:A:13:GLY:N	2.30	0.46
1:A:76:ASN:HB3	1:A:121:PHE:CZ	2.51	0.46
1:A:104:TYR:CE2	1:A:106:ALA:HB2	2.51	0.46
1:A:18:THR:HG21	1:A:72:LEU:HD22	1.98	0.45
1:B:83:ARG:HD2	1:B:83:ARG:HA	1.67	0.45
4:A:301[A]:BHI:H113	4:A:301[A]:BHI:H121	1.70	0.45
1:B:33:LEU:HD21	1:B:76:ASN:HD21	1.81	0.44
1:B:12:GLN:OE1	1:B:13:GLY:N	2.50	0.44
1:B:94:PRO:HA	1:B:95:PRO:HD3	1.83	0.44
1:B:173:LYS:NZ	5:B:638:HOH:O	2.50	0.44
1:B:64:ASN:HD22	1:B:162:MET:HB2	1.82	0.44
1:B:69:HIS:CE1	4:B:302[A]:BHI:H122	2.53	0.44
1:A:12:GLN:HG3	1:A:13:GLY:H	1.83	0.43
1:A:55:LYS:NZ	4:A:301[A]:BHI:O2	2.43	0.43
1:B:48:VAL:HG12	1:B:62:TRP:CE3	2.53	0.43
1:A:169:ARG:NH1	1:A:170:GLU:OE1	2.50	0.43
1:B:8:LEU:HD13	1:B:30:ARG:NH2	2.33	0.43
4:B:302[A]:BHI:H121	4:B:302[A]:BHI:H113	1.53	0.43
1:A:96:GLU:HG2	1:A:97:SER:N	2.34	0.43
1:A:116:GLU:OE1	4:A:301[B]:BHI:H112	2.19	0.42
1:B:72:LEU:HD12	1:B:72:LEU:HA	1.87	0.42
1:A:94:PRO:HA	1:A:95:PRO:HD3	1.87	0.42
1:A:41:ASN:O	1:A:124:ARG:NH1	2.50	0.42
1:A:83:ARG:HA	1:A:83:ARG:HD2	1.60	0.42
1:A:116:GLU:OE1	4:A:301[B]:BHI:O1	2.35	0.41
1:B:12:GLN:O	1:B:14:VAL:N	2.51	0.41
1:A:156:TRP:CZ3	1:B:48:VAL:HG11	2.56	0.41
1:A:8:LEU:O	1:A:15:PRO:HA	2.21	0.41
1:A:12:GLN:O	1:A:14:VAL:N	2.51	0.41
1:B:40:PHE:HA	1:B:45:GLN:O	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:23:ALA:HB2	5:B:659:HOH:O	2.20	0.41
1:A:87:GLU:OE2	4:A:301[A]:BHI:O4	2.40	0.40
1:B:12:GLN:CD	1:B:14:VAL:HG23	2.42	0.40
1:B:4:GLU:HG2	1:B:71:GLN:CD	2.41	0.40
1:B:34:ALA:O	1:B:119:PRO:HD2	2.22	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	174/183 (95%)	172 (99%)	2 (1%)	0	100	100
1	B	178/183 (97%)	173 (97%)	5 (3%)	0	100	100
All	All	352/366 (96%)	345 (98%)	7 (2%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

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	147/154 (96%)	135 (92%)	12 (8%)	11	2
1	B	151/154 (98%)	141 (93%)	10 (7%)	16	5
All	All	298/308 (97%)	276 (93%)	22 (7%)	13	3

All (22) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	10	ASN
1	A	22	TYR
1	A	30	ARG
1	A	72	LEU
1	A	96	GLU
1	A	98	ILE
1	A	99	TYR
1	A	103	ARG
1	A	108	ASP
1	A	142	CYS
1	A	169	ARG
1	A	173	LYS
1	B	10	ASN
1	B	12	GLN
1	B	19	LEU
1	B	30	ARG
1	B	72	LEU
1	B	108	ASP
1	B	159	SER
1	B	169	ARG
1	B	173	LYS
1	B	182	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	64	ASN
1	A	71	GLN
1	A	76	ASN
1	B	64	ASN
1	B	71	GLN
1	B	76	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

Of 8 ligands modelled in this entry, 4 are monoatomic - leaving 4 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	#$|Z| > 2$
4	BHI	B	302[B]	3	12,15,15	4.27	5 (41%)	15,23,23	1.77	3 (20%)
4	BHI	A	301[B]	3	12,15,15	4.21	5 (41%)	15,23,23	1.58	4 (26%)
4	BHI	A	301[A]	3	12,15,15	4.21	5 (41%)	15,23,23	1.63	2 (13%)
4	BHI	B	302[A]	3	12,15,15	4.16	5 (41%)	15,23,23	1.58	5 (33%)

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	BHI	B	302[A]	3	-	6/17/17/17	-
4	BHI	A	301[A]	3	-	8/17/17/17	-
4	BHI	A	301[B]	3	1/1/3/3	3/17/17/17	-
4	BHI	B	302[B]	3	1/1/3/3	7/17/17/17	-

All (20) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	302[B]	BHI	O1-C14	12.16	1.61	1.44
4	A	301[B]	BHI	O1-C14	12.10	1.61	1.44
4	A	301[A]	BHI	O1-C14	11.86	1.61	1.44
4	B	302[A]	BHI	O1-C14	11.66	1.61	1.44
4	A	301[A]	BHI	P5-O2	-5.17	1.34	1.54
4	B	302[B]	BHI	P5-O2	-5.05	1.35	1.54

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	302[A]	BHI	P5-O2	-4.99	1.35	1.54
4	A	301[B]	BHI	P5-O2	-4.72	1.36	1.54
4	B	302[A]	BHI	P9-O7	-4.67	1.33	1.55
4	A	301[A]	BHI	P9-O7	-4.64	1.33	1.55
4	A	301[B]	BHI	P9-O7	-4.58	1.33	1.55
4	B	302[B]	BHI	P9-O7	-4.51	1.34	1.55
4	B	302[A]	BHI	C11-C14	3.13	1.56	1.52
4	B	302[B]	BHI	C11-C14	3.05	1.56	1.52
4	B	302[A]	BHI	BR-C10	-3.02	1.84	1.95
4	A	301[A]	BHI	C11-C14	2.95	1.55	1.52
4	A	301[B]	BHI	C11-C14	2.92	1.55	1.52
4	B	302[B]	BHI	BR-C10	-2.92	1.85	1.95
4	A	301[A]	BHI	BR-C10	-2.90	1.85	1.95
4	A	301[B]	BHI	BR-C10	-2.74	1.85	1.95

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	302[B]	BHI	C13-C14-C10	-4.07	102.39	110.62
4	A	301[A]	BHI	P9-O6-P5	-3.27	121.60	132.83
4	A	301[A]	BHI	C11-C14-C10	-2.93	104.11	110.71
4	B	302[A]	BHI	C11-C14-C10	-2.63	104.77	110.71
4	A	301[B]	BHI	O2-P5-O6	2.61	113.38	104.64
4	B	302[A]	BHI	C13-C14-C10	-2.57	105.44	110.62
4	B	302[B]	BHI	C11-C14-C10	-2.47	105.15	110.71
4	A	301[B]	BHI	C11-C14-C10	-2.46	105.16	110.71
4	B	302[B]	BHI	O2-P5-O6	2.36	112.54	104.64
4	B	302[A]	BHI	P9-O15-C12	-2.18	110.83	121.59
4	B	302[A]	BHI	P9-O6-P5	-2.15	125.44	132.83
4	B	302[A]	BHI	O2-P5-O6	2.05	111.51	104.64
4	A	301[B]	BHI	O4-P5-O6	2.04	111.47	104.64
4	A	301[B]	BHI	C13-C14-C10	-2.01	106.55	110.62

All (2) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
4	A	301[B]	BHI	C14
4	B	302[B]	BHI	C14

All (24) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	301[A]	BHI	BR-C10-C14-O1
4	A	301[A]	BHI	BR-C10-C14-C11
4	A	301[A]	BHI	BR-C10-C14-C13
4	A	301[A]	BHI	C12-C13-C14-O1
4	A	301[A]	BHI	C12-C13-C14-C10
4	A	301[B]	BHI	BR-C10-C14-O1
4	A	301[B]	BHI	BR-C10-C14-C11
4	A	301[B]	BHI	BR-C10-C14-C13
4	B	302[A]	BHI	BR-C10-C14-O1
4	B	302[A]	BHI	BR-C10-C14-C11
4	B	302[A]	BHI	BR-C10-C14-C13
4	B	302[A]	BHI	C12-C13-C14-O1
4	B	302[A]	BHI	C12-C13-C14-C10
4	B	302[A]	BHI	C12-C13-C14-C11
4	B	302[B]	BHI	BR-C10-C14-O1
4	B	302[B]	BHI	BR-C10-C14-C11
4	B	302[B]	BHI	BR-C10-C14-C13
4	B	302[B]	BHI	O15-C12-C13-C14
4	B	302[B]	BHI	C12-C13-C14-O1
4	B	302[B]	BHI	C12-C13-C14-C10
4	B	302[B]	BHI	C12-C13-C14-C11
4	A	301[A]	BHI	C12-C13-C14-C11
4	A	301[A]	BHI	C12-O15-P9-O6
4	A	301[A]	BHI	C12-O15-P9-O8

There are no ring outliers.

4 monomers are involved in 17 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	302[B]	BHI	5	0
4	A	301[B]	BHI	4	0
4	A	301[A]	BHI	6	0
4	B	302[A]	BHI	2	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and

any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

Ligand BHI B 302 (B)

Bond lengths

Bond angles

Torsions

Rings

Ligand BHI A 301 (B)

Bond lengths

Bond angles

Torsions

Rings

Ligand BHI A 301 (A)

Bond lengths

Bond angles

Torsions

Rings

Ligand BHI B 302 (A)

Bond lengths

Bond angles

Torsions

Rings
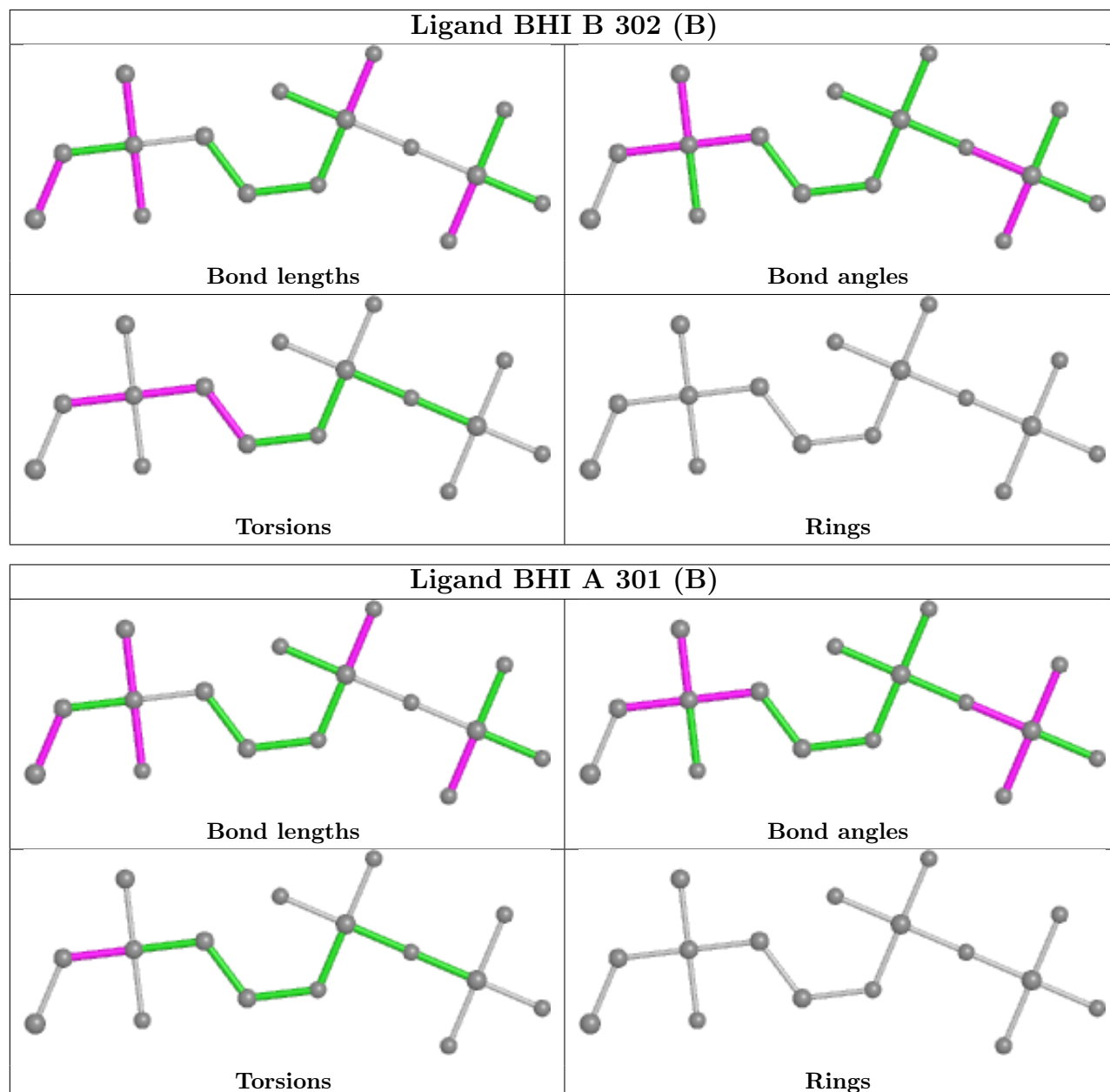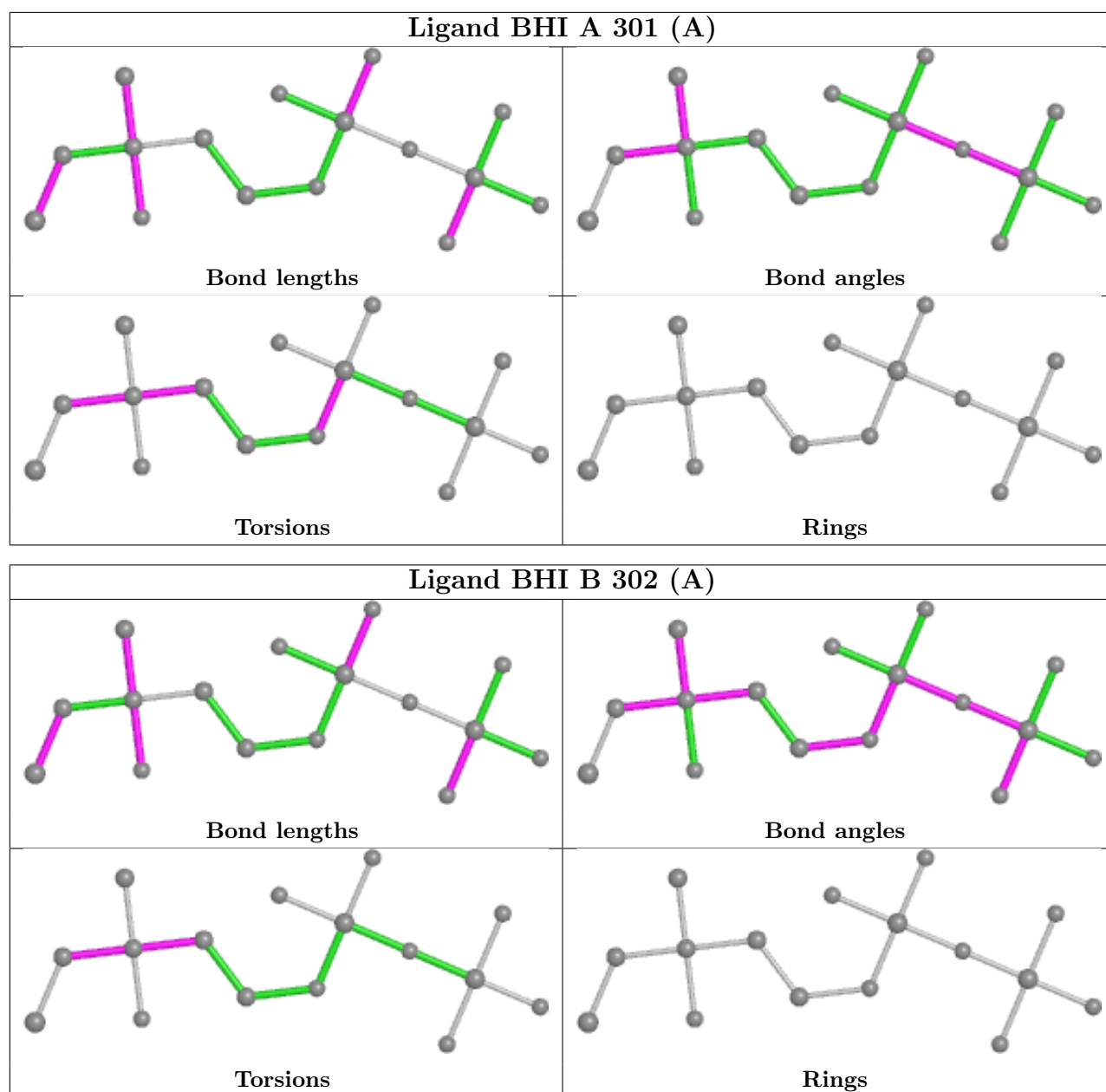
5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th 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	176/183 (96%)	0.95	20 (11%)	5	7	23, 29, 45, 75	0
1	B	180/183 (98%)	0.88	17 (9%)	8	12	24, 30, 44, 75	0
All	All	356/366 (97%)	0.92	37 (10%)	6	9	23, 30, 45, 75	0

All (37) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	22	TYR	7.9
1	A	179	THR	6.1
1	A	12	GLN	5.7
1	B	12	GLN	5.5
1	A	11	ALA	5.1
1	B	11	ALA	4.0
1	B	22	TYR	4.0
1	B	14	VAL	3.7
1	A	177	ALA	3.6
1	B	161	TRP	3.6
1	B	13	GLY	3.6
1	B	104	TYR	3.4
1	B	66	VAL	3.2
1	B	10	ASN	3.0
1	A	38	TRP	3.0
1	B	103	ARG	2.9
1	A	169	ARG	2.9
1	B	27	ALA	2.9
1	A	66	VAL	2.9
1	A	36	SER	2.8
1	A	42	ALA	2.8
1	A	65	SER	2.8
1	B	152	ASP	2.8
1	A	173	LYS	2.8

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Mol	Chain	Res	Type	RSRZ
1	B	19	LEU	2.6
1	A	96	GLU	2.6
1	A	47	LEU	2.5
1	B	23	ALA	2.4
1	B	36	SER	2.4
1	A	64	ASN	2.4
1	A	161	TRP	2.3
1	A	72	LEU	2.3
1	A	35	PHE	2.2
1	B	67	ALA	2.1
1	A	143	ASP	2.1
1	B	24	ALA	2.0
1	A	48	VAL	2.0

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

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

6.3 Carbohydrates ⓘ

There are no monosaccharides in this entry.

6.4 Ligands ⓘ

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, 95th 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	BHI	A	301[A]	16/16	0.91	0.22	19,31,64,76	16
4	BHI	A	301[B]	16/16	0.91	0.22	12,23,48,85	16
4	BHI	B	302[A]	16/16	0.91	0.20	15,27,36,63	16
4	BHI	B	302[B]	16/16	0.91	0.20	2,28,46,92	16
3	MG	A	401	1/1	0.94	0.19	12,12,12,12	0
3	MG	B	401	1/1	0.99	0.19	8,8,8,8	0
2	MN	A	201	1/1	1.00	0.05	25,25,25,25	0
2	MN	B	201	1/1	1.00	0.06	27,27,27,27	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.
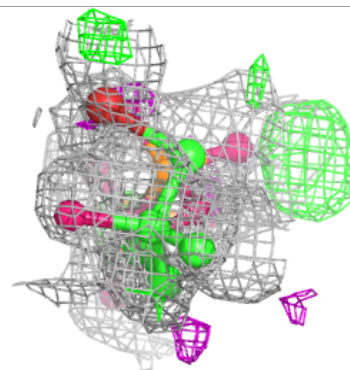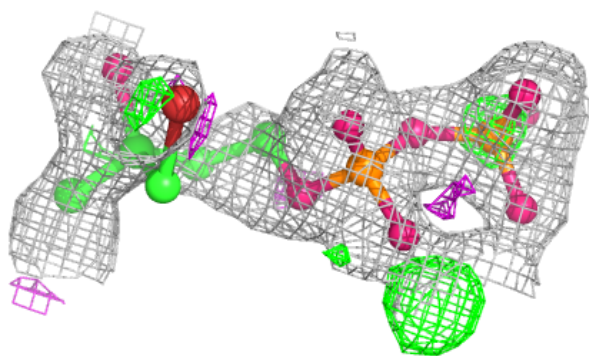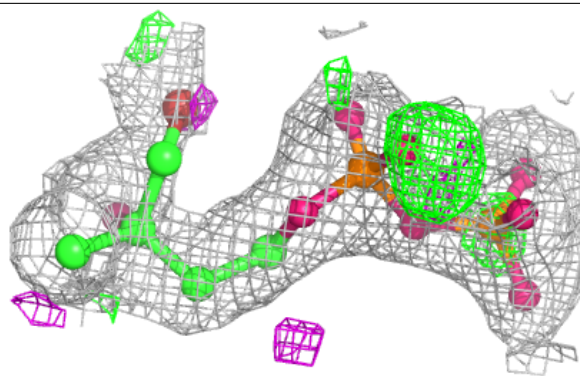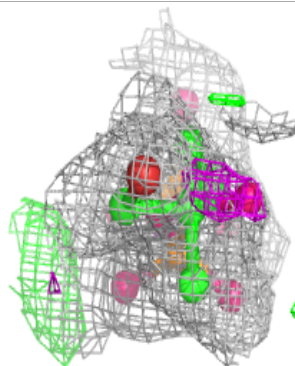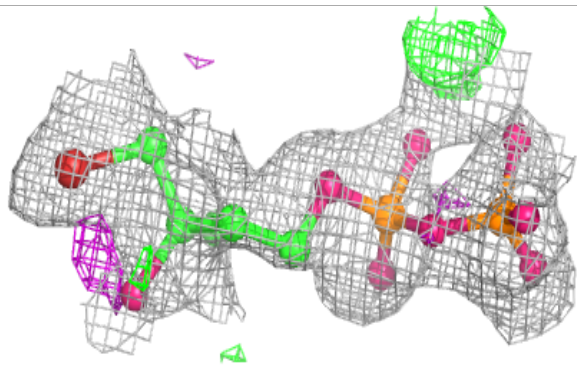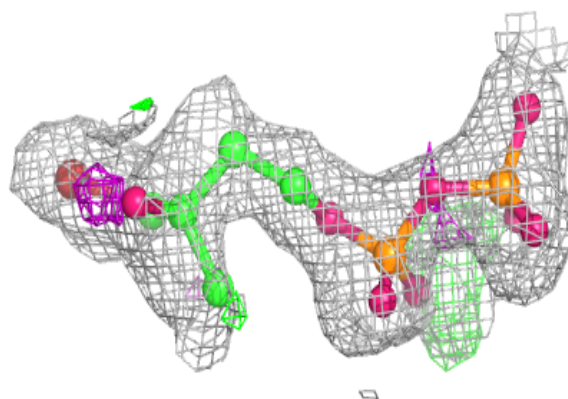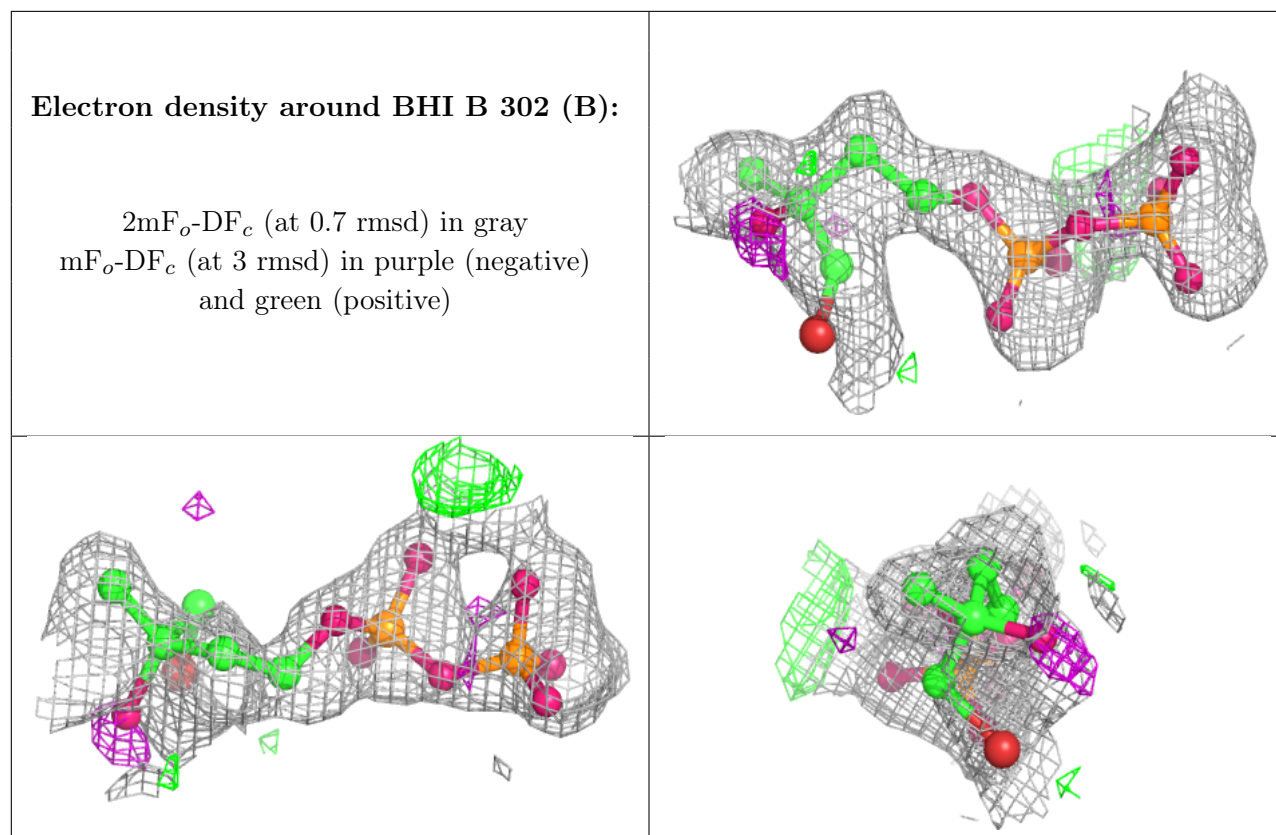

Electron density around BHI A 301 (A):

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
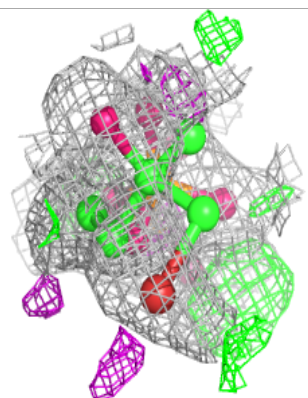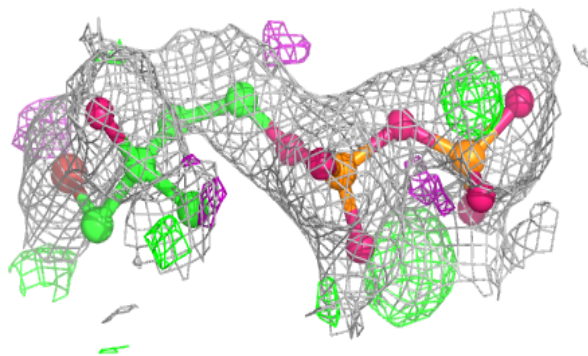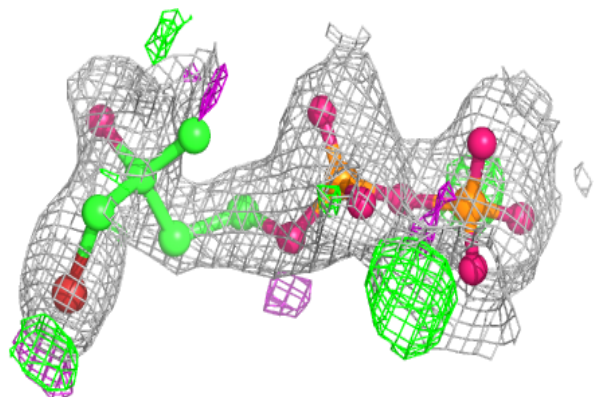
Electron density around BHI A 301 (B):

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

Electron density around BHI B 302 (A):

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

Electron density around BHI B 302 (B):

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.