Full wwPDB X-ray Structure Validation Report ⓘ

Jan 29, 2026 – 03:19 pm GMT

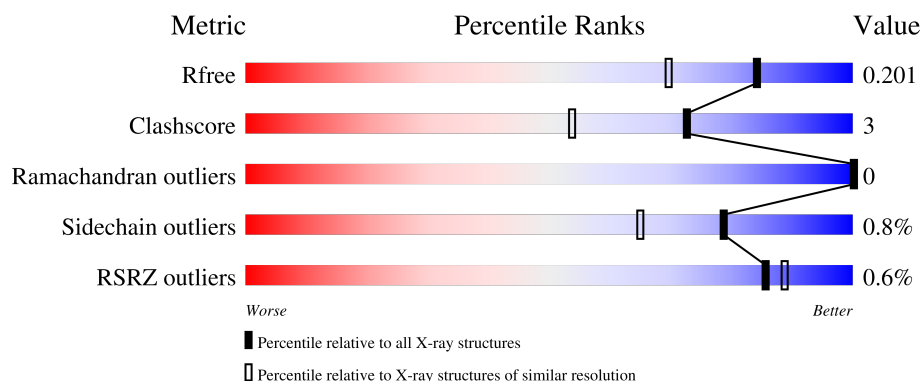|		
PDB ID	:	9QZ5 / pdb_00009qz5
Title	:	Actinobacterial 2-hydroxyacyl-CoA lyase (AcHACL) mutant E493S structure in complex with substrate 2-HIB-CoA and inactive cofactor 3-deaza-ThDP
Authors	:	Zahn, M.; Rohwerder, T.
Deposited on	:	2025-04-22
Resolution	:	1.57 Å(reported)

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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 1.57 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
Rfree		0.201
Clashscore		3
Ramachandran outliers		0
Sidechain outliers		0.8%
RSRZ outliers		0.6%

■ 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))
R_{free}	164625	7165 (1.60-1.56)
Clashscore	180529	1026 (1.58-1.58)
Ramachandran outliers	177936	1005 (1.58-1.58)
Sidechain outliers	177891	1004 (1.58-1.58)
RSRZ outliers	164620	7163 (1.60-1.56)

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	612	86% 7% 6%
1	B	612	84% 9% 6%

2 Entry composition ⓘ

There are 5 unique types of molecules in this entry. The entry contains 9737 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 2-hydroxyacyl-CoA lyase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	574	Total 4330	C 2687	N 802	O 832	S 9	0	4	0
1	B	573	Total 4326	C 2685	N 800	O 832	S 9	0	5	0

There are 46 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-10	MET	-	initiating methionine	UNP P0DUV9
A	-9	ALA	-	expression tag	UNP P0DUV9
A	-8	SER	-	expression tag	UNP P0DUV9
A	-7	HIS	-	expression tag	UNP P0DUV9
A	-6	HIS	-	expression tag	UNP P0DUV9
A	-5	HIS	-	expression tag	UNP P0DUV9
A	-4	HIS	-	expression tag	UNP P0DUV9
A	-3	HIS	-	expression tag	UNP P0DUV9
A	-2	HIS	-	expression tag	UNP P0DUV9
A	-1	SER	-	expression tag	UNP P0DUV9
A	0	GLY	-	expression tag	UNP P0DUV9
A	493	SER	GLU	engineered mutation	UNP P0DUV9
A	591	GLY	-	expression tag	UNP P0DUV9
A	592	SER	-	expression tag	UNP P0DUV9
A	593	ALA	-	expression tag	UNP P0DUV9
A	594	TRP	-	expression tag	UNP P0DUV9
A	595	SER	-	expression tag	UNP P0DUV9
A	596	HIS	-	expression tag	UNP P0DUV9
A	597	PRO	-	expression tag	UNP P0DUV9
A	598	GLN	-	expression tag	UNP P0DUV9
A	599	PHE	-	expression tag	UNP P0DUV9
A	600	GLU	-	expression tag	UNP P0DUV9
A	601	LYS	-	expression tag	UNP P0DUV9
B	-10	MET	-	initiating methionine	UNP P0DUV9
B	-9	ALA	-	expression tag	UNP P0DUV9

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Chain	Residue	Modelled	Actual	Comment	Reference
B	-8	SER	-	expression tag	UNP P0DUV9
B	-7	HIS	-	expression tag	UNP P0DUV9
B	-6	HIS	-	expression tag	UNP P0DUV9
B	-5	HIS	-	expression tag	UNP P0DUV9
B	-4	HIS	-	expression tag	UNP P0DUV9
B	-3	HIS	-	expression tag	UNP P0DUV9
B	-2	HIS	-	expression tag	UNP P0DUV9
B	-1	SER	-	expression tag	UNP P0DUV9
B	0	GLY	-	expression tag	UNP P0DUV9
B	493	SER	GLU	engineered mutation	UNP P0DUV9
B	591	GLY	-	expression tag	UNP P0DUV9
B	592	SER	-	expression tag	UNP P0DUV9
B	593	ALA	-	expression tag	UNP P0DUV9
B	594	TRP	-	expression tag	UNP P0DUV9
B	595	SER	-	expression tag	UNP P0DUV9
B	596	HIS	-	expression tag	UNP P0DUV9
B	597	PRO	-	expression tag	UNP P0DUV9
B	598	GLN	-	expression tag	UNP P0DUV9
B	599	PHE	-	expression tag	UNP P0DUV9
B	600	GLU	-	expression tag	UNP P0DUV9
B	601	LYS	-	expression tag	UNP P0DUV9

- Molecule 2 is 2-{4-[(4-AMINO-2-METHYLPYRIMIDIN-5-YL)METHYL]-3-METHYLTHIOPHEN-2-YL}ETHYL TRIHYDROGEN DIPHOSPHATE (CCD ID: TPW) (formula: $C_{13}H_{19}N_3O_7P_2S$) (labeled as "Ligand of Interest" by depositor).
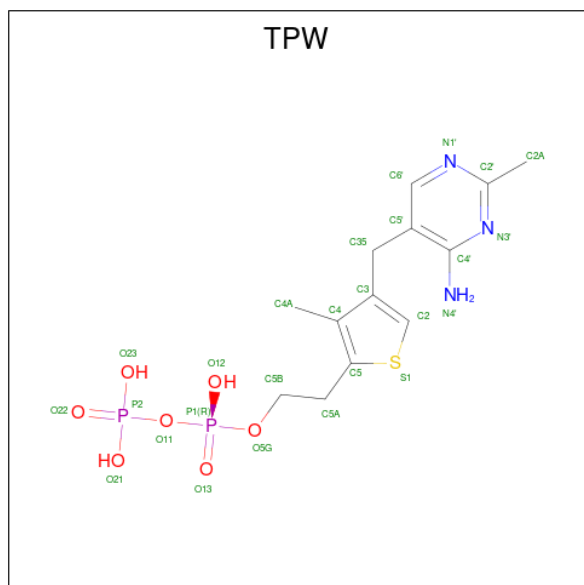
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
2	A	1	Total 26	C 13	N 3	O 7	P 2	S 1	0	0
2	B	1	Total 26	C 13	N 3	O 7	P 2	S 1	0	0

- Molecule 3 is S-{(3R,5R,9R)-1-[(2R,3S,4R,5R)-5-(6-amino-9H-purin-9-yl)-4-hydroxy-3-(phosphonooxy)tetrahydrofuran-2-yl]-3,5,9-trihydroxy-8,8-dimethyl-3,5-dioxido-10,14-dioxo-2,4,6-trioxa-11,15-diaza-3lambda 5 ,5lambda 5 -diphosphaheptadecan-17-yl} 2-hydroxy-2-methylpropanethioate (CCD ID: 3KK) (formula: $C_{25}H_{42}N_7O_{18}P_3S$) (labeled as "Ligand of Interest" by depositor).
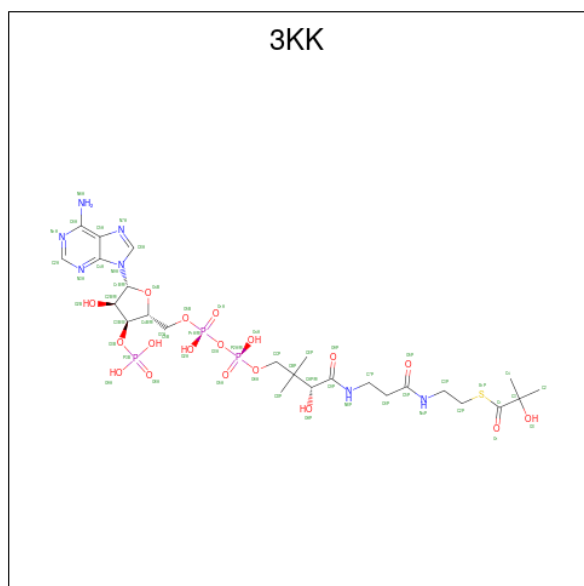
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
3	A	1	Total 54	C 25	N 7	O 18	P 3	S 1	0	0
3	B	1	Total 54	C 25	N 7	O 18	P 3	S 1	0	0

- Molecule 4 is MAGNESIUM ION (CCD ID: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

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

- Molecule 5 is water.

| Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	447	Total O 447 447	0	0
5	B	471	Total O 471 471	0	0

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: 2-hydroxyacyl-CoA lyase
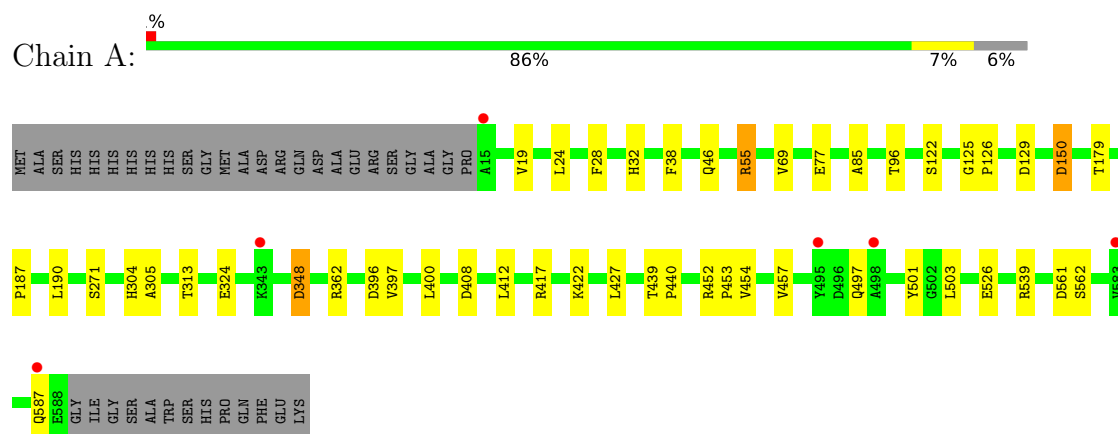
- Molecule 1: 2-hydroxyacyl-CoA lyase
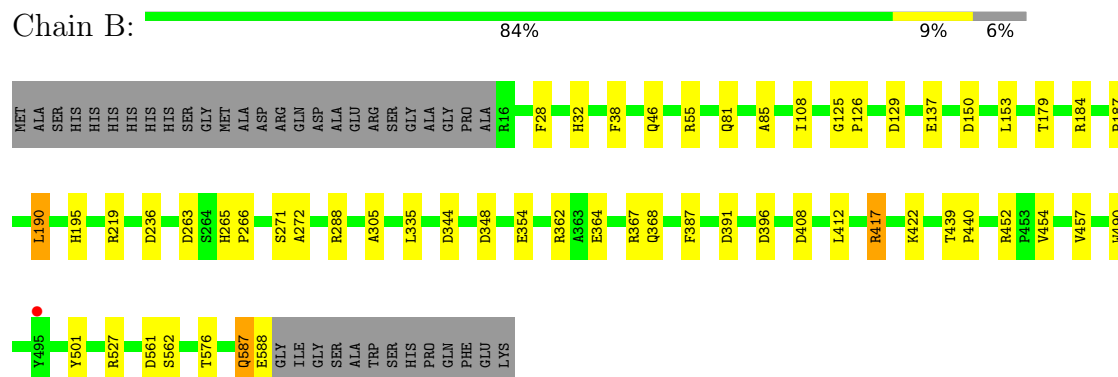
4 Data and refinement statistics (i)

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α, β, γ	103.86Å 148.16Å 174.58Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	87.29 – 1.57 87.29 – 1.57	Depositor EDS
% Data completeness (in resolution range)	48.1 (87.29-1.57) 48.1 (87.29-1.57)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.14 (at 1.57Å)	Xtriage
Refinement program	REFMAC 5.8.0430 (refmacat 0.4.100)	Depositor
R, R_{free}	0.164 , 0.201 0.164 , 0.201	Depositor DCC
R_{free} test set	4492 reflections (2.42%)	wwPDB-VP
Wilson B-factor (Å^2)	19.9	Xtriage
Anisotropy	0.100	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.37 , 37.5	EDS
L-test for twinning[2]	$< |L| > = 0.51$, $< L^2 > = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.97	EDS
Total number of atoms	9737	wwPDB-VP
Average B, all atoms (Å^2)	22.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.33% 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: TPW, 3KK, MG

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	0.61	0/4424	1.12	9/6030 (0.1%)
1	B	0.62	0/4424	1.12	15/6030 (0.2%)
All	All	0.62	0/8848	1.12	24/12060 (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	2
1	B	0	3
All	All	0	5

There are no bond length outliers.

All (24) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	150	ASP	CB-CA-C	-7.43	94.65	110.32
1	B	179	THR	OG1-CB-CG2	-7.28	94.75	109.30
1	A	150	ASP	CB-CA-C	-7.14	95.25	110.32
1	A	179	THR	OG1-CB-CG2	-7.09	95.12	109.30
1	B	354	GLU	CB-CG-CD	-6.65	101.29	112.60
1	B	452	ARG	CB-CA-C	-6.24	99.84	109.20
1	B	153	LEU	N-CA-CB	-6.08	101.17	110.16
1	B	396	ASP	CA-CB-CG	5.99	118.59	112.60
1	B	184	ARG	CG-CD-NE	-5.84	99.15	112.00
1	A	452	ARG	CB-CA-C	-5.79	100.52	109.20
1	A	55	ARG	CG-CD-NE	-5.74	99.37	112.00
1	A	396	ASP	CA-CB-CG	5.72	118.32	112.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	387	PHE	CA-CB-CG	-5.62	108.18	113.80
1	A	454	VAL	N-CA-CB	-5.61	101.88	110.86
1	A	408	ASP	CA-CB-CG	5.57	118.17	112.60
1	B	587	GLN	CB-CA-C	-5.55	99.25	109.46
1	A	587	GLN	N-CA-CB	5.45	119.70	110.49
1	B	55	ARG	CG-CD-NE	-5.37	100.18	112.00
1	B	408	ASP	CA-CB-CG	5.31	117.91	112.60
1	B	454	VAL	N-CA-CB	-5.21	102.52	110.86
1	B	236	ASP	CA-CB-CG	5.18	117.78	112.60
1	A	453	PRO	CB-CA-C	5.17	118.01	111.39
1	B	417	ARG	CD-NE-CZ	5.08	131.50	124.40
1	B	576	THR	CA-CB-OG1	-5.06	102.01	109.60

There are no chirality outliers.

All (5) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	305	ALA	Peptide
1	A	55	ARG	Sidechain
1	B	219	ARG	Sidechain
1	B	288	ARG	Sidechain
1	B	305	ALA	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	4330	0	4291	28	0
1	B	4326	0	4283	26	0
2	A	26	0	16	1	0
2	B	26	0	16	2	0
3	A	54	0	38	1	0
3	B	54	0	38	2	0
4	A	2	0	0	0	0
4	B	1	0	0	0	0
5	A	447	0	0	8	0
5	B	471	0	0	10	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	9737	0	8682	55	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 3.

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)
3:B:701:3KK:H10	5:B:1170:HOH:O	1.33	1.20
1:B:187:PRO:HG2	1:B:190:LEU:HD22	1.62	0.81
1:A:422:LYS:HD3	5:A:839:HOH:O	1.83	0.77
1:A:126:PRO:HG2	1:A:129:ASP:HB2	1.70	0.73
1:B:126:PRO:HG2	1:B:129:ASP:HB2	1.71	0.73
1:A:150:ASP:OD2	5:A:802:HOH:O	2.12	0.67
1:A:348:ASP:OD1	5:A:801:HOH:O	2.12	0.67
1:A:77[A]:GLU:OE2	1:A:427:LEU:HD21	1.98	0.64
1:B:28:PHE:CE2	1:B:32:HIS:CE1	2.92	0.58
1:A:271:SER:O	1:A:362:ARG:NH1	2.34	0.58
1:A:28:PHE:CE2	1:A:32:HIS:CE1	2.93	0.56
1:B:137:GLU:HG3	5:B:1180:HOH:O	2.06	0.56
1:B:391[A]:ASP:OD1	1:B:422:LYS:NZ	2.21	0.55
1:B:271:SER:O	1:B:362:ARG:NH1	2.41	0.54
1:B:368:GLN:NE2	5:B:804:HOH:O	2.30	0.52
1:A:324:GLU:OE1	5:A:803:HOH:O	2.19	0.50
1:B:125:GLY:N	1:B:126:PRO:CD	2.74	0.50
1:A:397:VAL:HG11	1:A:539[B]:ARG:HG3	1.93	0.49
1:B:81:GLN:HG2	5:B:1117:HOH:O	2.13	0.49
1:B:412:LEU:C	1:B:412:LEU:HD13	2.39	0.48
1:B:527:ARG:HB2	5:B:809:HOH:O	2.14	0.48
1:A:125:GLY:N	1:A:126:PRO:CD	2.77	0.47
1:B:439:THR:HB	1:B:440:PRO:HD3	1.96	0.47
1:A:412:LEU:C	1:A:412:LEU:HD13	2.40	0.47
1:B:38:PHE:O	1:B:85:ALA:HA	2.15	0.46
1:A:526:GLU:CD	5:A:804:HOH:O	2.59	0.46
1:B:195:HIS:HD2	5:B:1197:HOH:O	1.98	0.46
1:A:46:GLN:HG3	1:B:501:TYR:CZ	2.51	0.46
1:A:348:ASP:CG	5:A:801:HOH:O	2.56	0.46
1:A:38:PHE:O	1:A:85:ALA:HA	2.16	0.46
1:A:501:TYR:CZ	1:B:46:GLN:HG3	2.52	0.45
1:B:108:ILE:HD11	5:B:1092:HOH:O	2.16	0.44
1:A:439:THR:HB	1:A:440:PRO:HD3	1.98	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:412:LEU:HD11	1:B:457:VAL:HG12	1.98	0.44
1:B:490:TRP:HB3	2:B:702:TPW:H5A1	1.99	0.43
1:A:187:PRO:HG2	1:A:190:LEU:HD12	1.99	0.43
2:A:701:TPW:H2	3:A:702:3KK:C1	2.49	0.43
1:A:19:VAL:HG23	1:A:24:LEU:HG	2.02	0.42
1:B:344:ASP:N	5:B:801:HOH:O	1.90	0.42
1:B:417:ARG:HH22	1:B:561:ASP:CG	2.28	0.42
1:B:265:HIS:CG	1:B:266:PRO:HD2	2.55	0.42
1:A:304:HIS:HD2	5:A:1226:HOH:O	2.03	0.42
1:B:587:GLN:O	1:B:588:GLU:HB2	2.20	0.42
1:A:417:ARG:HH22	1:A:561:ASP:CG	2.28	0.41
1:B:263:ASP:HB2	5:B:1140:HOH:O	2.19	0.41
1:A:412:LEU:HD11	1:A:457:VAL:HG12	2.02	0.41
1:A:397:VAL:HG21	1:A:539[B]:ARG:HG3	2.03	0.41
1:B:364:GLU:HG2	1:B:367:ARG:HH22	1.84	0.41
3:B:701:3KK:C1	2:B:702:TPW:H2	2.50	0.41
1:A:28:PHE:CD1	1:A:28:PHE:C	2.98	0.41
1:A:122:SER:HA	5:A:1187:HOH:O	2.20	0.41
1:B:272:ALA:HA	5:B:882:HOH:O	2.20	0.40
1:A:69:VAL:HG21	1:A:96:THR:HB	2.03	0.40
1:A:497:GLN:HB3	1:A:503:LEU:O	2.20	0.40
1:A:400:LEU:HD23	1:A:400:LEU:HA	1.94	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	576/612 (94%)	559 (97%)	17 (3%)	0	100	100
1	B	576/612 (94%)	561 (97%)	15 (3%)	0	100	100
All	All	1152/1224 (94%)	1120 (97%)	32 (3%)	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	443/467 (95%)	440 (99%)	3 (1%)	81	69
1	B	444/467 (95%)	440 (99%)	4 (1%)	75	59
All	All	887/934 (95%)	880 (99%)	7 (1%)	79	65

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

Mol	Chain	Res	Type
1	A	313	THR
1	A	348	ASP
1	A	562	SER
1	B	190	LEU
1	B	335	LEU
1	B	348	ASP
1	B	562	SER

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	102	ASN
1	A	368	GLN
1	B	102	ASN
1	B	195	HIS
1	B	320	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 ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 7 ligands modelled in this entry, 3 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	#$|Z| > 2$
2	TPW	B	702	4	23,27,27	1.24	3 (13%)	30,40,40	0.96	1 (3%)
3	3KK	B	701	-	47,56,56	0.74	1 (2%)	58,85,85	1.21	3 (5%)
3	3KK	A	702	-	47,56,56	0.84	2 (4%)	58,85,85	1.28	6 (10%)
2	TPW	A	701	4	23,27,27	1.44	2 (8%)	30,40,40	0.94	1 (3%)

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	TPW	B	702	4	-	1/16/17/17	0/2/2/2
3	3KK	B	701	-	-	6/52/73/73	0/3/3/3
3	3KK	A	702	-	-	8/52/73/73	0/3/3/3
2	TPW	A	701	4	-	2/16/17/17	0/2/2/2

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	701	TPW	C4'-N4'	4.98	1.46	1.34

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	702	TPW	C4'-N4'	4.53	1.45	1.34
2	A	701	TPW	C5A-C5	-3.04	1.49	1.50
3	A	702	3KK	C1-S1P	2.59	1.81	1.78
3	A	702	3KK	O3-C3	2.58	1.46	1.43
2	B	702	TPW	C5A-C5	-2.40	1.49	1.50
2	B	702	TPW	C2-C3	2.20	1.38	1.37
3	B	701	3KK	O1-C1	2.01	1.22	1.20

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	A	702	3KK	O1-C1-S1P	-5.40	116.50	122.00
3	B	701	3KK	O1-C1-S1P	-4.48	117.43	122.00
3	A	702	3KK	C2P-S1P-C1	3.94	112.82	101.46
3	B	701	3KK	C2P-S1P-C1	2.92	109.88	101.46
3	A	702	3KK	O6A-CCP-CBP	-2.84	105.99	110.55
3	A	702	3KK	C5A-C6A-N6A	2.83	124.66	120.35
3	B	701	3KK	O3B-P3B-O8A	-2.70	98.95	109.39
3	A	702	3KK	C2P-C3P-N4P	-2.22	107.75	112.42
3	A	702	3KK	O2A-P1A-O1A	2.19	123.08	112.24
2	B	702	TPW	C4A-C4-C3	-2.15	120.89	124.94
2	A	701	TPW	C35-C5'-C6'	-2.13	118.79	121.73

There are no chirality outliers.

All (17) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	701	TPW	P1-O11-P2-O21
3	A	702	3KK	C3P-C2P-S1P-C1
3	A	702	3KK	CCP-O6A-P2A-O5A
3	A	702	3KK	C5B-O5B-P1A-O2A
3	B	701	3KK	C3P-C2P-S1P-C1
3	B	701	3KK	C5B-O5B-P1A-O2A
2	A	701	TPW	P1-O11-P2-O22
2	B	702	TPW	P1-O11-P2-O23
3	A	702	3KK	C3B-O3B-P3B-O9A
3	B	701	3KK	C5B-O5B-P1A-O3A
3	A	702	3KK	C5B-O5B-P1A-O1A
3	A	702	3KK	P1A-O3A-P2A-O4A
3	A	702	3KK	P1A-O3A-P2A-O5A
3	B	701	3KK	C2P-C3P-N4P-C5P
3	A	702	3KK	C5B-O5B-P1A-O3A

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Mol	Chain	Res	Type	Atoms
3	B	701	3KK	CCP-O6A-P2A-O5A
3	B	701	3KK	C5B-O5B-P1A-O1A

There are no ring outliers.

4 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	702	TPW	2	0
3	B	701	3KK	2	0
3	A	702	3KK	1	0
2	A	701	TPW	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 TPW B 702

Bond lengths

Bond angles

Torsions

Rings

Ligand 3KK B 701

Bond lengths

Bond angles

Torsions

Rings

Ligand 3KK A 702

Bond lengths

Bond angles

Torsions

Rings

Ligand TPW A 701

Bond lengths

Bond angles

Torsions

Rings
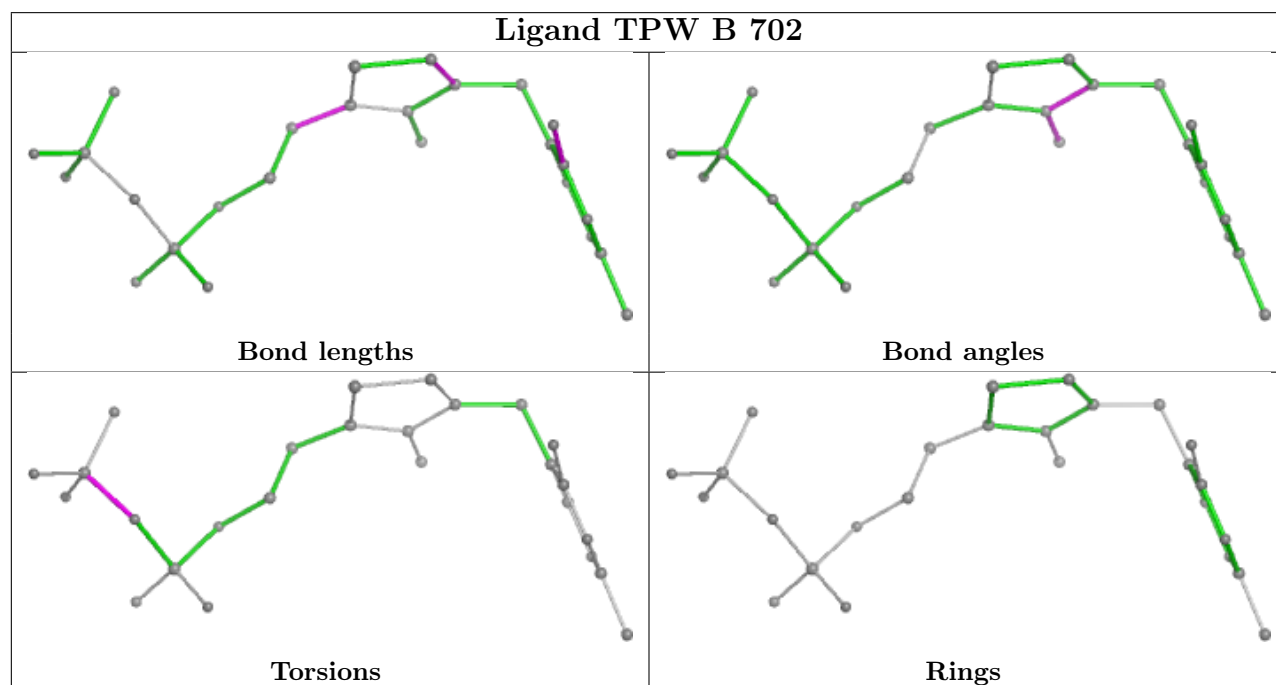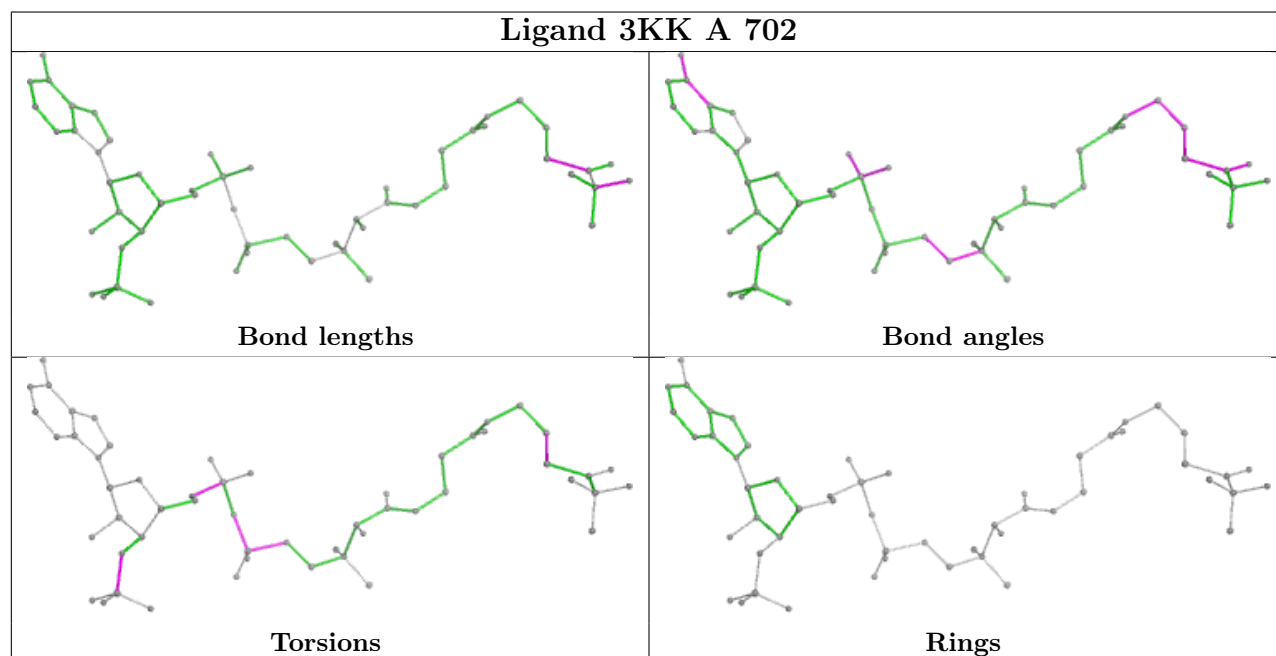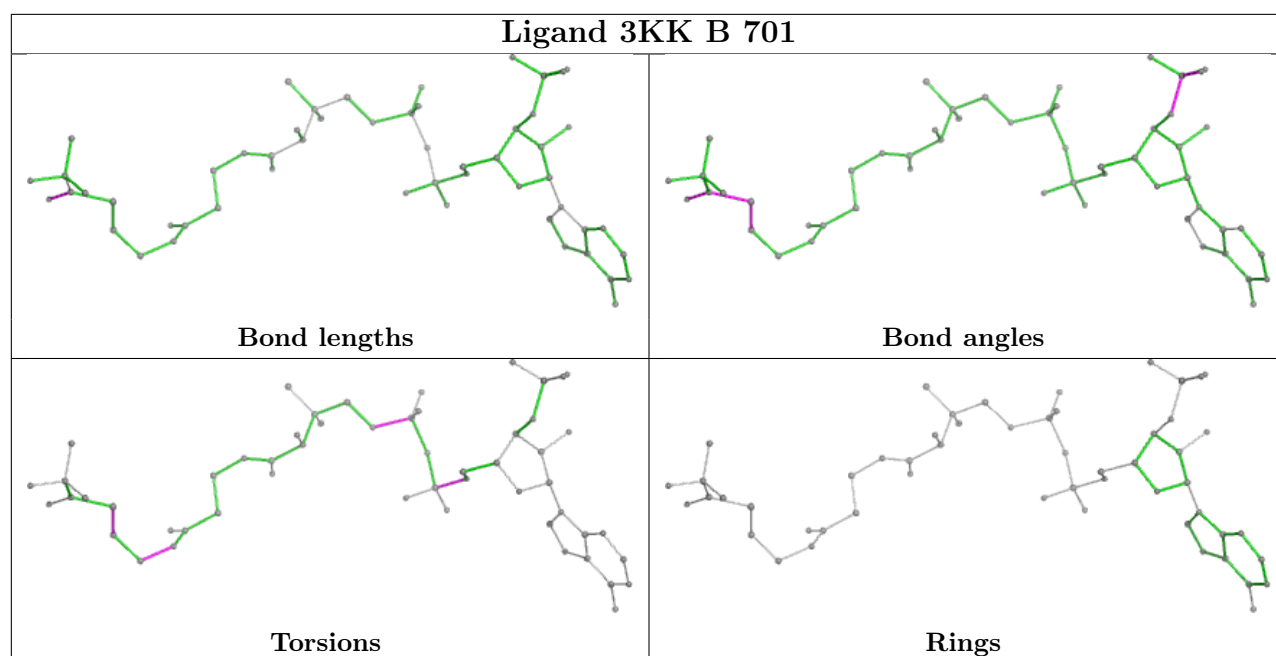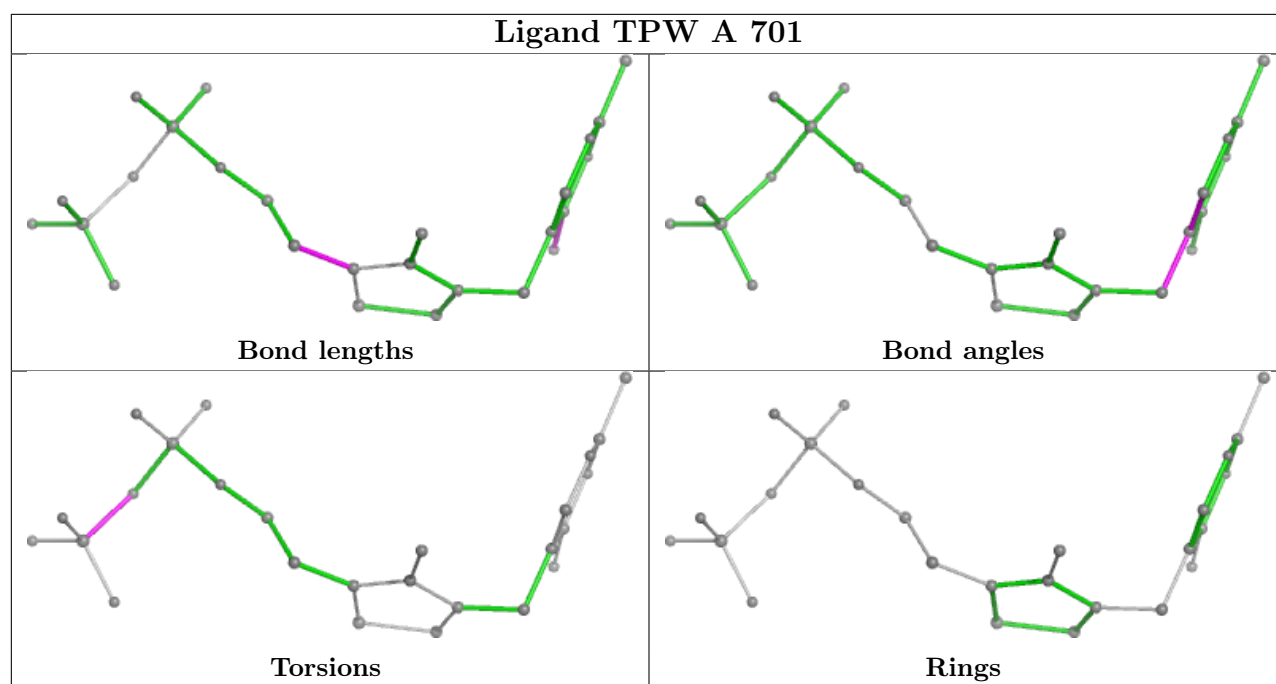
5.7 Other polymers ⓘ

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, 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	574/612 (93%)	-0.21	6 (1%)	79	83	10, 20, 35, 69	4 (0%)
1	B	573/612 (93%)	-0.28	1 (0%)	92	92	13, 20, 33, 61	5 (0%)
All	All	1147/1224 (93%)	-0.24	7 (0%)	85	89	10, 20, 34, 69	9 (0%)

All (7) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	15	ALA	2.6
1	A	343	LYS	2.5
1	A	583	VAL	2.4
1	A	587	GLN	2.2
1	B	495	TYR	2.1
1	A	498	ALA	2.1
1	A	495	TYR	2.1

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 oligosaccharides 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.

WORLDWIDE
wwPDB
PROTEIN DATA BANK

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	3KK	A	702	54/54	0.95	0.08	18,27,37,41	0
3	3KK	B	701	54/54	0.97	0.06	16,20,26,30	0
2	TPW	A	701	26/26	0.98	0.04	15,17,19,19	0
4	MG	A	704	1/1	0.98	0.03	20,20,20,20	0
4	MG	A	703	1/1	0.99	0.02	18,18,18,18	0
2	TPW	B	702	26/26	0.99	0.04	12,14,15,16	0
4	MG	B	703	1/1	0.99	0.02	16,16,16,16	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 3KK A 702:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative) and green (positive)
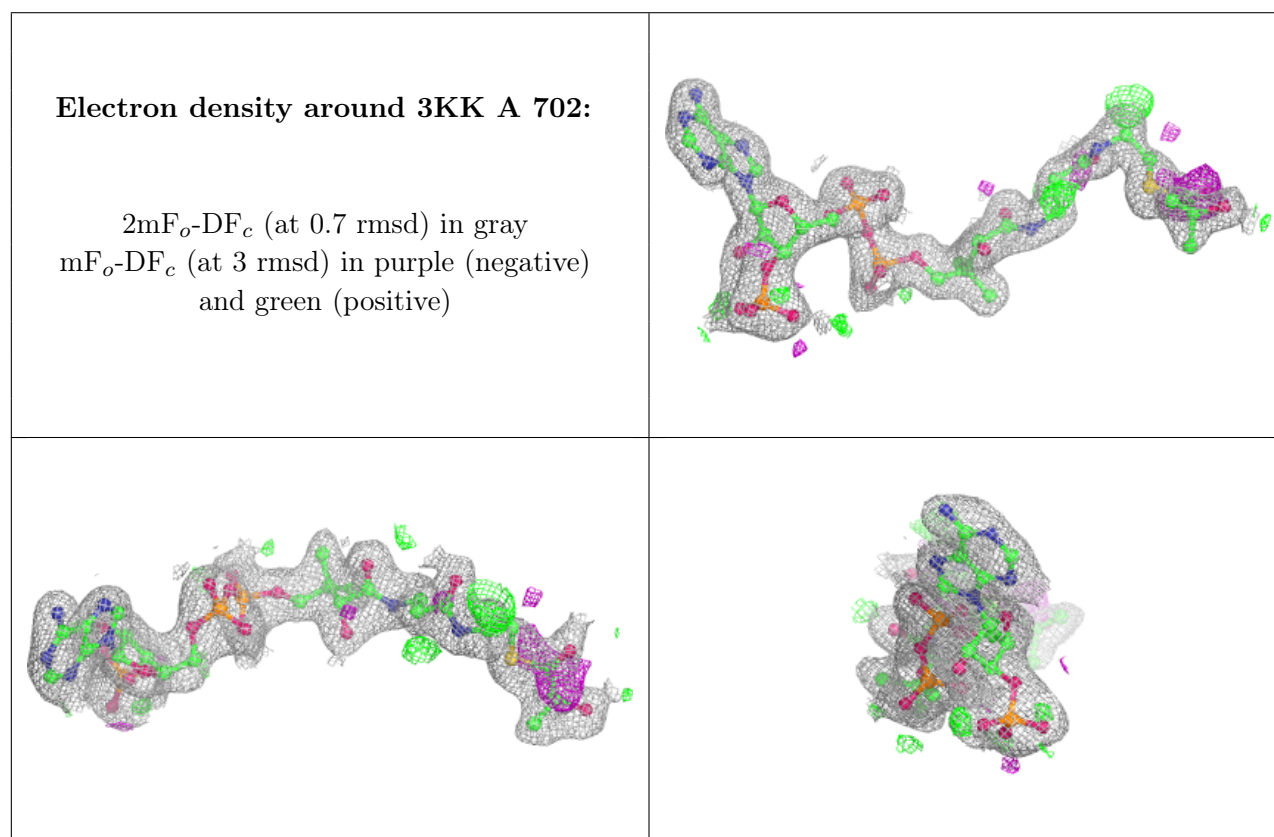
Electron density around 3KK B 701:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)
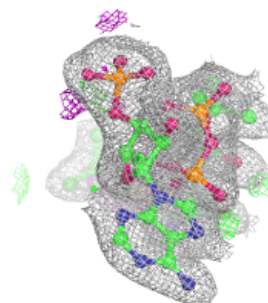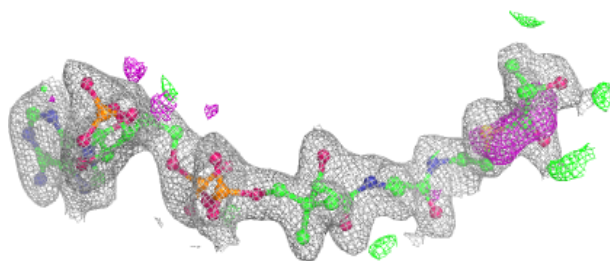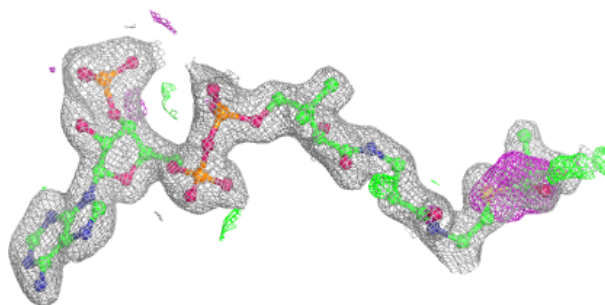
Electron density around TPW A 701:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
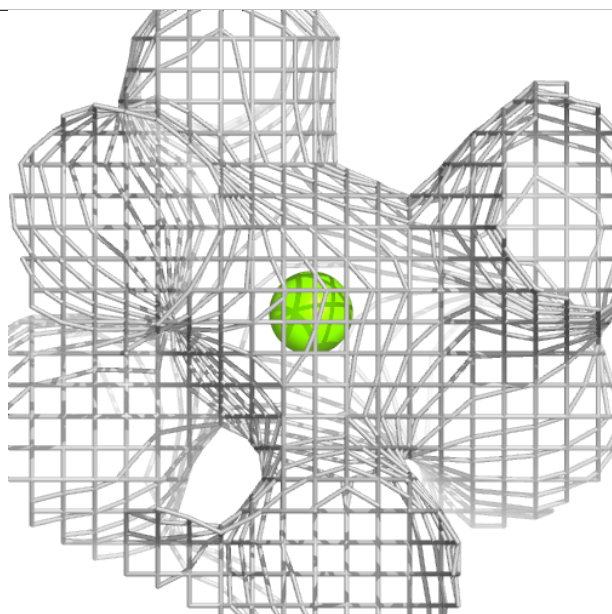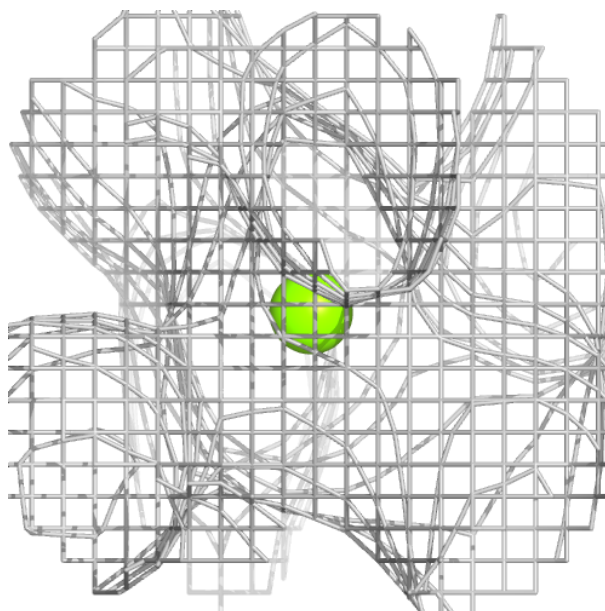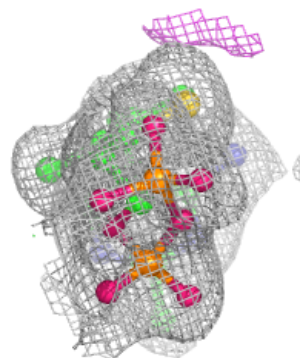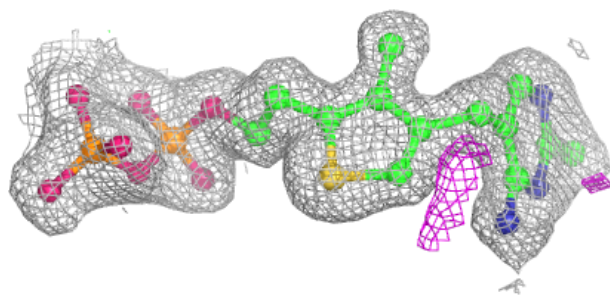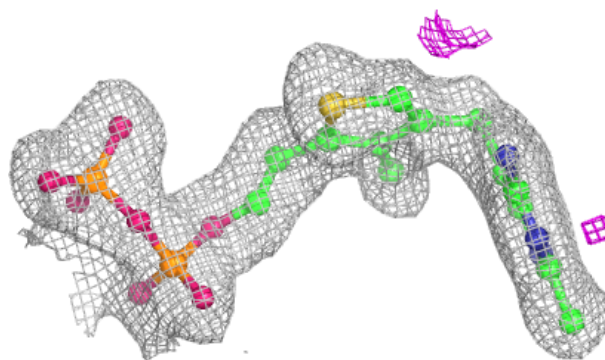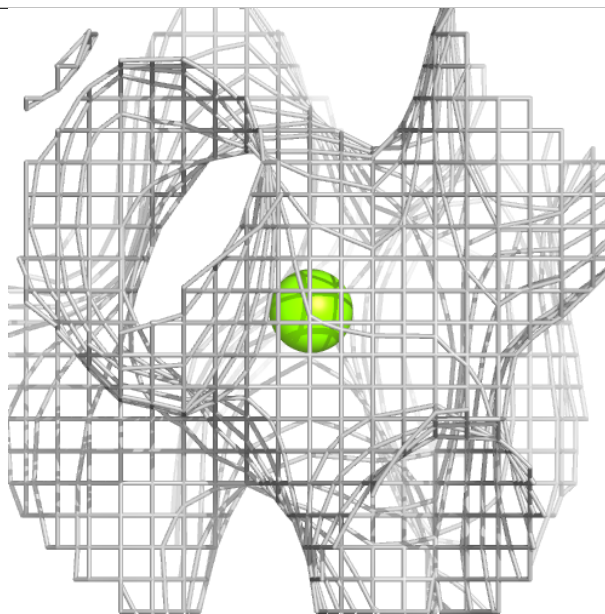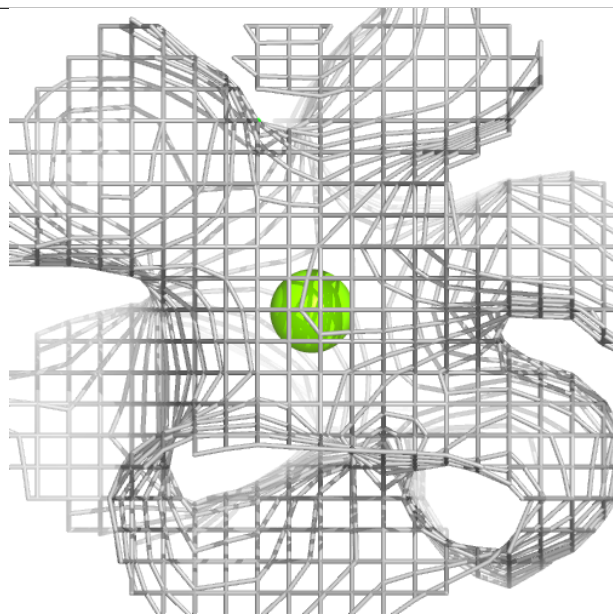mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)
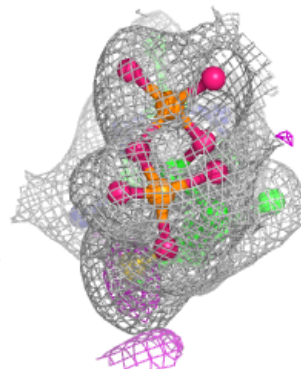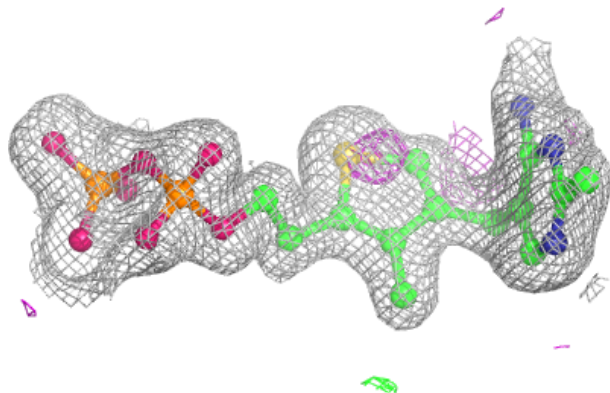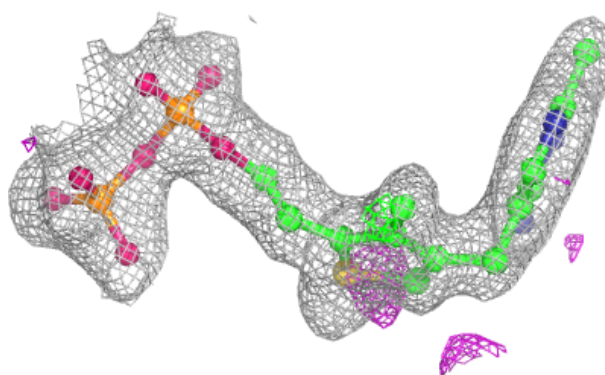
Electron density around MG A 704:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
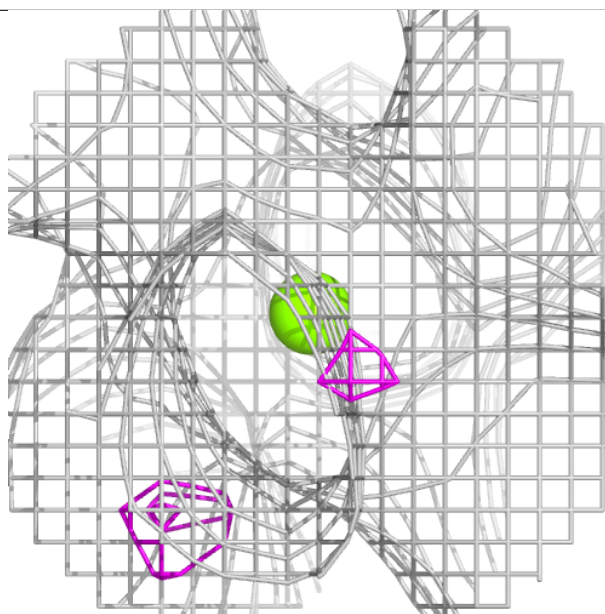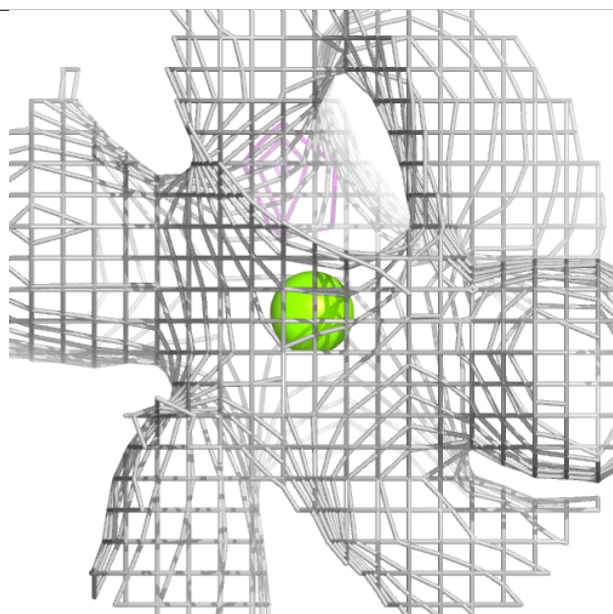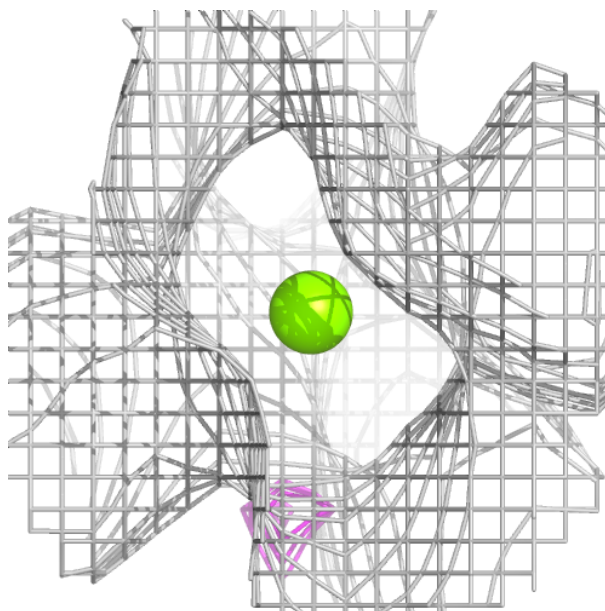
Electron density around MG A 703:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
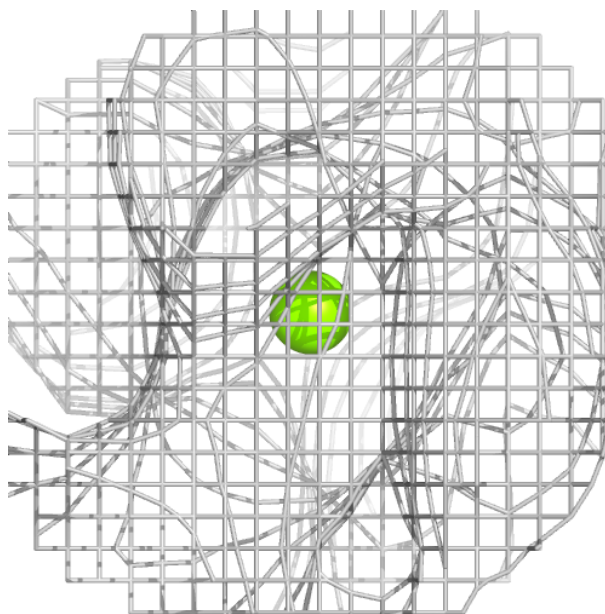$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
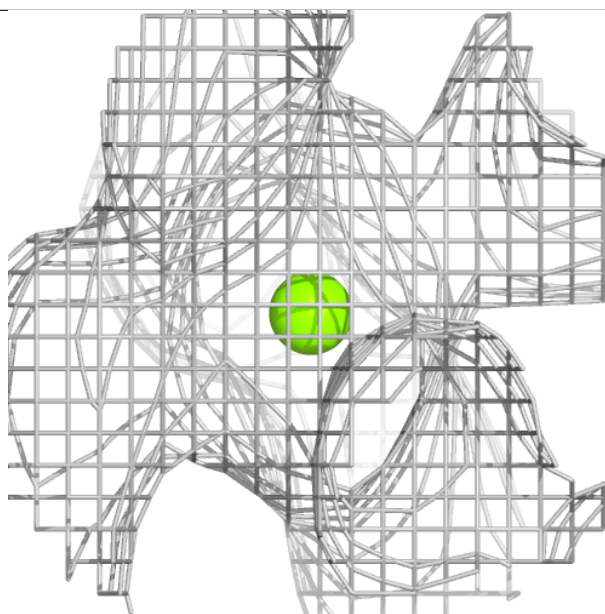
Electron density around TPW B 702:

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

Electron density around MG B 703:

$2mF_o$-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.