WORLDWIDE wwPDB PROTEIN DATA BANK

wwPDB X-ray Structure Validation Summary Report (i)

Jun 3, 2025 – 08:16 PM JST

PDB ID	:	9LSF / pdb_00009lsf
Title	:	Crystal structure of mRFP1 with a grafted calcium-binding sequence and one bound calcium ion in a calcium-free solution
Authors	:	Uehara, R.; Kamiya, Y.; Maeda, S.; Okamoto, K.; Toya, S.; Chiba, R.; Amesaka, H.; Takano, K.; Matsumura, H.; Tanaka, S.-i.
Deposited on	:	2025-02-04
Resolution	:	1.62 Å(reported)

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

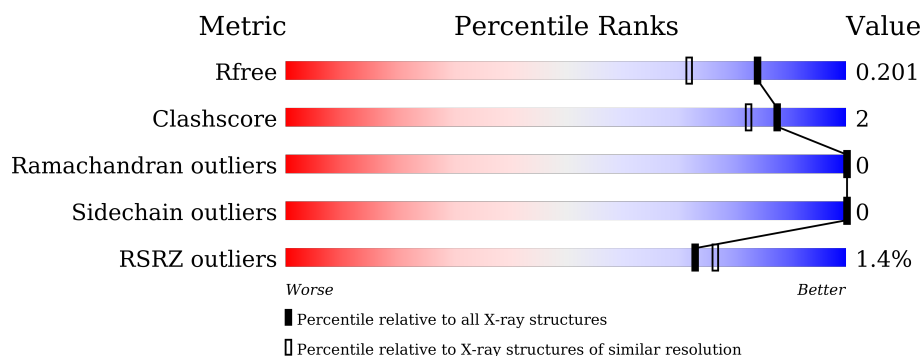|		
MolProbity	:	4-5-2 with Phenix2.0rc1
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	2.0rc1
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.006 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.43.1

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 1.62 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		2
Ramachandran outliers		0
Sidechain outliers		0
RSRZ outliers		1.4%

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))
R$_{free}$	164625	6077 (1.64-1.60)
Clashscore	180529	6617 (1.64-1.60)
Ramachandran outliers	177936	6498 (1.64-1.60)
Sidechain outliers	177891	6497 (1.64-1.60)
RSRZ outliers	164620	6075 (1.64-1.60)

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	278	78% • 21%
1	B	278	2% 73% 6% 21%

2 Entry composition ⓘ

There are 5 unique types of molecules in this entry. The entry contains 3858 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 Red fluorescent protein,grafted calcium-binding sequence.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	220	Total	C	N	O	S	0	0	0
			1767	1122	296	341	8			
1	B	220	Total	C	N	O	S	0	0	0
			1767	1122	296	341	8			

There are 106 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-36	MET	-	initiating methionine	UNP A0A4V4ND72
A	-35	GLY	-	expression tag	UNP A0A4V4ND72
A	-34	GLY	-	expression tag	UNP A0A4V4ND72
A	-33	SER	-	expression tag	UNP A0A4V4ND72
A	-32	HIS	-	expression tag	UNP A0A4V4ND72
A	-31	HIS	-	expression tag	UNP A0A4V4ND72
A	-30	HIS	-	expression tag	UNP A0A4V4ND72
A	-29	HIS	-	expression tag	UNP A0A4V4ND72
A	-28	HIS	-	expression tag	UNP A0A4V4ND72
A	-27	HIS	-	expression tag	UNP A0A4V4ND72
A	-26	GLY	-	expression tag	UNP A0A4V4ND72
A	-25	MET	-	expression tag	UNP A0A4V4ND72
A	-24	ALA	-	expression tag	UNP A0A4V4ND72
A	-23	SER	-	expression tag	UNP A0A4V4ND72
A	-22	MET	-	expression tag	UNP A0A4V4ND72
A	-21	THR	-	expression tag	UNP A0A4V4ND72
A	-20	GLY	-	expression tag	UNP A0A4V4ND72
A	-19	GLY	-	expression tag	UNP A0A4V4ND72
A	-18	GLN	-	expression tag	UNP A0A4V4ND72
A	-17	GLN	-	expression tag	UNP A0A4V4ND72
A	-16	MET	-	expression tag	UNP A0A4V4ND72
A	-15	GLY	-	expression tag	UNP A0A4V4ND72
A	-14	ARG	-	expression tag	UNP A0A4V4ND72
A	-13	ASP	-	expression tag	UNP A0A4V4ND72
A	-12	LEU	-	expression tag	UNP A0A4V4ND72

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Chain	Residue	Modelled	Actual	Comment	Reference
A	-11	TYR	-	expression tag	UNP A0A4V4ND72
A	-10	ASP	-	expression tag	UNP A0A4V4ND72
A	-9	ASP	-	expression tag	UNP A0A4V4ND72
A	-8	ASP	-	expression tag	UNP A0A4V4ND72
A	-7	ASP	-	expression tag	UNP A0A4V4ND72
A	-6	LYS	-	expression tag	UNP A0A4V4ND72
A	-5	ASP	-	expression tag	UNP A0A4V4ND72
A	-4	ARG	-	expression tag	UNP A0A4V4ND72
A	-3	TRP	-	expression tag	UNP A0A4V4ND72
A	-2	GLY	-	expression tag	UNP A0A4V4ND72
A	-1	SER	-	expression tag	UNP A0A4V4ND72
A	0	GLU	-	expression tag	UNP A0A4V4ND72
A	1	LEU	-	expression tag	UNP A0A4V4ND72
A	66	CRQ	GLN	chromophore	UNP A0A4V4ND72
A	66	CRQ	TYR	chromophore	UNP A0A4V4ND72
A	66	CRQ	GLY	chromophore	UNP A0A4V4ND72
A	232	GLY	-	expression tag	UNP A0A4V4ND72
A	233	GLY	-	expression tag	UNP A0A4V4ND72
A	234	SER	-	expression tag	UNP A0A4V4ND72
A	235	GLY	-	expression tag	UNP A0A4V4ND72
A	236	GLY	-	expression tag	UNP A0A4V4ND72
A	237	SER	-	expression tag	UNP A0A4V4ND72
A	238	GLU	-	expression tag	UNP A0A4V4ND72
A	239	ASN	-	expression tag	UNP A0A4V4ND72
A	240	LEU	-	expression tag	UNP A0A4V4ND72
A	241	TYR	-	expression tag	UNP A0A4V4ND72
A	242	PHE	-	expression tag	UNP A0A4V4ND72
A	243	GLN	-	expression tag	UNP A0A4V4ND72
B	-36	MET	-	initiating methionine	UNP A0A4V4ND72
B	-35	GLY	-	expression tag	UNP A0A4V4ND72
B	-34	GLY	-	expression tag	UNP A0A4V4ND72
B	-33	SER	-	expression tag	UNP A0A4V4ND72
B	-32	HIS	-	expression tag	UNP A0A4V4ND72
B	-31	HIS	-	expression tag	UNP A0A4V4ND72
B	-30	HIS	-	expression tag	UNP A0A4V4ND72
B	-29	HIS	-	expression tag	UNP A0A4V4ND72
B	-28	HIS	-	expression tag	UNP A0A4V4ND72
B	-27	HIS	-	expression tag	UNP A0A4V4ND72
B	-26	GLY	-	expression tag	UNP A0A4V4ND72
B	-25	MET	-	expression tag	UNP A0A4V4ND72
B	-24	ALA	-	expression tag	UNP A0A4V4ND72
B	-23	SER	-	expression tag	UNP A0A4V4ND72

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Chain	Residue	Modelled	Actual	Comment	Reference
B	-22	MET	-	expression tag	UNP A0A4V4ND72
B	-21	THR	-	expression tag	UNP A0A4V4ND72
B	-20	GLY	-	expression tag	UNP A0A4V4ND72
B	-19	GLY	-	expression tag	UNP A0A4V4ND72
B	-18	GLN	-	expression tag	UNP A0A4V4ND72
B	-17	GLN	-	expression tag	UNP A0A4V4ND72
B	-16	MET	-	expression tag	UNP A0A4V4ND72
B	-15	GLY	-	expression tag	UNP A0A4V4ND72
B	-14	ARG	-	expression tag	UNP A0A4V4ND72
B	-13	ASP	-	expression tag	UNP A0A4V4ND72
B	-12	LEU	-	expression tag	UNP A0A4V4ND72
B	-11	TYR	-	expression tag	UNP A0A4V4ND72
B	-10	ASP	-	expression tag	UNP A0A4V4ND72
B	-9	ASP	-	expression tag	UNP A0A4V4ND72
B	-8	ASP	-	expression tag	UNP A0A4V4ND72
B	-7	ASP	-	expression tag	UNP A0A4V4ND72
B	-6	LYS	-	expression tag	UNP A0A4V4ND72
B	-5	ASP	-	expression tag	UNP A0A4V4ND72
B	-4	ARG	-	expression tag	UNP A0A4V4ND72
B	-3	TRP	-	expression tag	UNP A0A4V4ND72
B	-2	GLY	-	expression tag	UNP A0A4V4ND72
B	-1	SER	-	expression tag	UNP A0A4V4ND72
B	0	GLU	-	expression tag	UNP A0A4V4ND72
B	1	LEU	-	expression tag	UNP A0A4V4ND72
B	66	CRQ	GLN	chromophore	UNP A0A4V4ND72
B	66	CRQ	TYR	chromophore	UNP A0A4V4ND72
B	66	CRQ	GLY	chromophore	UNP A0A4V4ND72
B	232	GLY	-	expression tag	UNP A0A4V4ND72
B	233	GLY	-	expression tag	UNP A0A4V4ND72
B	234	SER	-	expression tag	UNP A0A4V4ND72
B	235	GLY	-	expression tag	UNP A0A4V4ND72
B	236	GLY	-	expression tag	UNP A0A4V4ND72
B	237	SER	-	expression tag	UNP A0A4V4ND72
B	238	GLU	-	expression tag	UNP A0A4V4ND72
B	239	ASN	-	expression tag	UNP A0A4V4ND72
B	240	LEU	-	expression tag	UNP A0A4V4ND72
B	241	TYR	-	expression tag	UNP A0A4V4ND72
B	242	PHE	-	expression tag	UNP A0A4V4ND72
B	243	GLN	-	expression tag	UNP A0A4V4ND72

- Molecule 2 is CALCIUM ION (CCD ID: CA) (formula: Ca) (labeled as "Ligand of Interest" by depositor).

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

- Molecule 3 is DI(HYDROXYETHYL)ETHER (CCD ID: PEG) (formula: $C_4H_{10}O_3$) (labeled as "Ligand of Interest" by depositor).

PEG
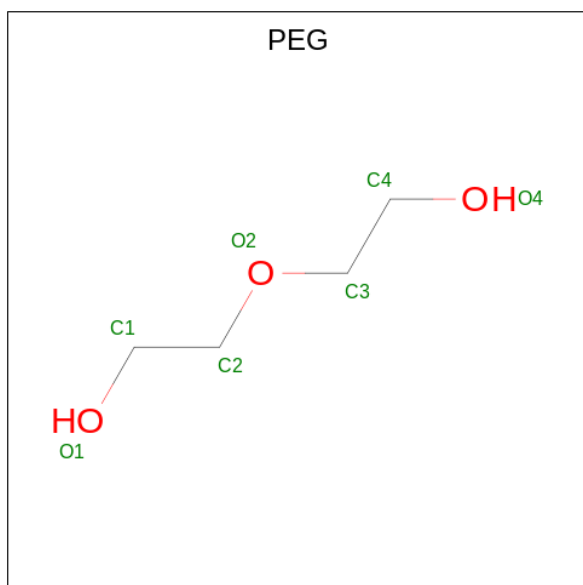
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total 7	C 4	O 3	0	0
3	B	1	Total 7	C 4	O 3	0	0

- Molecule 4 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: $C_2H_6O_2$) (labeled as "Ligand of Interest" by depositor).

EDO

O2

OH

C1

C2

HO

O1
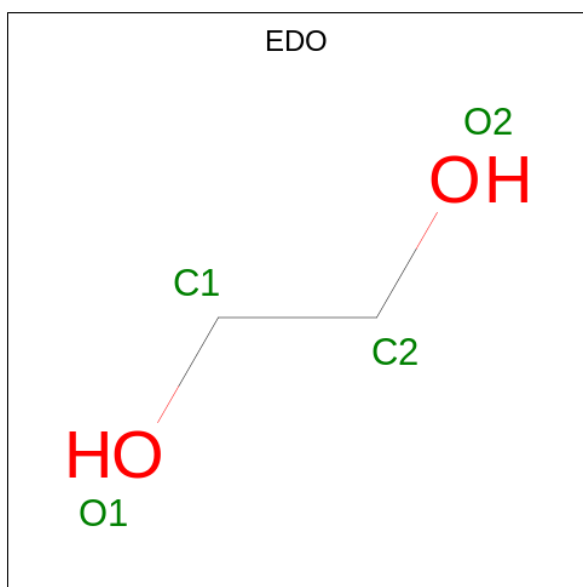
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	B	1	Total 4	C 2	O 2	0	0
4	B	1	Total 4	C 2	O 2	0	0
4	B	1	Total 4	C 2	O 2	0	0

• Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	148	Total 148	O 148	0	0
5	B	148	Total 148	O 148	0	0

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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: Red fluorescent protein,grafted calcium-binding sequence
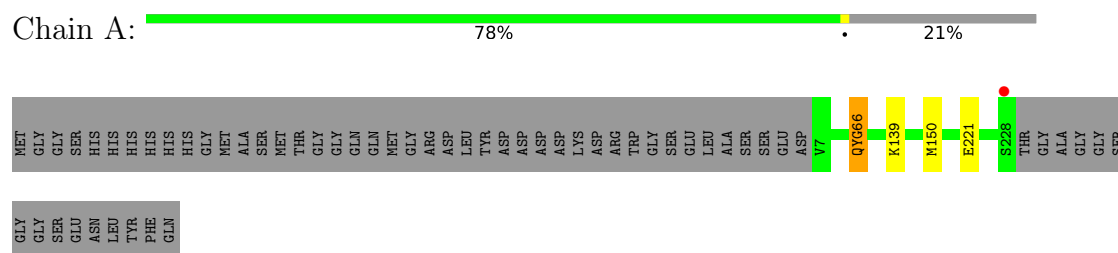
• Molecule 1: Red fluorescent protein,grafted calcium-binding sequence
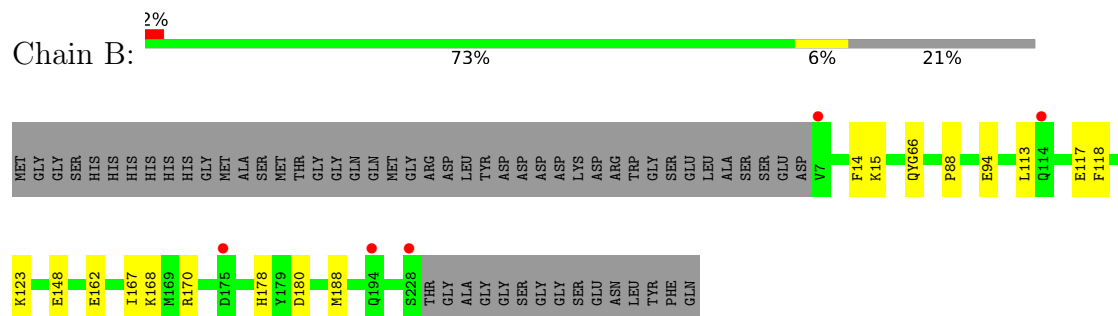
4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	56.25Å 86.01Å 109.95Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	47.08 – 1.62 47.08 – 1.62	Depositor EDS
% Data completeness (in resolution range)	99.7 (47.08-1.62) 99.7 (47.08-1.62)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.39 (at 1.62Å)	Xtriage
Refinement program	PHENIX (1.17.1_3660: ???)	Depositor
R, R_{free}	0.175 , 0.198 0.179 , 0.201	Depositor DCC
R_{free} test set	66545 reflections (2.93%)	wwPDB-VP
Wilson B-factor (Å^2)	22.0	Xtriage
Anisotropy	0.226	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.39 , 34.5	EDS
L-test for twinning[2]	$< |L| > = 0.50, < L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	3858	wwPDB-VP
Average B, all atoms (Å^2)	24.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.99% 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 (i)

5.1   Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: CRQ, PEG, EDO, CA

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	0.26	0/1784	0.52	0/2398
1	B	0.27	0/1784	0.53	0/2398
All	All	0.27	0/3568	0.53	0/4796

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2   Too-close contacts (i)

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	1767	0	1705	3	0
1	B	1767	0	1705	10	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
3	A	7	0	10	0	0
3	B	7	0	10	0	0
4	B	12	0	18	1	0
5	A	148	0	0	0	0
5	B	148	0	0	0	0
All	All	3858	0	3448	13	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 2.

The worst 5 of 13 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:162:GLU:HG2	1:B:188:MET:HG2	1.73	0.70
1:B:168:LYS:HE3	1:B:180:ASP:HB3	1.83	0.60
1:B:15:LYS:HE2	1:B:117:GLU:OE2	2.06	0.56
1:B:170:ARG:HG2	1:B:178:HIS:CD2	2.47	0.49
1:A:66:CRQ:HB11	1:A:221:GLU:OE2	2.14	0.47

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	215/278 (77%)	211 (98%)	4 (2%)	0	100	100
1	B	215/278 (77%)	211 (98%)	4 (2%)	0	100	100
All	All	430/556 (77%)	422 (98%)	8 (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	185/228 (81%)	185 (100%)	0	100	100
1	B	185/228 (81%)	185 (100%)	0	100	100
All	All	370/456 (81%)	370 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	137	GLN
1	B	194	GLN

5.3.3   RNA ⓘ

There are no RNA molecules in this entry.

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

2 non-standard protein/DNA/RNA residues are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#$|Z| > 2$	Counts	RMSZ	#$|Z| > 2$
1	CRQ	B	66	1	24,25,26	1.25	3 (12%)	27,34,36	2.71	7 (25%)
1	CRQ	A	66	1	24,25,26	1.20	3 (12%)	27,34,36	2.63	5 (18%)

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	CRQ	B	66	1	-	3/10/32/33	0/2/2/2

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	CRQ	A	66	1	-	4/10/32/33	0/2/2/2

The worst 5 of 6 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	66	CRQ	CB2-CA2	4.44	1.38	1.35
1	A	66	CRQ	CB2-CA2	4.13	1.38	1.35
1	B	66	CRQ	CA2-C2	-2.16	1.46	1.48
1	B	66	CRQ	C2-N3	-2.14	1.34	1.39
1	A	66	CRQ	CA2-C2	-2.12	1.46	1.48

The worst 5 of 12 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	66	CRQ	O2-C2-CA2	-9.42	125.67	130.96
1	B	66	CRQ	O2-C2-CA2	-9.39	125.69	130.96
1	B	66	CRQ	CA2-C2-N3	7.22	106.79	103.37
1	A	66	CRQ	CA2-C2-N3	7.15	106.75	103.37
1	B	66	CRQ	C2-CA2-N2	-3.86	106.23	108.93

There are no chirality outliers.

5 of 7 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	66	CRQ	C1-CA1-CB1-CG1
1	A	66	CRQ	N2-CA2-CB2-CG2
1	A	66	CRQ	C2-CA2-CB2-CG2
1	B	66	CRQ	C1-CA1-CB1-CG1
1	B	66	CRQ	C2-CA2-CB2-CG2

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	A	66	CRQ	1	0

5.5 Carbohydrates (i)

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 7 ligands modelled in this entry, 2 are monoatomic - leaving 5 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	$\#|Z| > 2$
3	PEG	A	302	-	6,6,6	0.47	0	5,5,5	0.47	0
4	EDO	B	302	-	3,3,3	0.51	0	2,2,2	0.50	0
4	EDO	B	303	-	3,3,3	0.41	0	2,2,2	0.33	0
3	PEG	B	305	-	6,6,6	0.47	0	5,5,5	0.47	0
4	EDO	B	304	-	3,3,3	0.48	0	2,2,2	0.42	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
3	PEG	A	302	-	-	1/4/4/4	-
4	EDO	B	302	-	-	0/1/1/1	-
4	EDO	B	303	-	-	1/1/1/1	-
3	PEG	B	305	-	-	0/4/4/4	-
4	EDO	B	304	-	-	0/1/1/1	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	302	PEG	O2-C3-C4-O4
4	B	303	EDO	O1-C1-C2-O2

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	304	EDO	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 PEG A 302

Bond lengths   Bond angles

Torsions   Rings

Ligand EDO B 302

Bond lengths

Bond angles

Torsions

Rings

Ligand EDO B 303

Bond lengths

Bond angles

Torsions

Rings

Ligand PEG B 305

Bond lengths

Bond angles

Torsions

Rings

Ligand EDO B 304

Bond lengths

Bond angles

Torsions

Rings
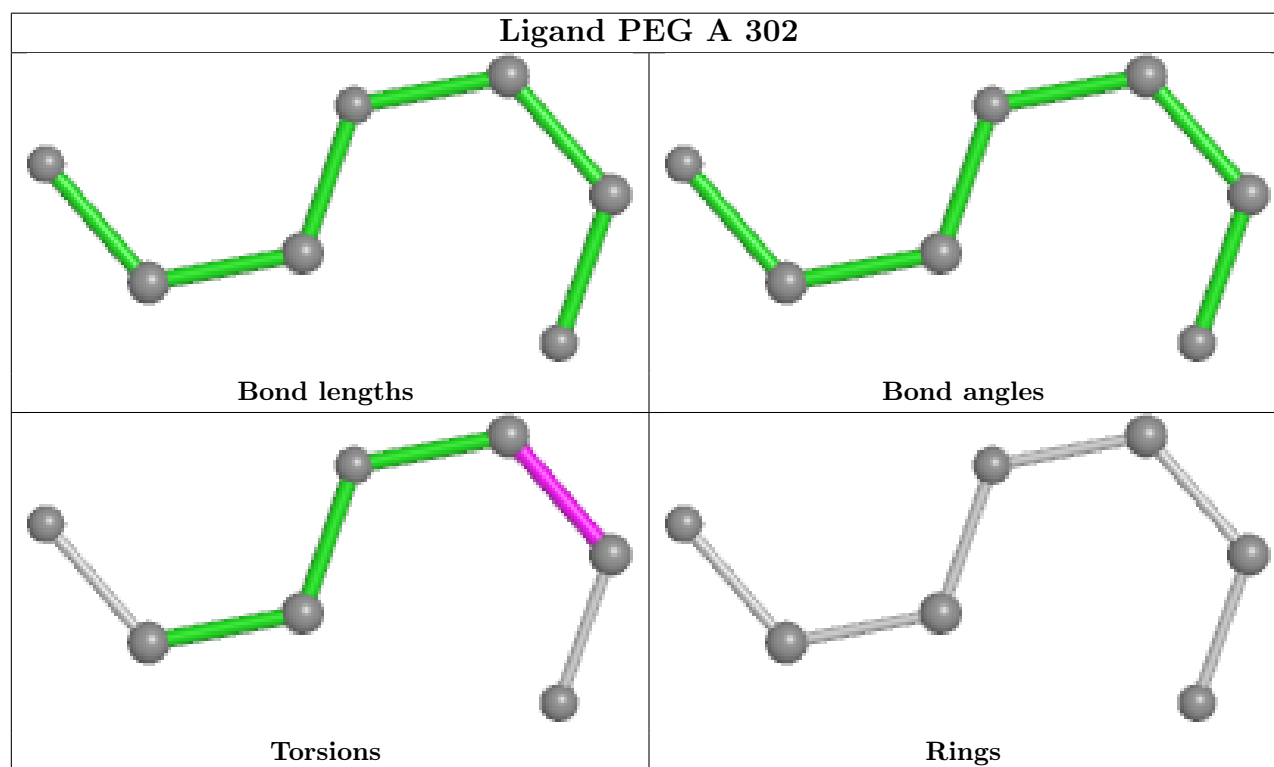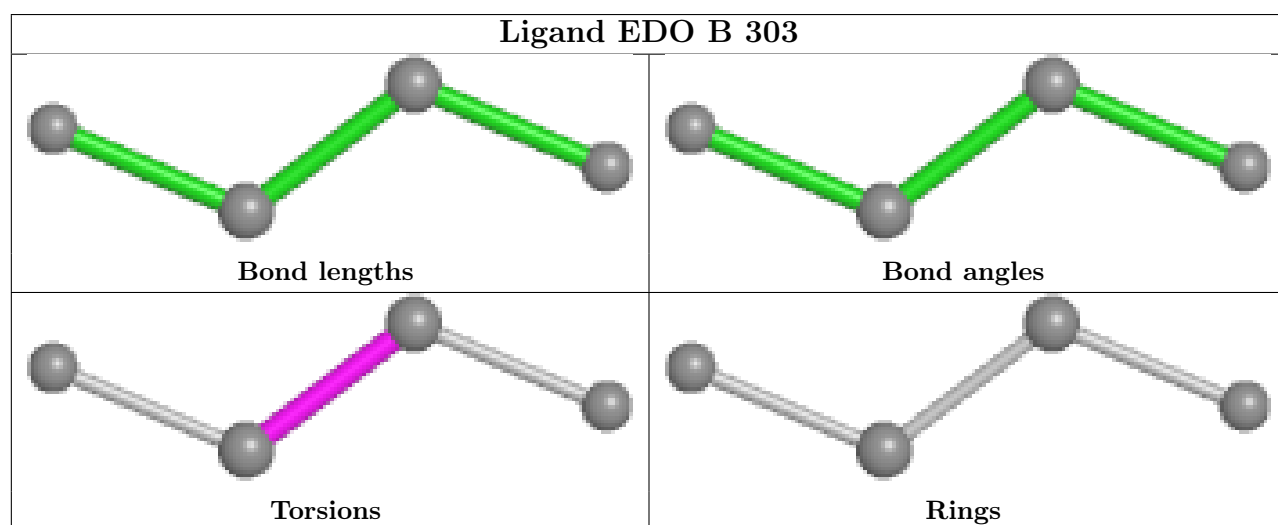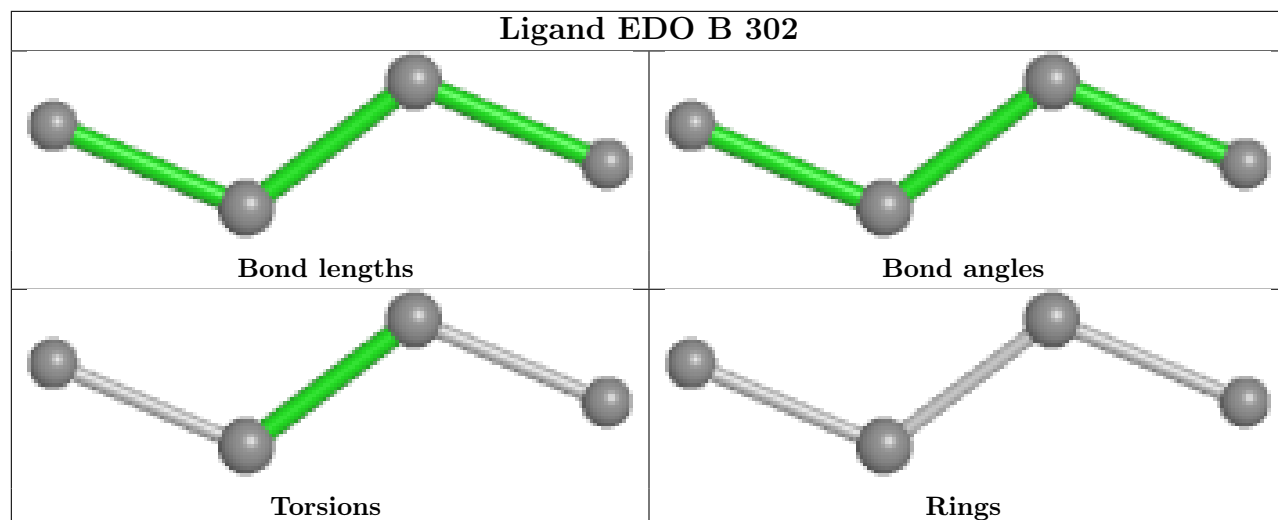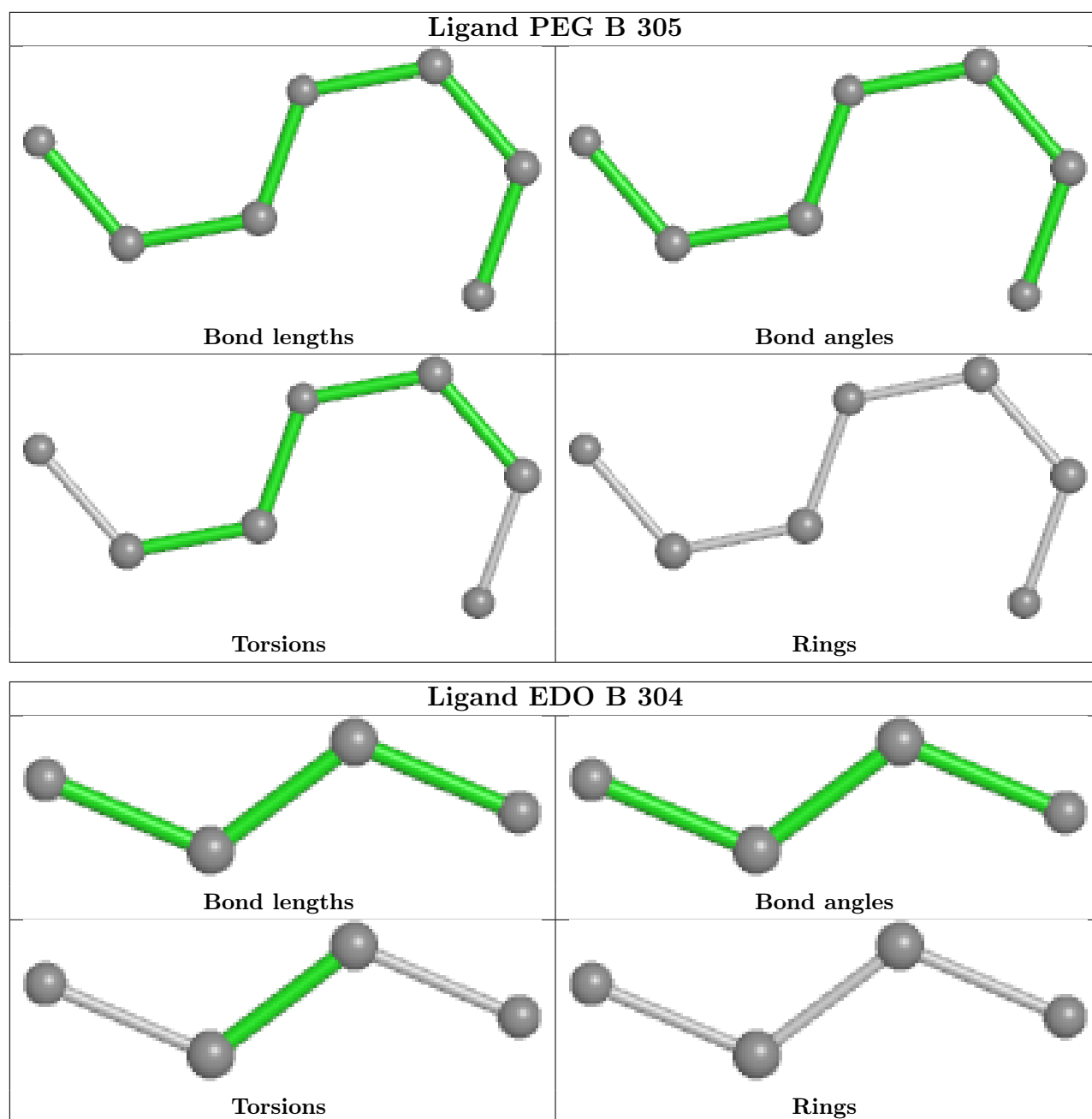
5.7 Other polymers ⓘ

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	219/278 (78%)	0.03	1 (0%)	87	90	15, 22, 33, 45	0
1	B	219/278 (78%)	0.06	5 (2%)	61	64	15, 22, 33, 48	0
All	All	438/556 (78%)	0.05	6 (1%)	73	77	15, 22, 33, 48	0

The worst 5 of 6 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	175	ASP	3.4
1	B	228	SER	2.8
1	A	228	SER	2.7
1	B	7	VAL	2.6
1	B	194	GLN	2.4

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

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 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
1	CRQ	B	66	24/25	0.95	0.08	18,22,25,29	0
1	CRQ	A	66	24/25	0.96	0.07	18,24,29,29	0

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	EDO	B	302	4/4	0.82	0.13	26,32,32,39	0
4	EDO	B	303	4/4	0.85	0.13	30,31,39,43	0
4	EDO	B	304	4/4	0.86	0.13	31,37,40,47	0
3	PEG	B	305	7/7	0.92	0.10	29,33,38,48	0
3	PEG	A	302	7/7	0.93	0.09	27,32,36,42	0
2	CA	B	301	1/1	0.98	0.08	26,26,26,26	0
2	CA	A	301	1/1	0.98	0.05	22,22,22,22	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 EDO B 302:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
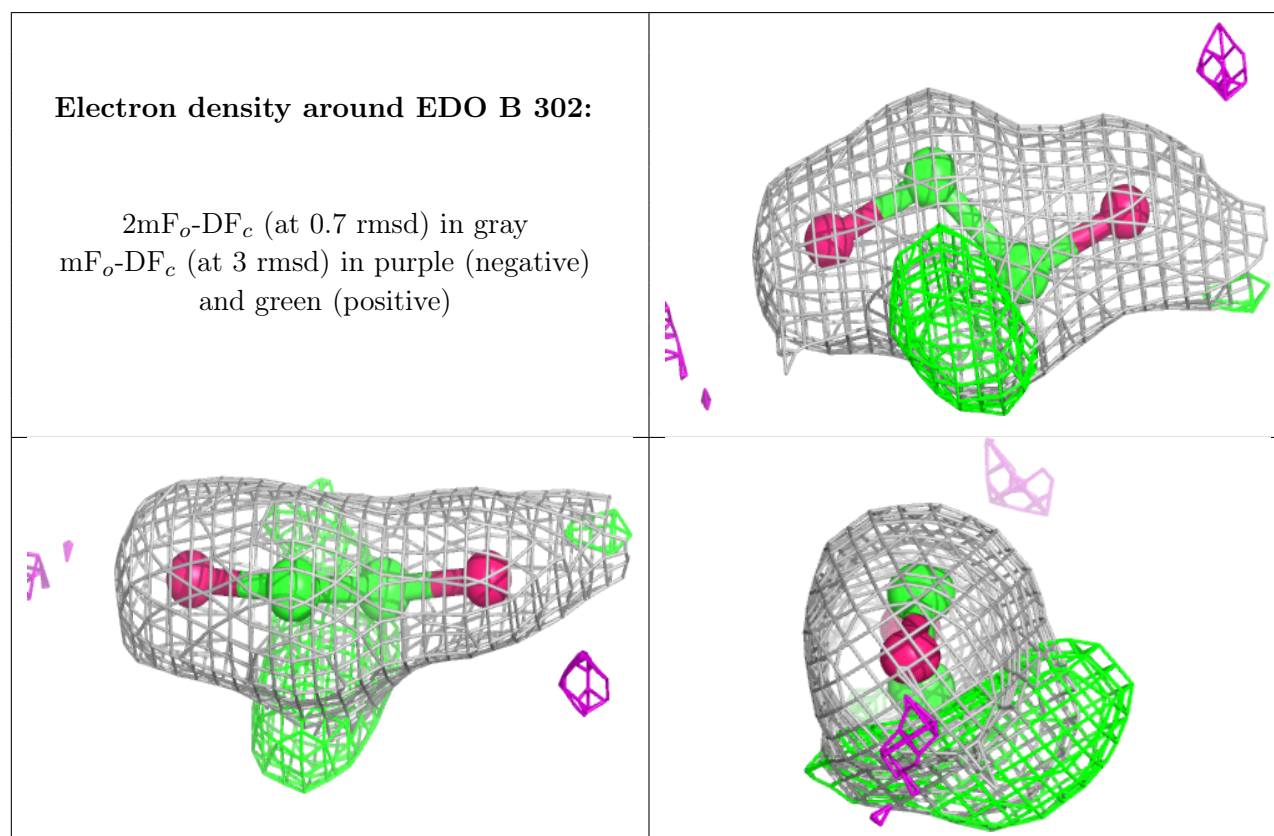
Electron density around EDO B 303:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
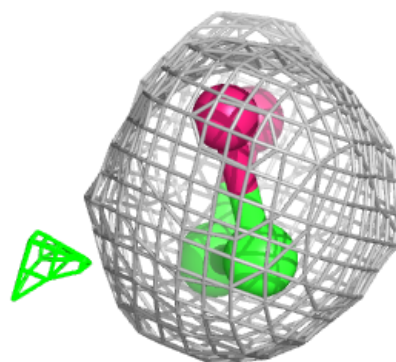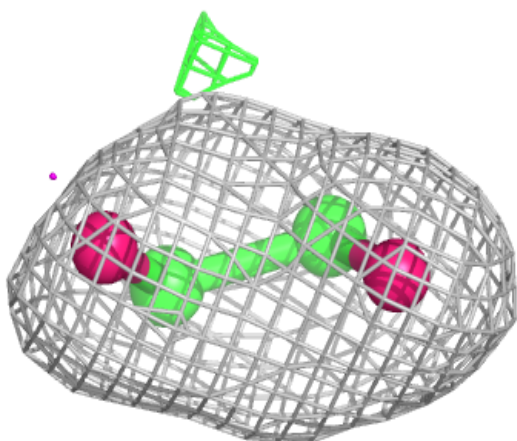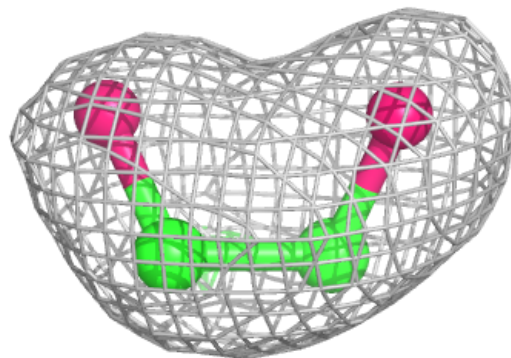
Electron density around EDO B 304:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
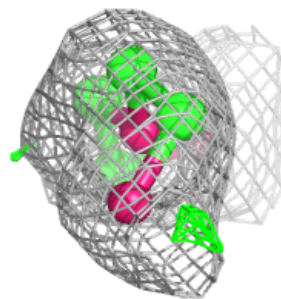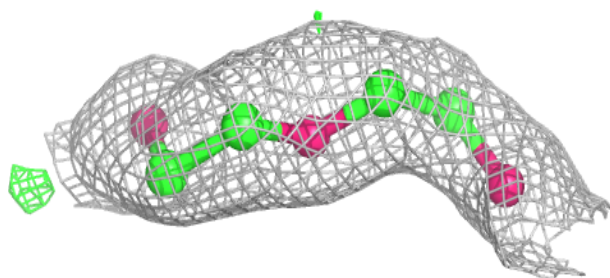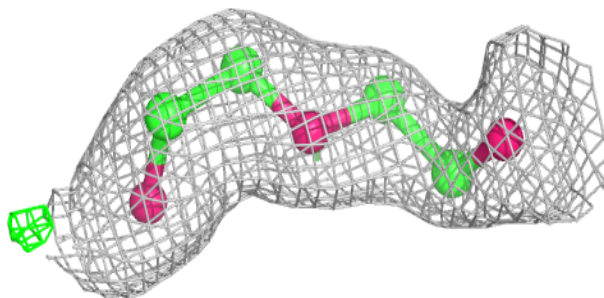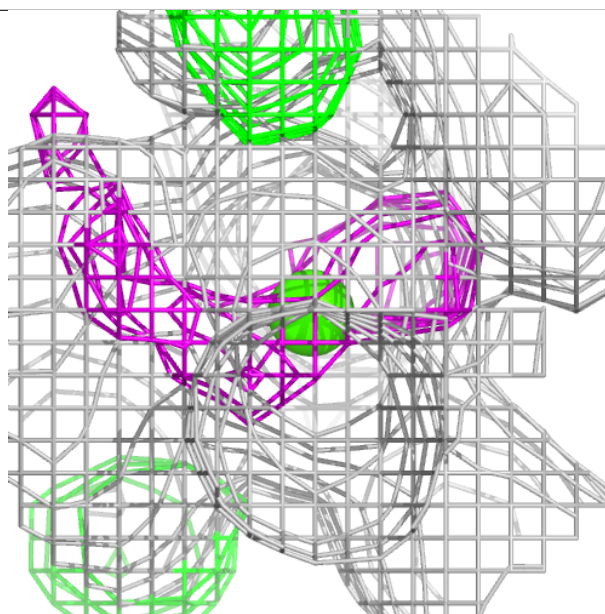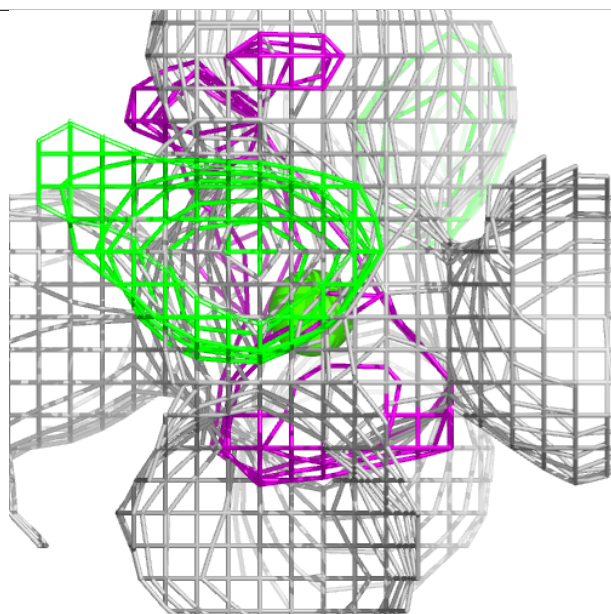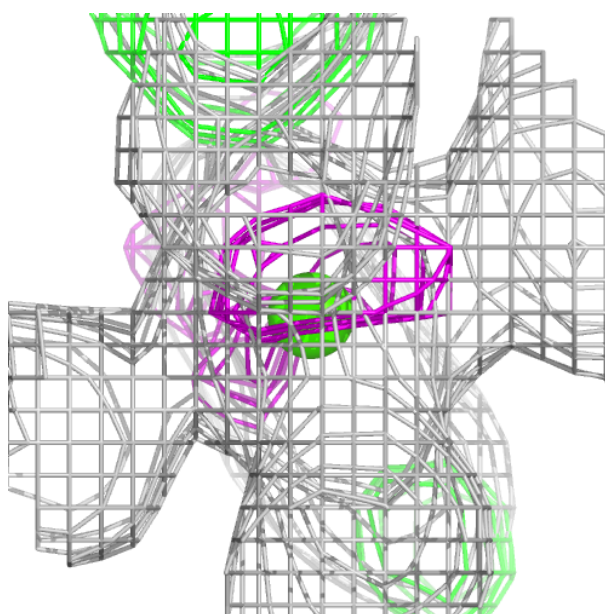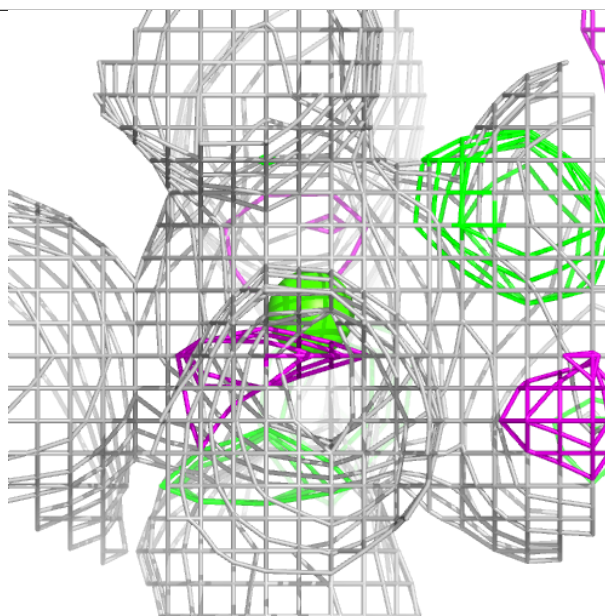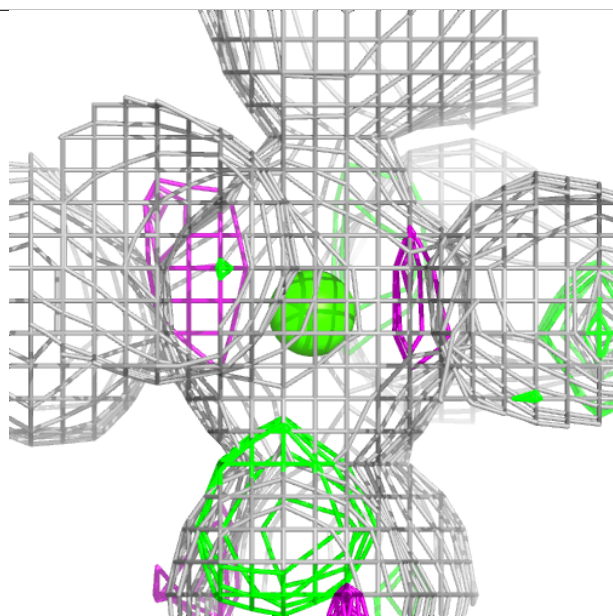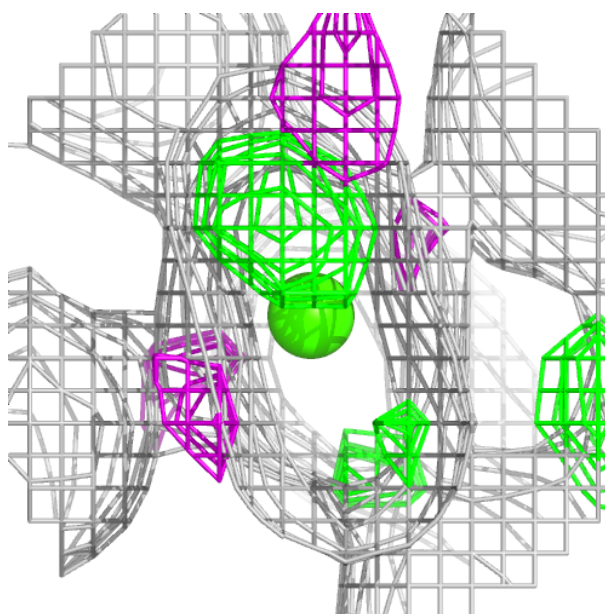and green (positive)
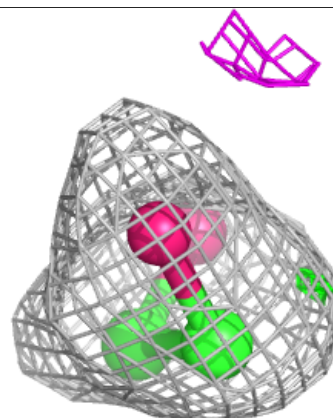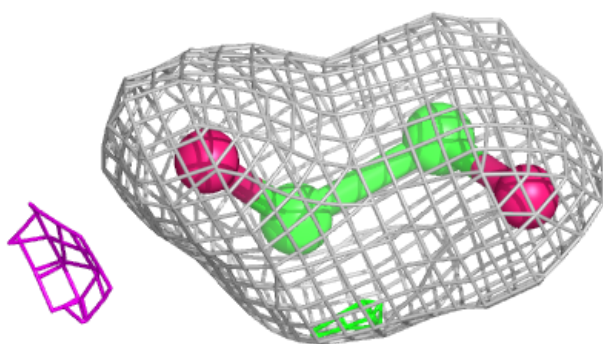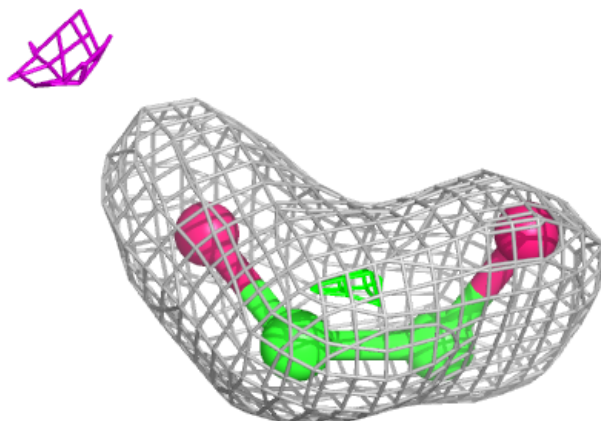
Electron density around PEG B 305:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
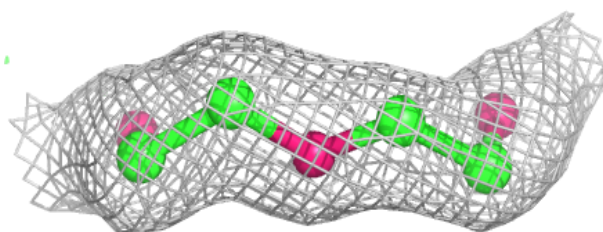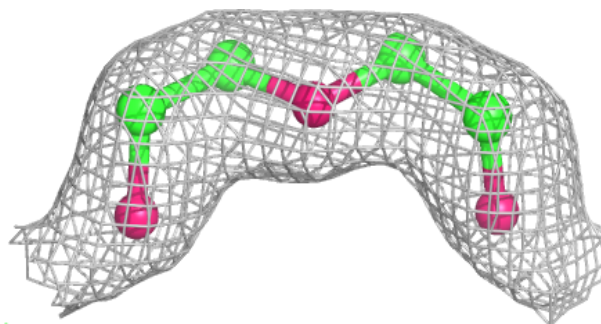
Electron density around PEG A 302:

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

Electron density around CA B 301:

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

Electron density around CA A 301:

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

6.5 Other polymers ⓘ

There are no such residues in this entry.