Full wwPDB X-ray Structure Validation Report (i)

Jun 24, 2024 – 01:48 PM EDT

PDB ID	:	6YN7
Title	:	Crystal Structure of AHE enzyme from Alicyclobacillus herbarius
Authors	:	Gourlay, L.J.; Di Pisa, F.
Deposited on	:	2020-04-11
Resolution	:	1.98 Å(reported)

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

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the (i) symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

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

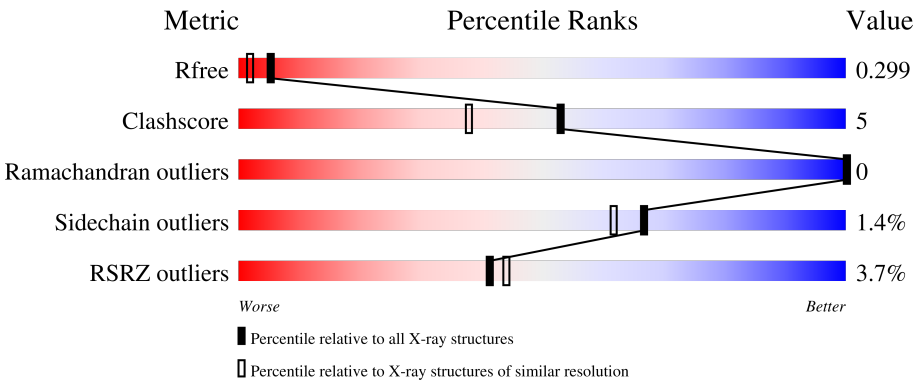
MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.20.1
EDS	:	2.37.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.37.1

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 1.98 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	11647 (2.00-1.96)
Clashscore	141614	1014 (1.98-1.98)
Ramachandran outliers	138981	1006 (1.98-1.98)
Sidechain outliers	138945	1006 (1.98-1.98)
RSRZ outliers	127900	11410 (2.00-1.96)

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	452	2% 83% 15% •
1	B	452	% 87% 12% ••
1	C	452	8% 86% 11% •
1	D	452	4% 83% 14% • •

2 Entry composition (i)

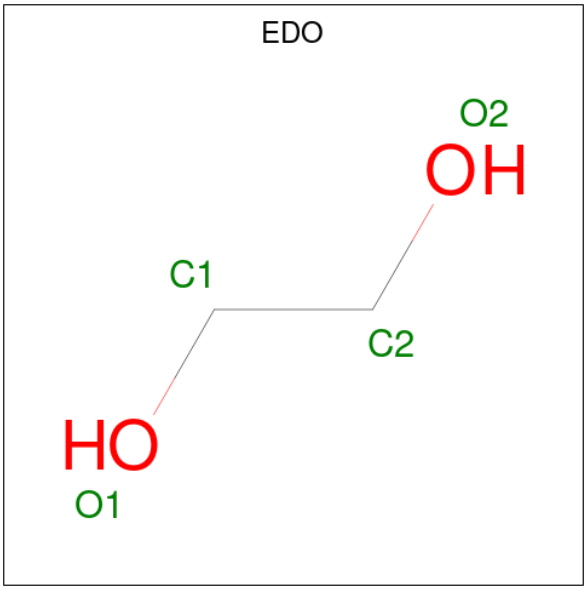
There are 6 unique types of molecules in this entry. The entry contains 14649 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 AHE, beta-glucosidase enzyme.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	447	3557	2285	621	644	7	0	1	0
1	B	447	3597	2307	635	648	7	0	0	0
1	C	440	3515	2258	617	633	7	0	0	0
1	D	440	3574	2289	627	650	8	0	2	0

- Molecule 2 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: $C_2H_6O_2$) (labeled as "Ligand of Interest" by depositor).



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

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

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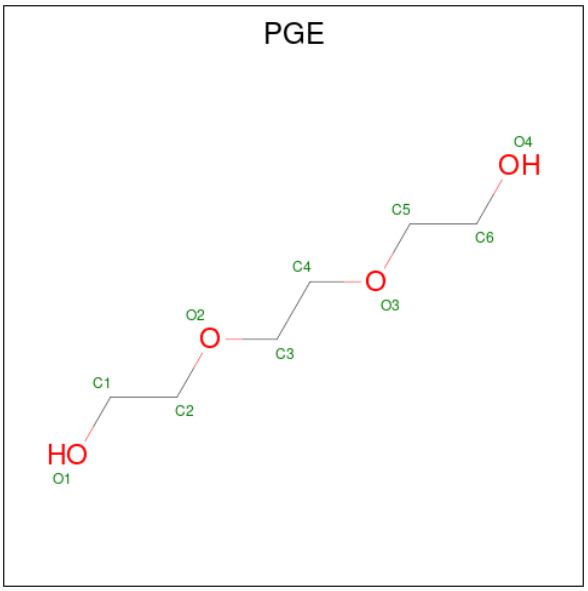
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
2	D	1	4	2	2	0	0
			Total	C	O		
2	D	1	4	2	2	0	0
			Total	C	O		
2	D	1	4	2	2	0	0

- Molecule 3 is NICKEL (II) ION (three-letter code: NI) (formula: Ni) (labeled as "Ligand of Interest" by depositor).

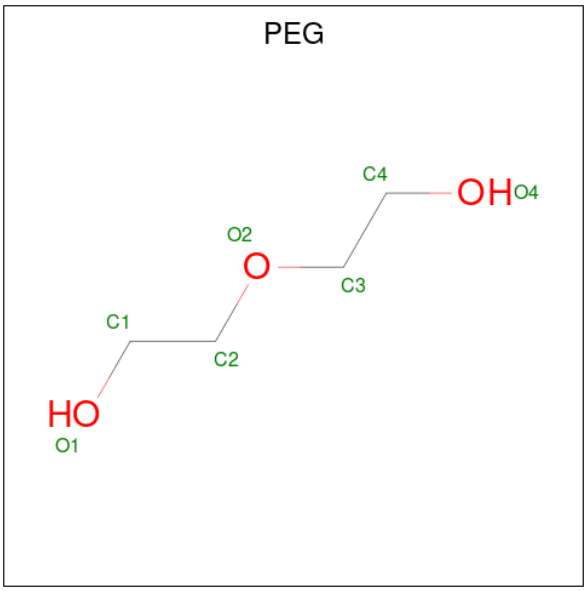
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Ni		
3	A	1	1	1	0	0
			Total	Ni		
3	B	1	1	1	0	0

- Molecule 4 is TRIETHYLENE GLYCOL (three-letter code: PGE) (formula: $C_6H_{14}O_4$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
4	A	1	10	6	4	0	0
			Total	C	O		
4	B	1	10	6	4	0	0

- Molecule 5 is DI(HYDROXYETHYL)ETHER (three-letter code: PEG) (formula: $C_4H_{10}O_3$) (labeled as "Ligand of Interest" by depositor).



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

- Molecule 6 is water.

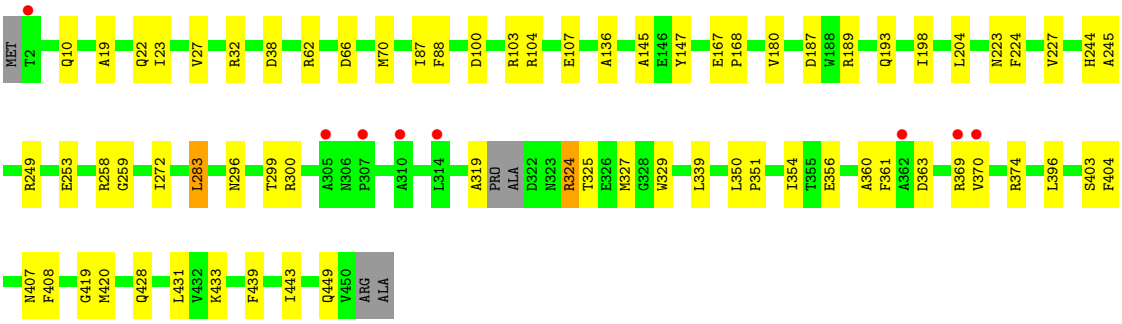
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
6	A	76	76	76	0	0
			Total	O		
6	B	62	62	62	0	0
			Total	O		
6	C	54	54	54	0	0
			Total	O		
6	D	81	81	81	0	0

3 Residue-property plots (i)

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

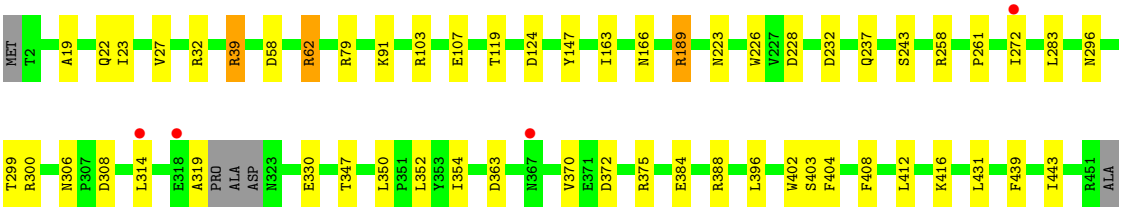
• Molecule 1: AHE, beta-glucosidase enzyme

Chain A:



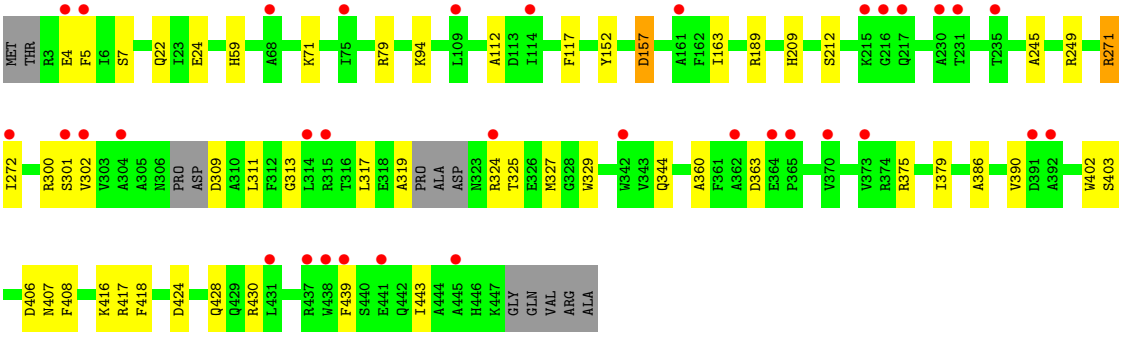
• Molecule 1: AHE, beta-glucosidase enzyme

Chain B:



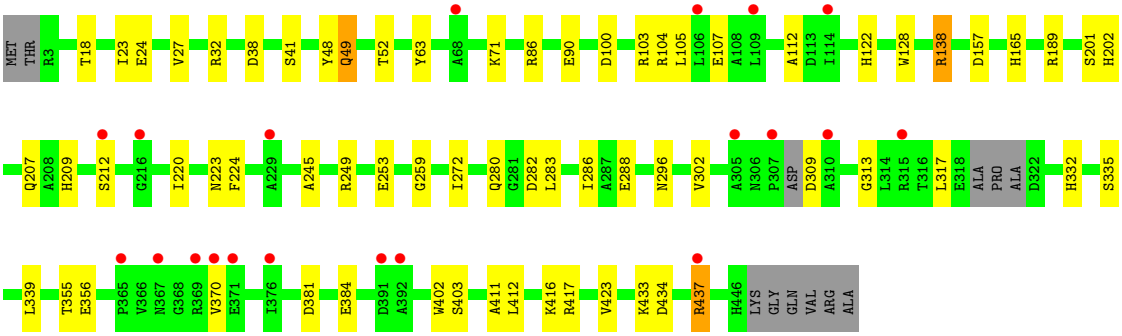
• Molecule 1: AHE, beta-glucosidase enzyme

Chain C:



• Molecule 1: AHE, beta-glucosidase enzyme

Chain D:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	100.05Å 93.35Å 106.38Å 90.00° 98.69° 90.00°	Depositor
Resolution (Å)	98.90 – 1.98 98.90 – 1.98	Depositor EDS
% Data completeness (in resolution range)	93.5 (98.90-1.98) 43.3 (98.90-1.98)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.41 (at 1.98Å)	Xtriage
Refinement program	PHENIX 1.13_2998	Depositor
R, R_{free}	0.247 , 0.298 0.247 , 0.299	Depositor DCC
R_{free} test set	1993 reflections (3.40%)	wwPDB-VP
Wilson B-factor (Å^2)	23.9	Xtriage
Anisotropy	0.178	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.33 , 28.3	EDS
L-test for twinning[2]	$< \|L\| > = 0.47$, $< L^2 > = 0.30$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.92	EDS
Total number of atoms	14649	wwPDB-VP
Average B, all atoms (Å^2)	26.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 62.71 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 1.0810e-05. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

[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: NI, PGE, PEG, EDO

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	0.24	0/3673	0.41	0/5000
1	B	0.25	0/3710	0.41	0/5042
1	C	0.24	0/3626	0.41	0/4930
1	D	0.25	0/3689	0.41	0/5013
All	All	0.25	0/14698	0.41	0/19985

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	3557	0	3274	45	0
1	B	3597	0	3351	35	0
1	C	3515	0	3244	29	0
1	D	3574	0	3315	41	0
2	A	32	0	48	3	0
2	B	12	0	18	0	0
2	C	20	0	30	0	0
2	D	40	0	60	1	0
3	A	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	1	0	0	0	0
4	A	10	0	14	3	0
4	B	10	0	14	0	0
5	B	7	0	10	3	0
6	A	76	0	0	0	0
6	B	62	0	0	1	0
6	C	54	0	0	0	0
6	D	81	0	0	2	0
All	All	14649	0	13378	151	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 5.

All (151) 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:C:325:THR:HG22	1:C:327:MET:H	1.42	0.81
1:A:325:THR:HG23	1:A:327:MET:H	1.46	0.80
1:B:261:PRO:HA	5:B:506:PEG:H12	1.67	0.74
1:D:434:ASP:HA	1:D:437:ARG:HD3	1.70	0.72
1:A:369:ARG:HA	1:A:431:LEU:HD21	1.74	0.69
1:D:27:VAL:HG23	1:D:32:ARG:HH21	1.60	0.67
1:A:32:ARG:NH2	1:A:38:ASP:OD2	2.28	0.66
1:A:10:GLN:HA	2:A:501:EDO:H22	1.75	0.66
1:A:100:ASP:OD1	1:A:104:ARG:NH1	2.29	0.65
1:D:32:ARG:NH2	1:D:38:ASP:OD2	2.31	0.64
1:B:306:ASN:OD1	1:B:308:ASP:N	2.30	0.63
1:D:259:GLY:HA2	1:D:283:LEU:HD22	1.80	0.63
1:D:18:THR:HB	1:D:23:ILE:HG21	1.81	0.62
1:B:232:ASP:HA	1:B:237:GLN:HE22	1.65	0.61
1:C:406:ASP:OD2	1:C:417:ARG:NH1	2.33	0.61
1:D:245:ALA:HA	1:D:249:ARG:HB2	1.85	0.58
1:D:417:ARG:NH1	1:D:423:VAL:O	2.37	0.57
1:A:258:ARG:HD3	2:A:507:EDO:H11	1.87	0.57
1:C:327:MET:SD	1:C:416:LYS:HG2	2.43	0.57
1:D:302:VAL:HG23	1:D:317:LEU:HB2	1.87	0.57
1:A:319:ALA:HB3	1:A:324:ARG:HD2	1.87	0.57
1:A:361:PHE:CZ	1:A:374:ARG:HG2	2.39	0.57
1:B:354:ILE:HG13	1:B:396:LEU:HD11	1.85	0.57
1:A:180:VAL:HG11	4:A:510:PGE:H1	1.88	0.56
1:C:319:ALA:HB3	1:C:324:ARG:HD2	1.87	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:428:GLN:NE2	1:C:430:ARG:HH12	2.04	0.55
1:B:243:SER:HB2	1:B:314:LEU:HD13	1.90	0.54
1:A:245:ALA:HA	1:A:249:ARG:HB2	1.89	0.54
1:C:245:ALA:HA	1:C:249:ARG:HB2	1.89	0.53
1:A:449:GLN:HB3	2:A:501:EDO:H11	1.91	0.53
1:C:325:THR:HG23	1:C:360:ALA:H	1.73	0.53
1:C:71:LYS:HB2	1:C:112:ALA:HB1	1.91	0.52
1:D:71:LYS:HB2	1:D:112:ALA:HB1	1.91	0.52
1:C:79:ARG:HE	1:C:163:ILE:HD13	1.75	0.52
1:C:24:GLU:HA	1:C:59:HIS:HB3	1.92	0.52
4:A:510:PGE:H2	4:A:510:PGE:H52	1.90	0.52
1:A:259:GLY:HA2	1:A:283:LEU:HD11	1.93	0.51
1:B:258:ARG:HH11	5:B:506:PEG:H41	1.75	0.51
1:D:41:SER:HB3	1:D:52:THR:HG22	1.93	0.51
1:D:282:ASP:O	1:D:286:ILE:HG13	2.11	0.51
1:B:79:ARG:NH2	1:B:166:ASN:OD1	2.38	0.50
1:D:103:ARG:O	1:D:107:GLU:HG3	2.10	0.50
1:D:412:LEU:HD13	1:D:416:LYS:HE3	1.92	0.50
1:A:325:THR:HG22	1:A:329:TRP:H	1.77	0.50
1:A:361:PHE:CE1	1:A:374:ARG:CZ	2.95	0.50
1:A:187:ASP:OD2	1:B:39:ARG:NE	2.41	0.49
1:B:258:ARG:HD3	5:B:506:PEG:H41	1.93	0.49
1:C:189:ARG:HH11	1:C:272:ILE:HG22	1.77	0.49
1:C:302:VAL:HG23	1:C:317:LEU:HD13	1.94	0.49
1:A:145:ALA:HB2	1:A:204:LEU:HB3	1.92	0.49
1:D:223:ASN:HA	1:D:296:ASN:HB2	1.94	0.49
1:D:381:ASP:O	1:D:384:GLU:HG2	2.12	0.49
1:A:223:ASN:HA	1:A:296:ASN:HB2	1.94	0.49
1:A:168:PRO:HB3	1:A:198:ILE:HG21	1.95	0.48
1:B:27:VAL:HB	1:B:32:ARG:NH1	2.29	0.48
1:B:372:ASP:OD2	1:B:375:ARG:NH1	2.43	0.48
1:A:363:ASP:HB3	1:A:370:VAL:HG11	1.94	0.48
1:B:319:ALA:CB	1:B:330:GLU:HB2	2.43	0.48
1:C:424:ASP:O	1:C:428:GLN:N	2.44	0.48
1:A:22:GLN:NE2	1:A:407:ASN:OD1	2.47	0.48
1:C:79:ARG:HA	1:C:117:PHE:O	2.14	0.48
1:B:402:TRP:HA	1:B:403:SER:HA	1.53	0.48
1:C:439:PHE:O	1:C:443:ILE:HG12	2.13	0.48
1:D:370:VAL:HG12	1:D:433:LYS:HA	1.95	0.48
1:A:249:ARG:NE	1:A:253:GLU:OE2	2.44	0.48
1:D:309:ASP:HB3	1:D:313:GLY:HA2	1.95	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:232:ASP:CA	1:B:237:GLN:HE22	2.27	0.47
1:D:23:ILE:HG13	1:D:24:GLU:N	2.28	0.47
1:D:209:HIS:HA	1:D:212:SER:HB3	1.96	0.47
1:C:327:MET:HE2	1:C:329:TRP:CZ2	2.49	0.47
1:A:439:PHE:O	1:A:443:ILE:HG12	2.14	0.47
1:B:439:PHE:O	1:B:443:ILE:HG12	2.15	0.47
1:B:363:ASP:HB3	1:B:370:VAL:HG11	1.96	0.47
1:C:375:ARG:O	1:C:379:ILE:HG12	2.15	0.47
1:B:412:LEU:HD13	1:B:416:LYS:HE3	1.97	0.46
1:C:22:GLN:NE2	1:C:408:PHE:O	2.29	0.46
1:A:27:VAL:HA	1:A:32:ARG:HE	1.80	0.46
1:B:19:ALA:O	1:B:23:ILE:HG12	2.15	0.46
1:A:324:ARG:O	1:A:374:ARG:NH2	2.28	0.46
1:A:62:ARG:HH21	1:A:428:GLN:HG3	1.81	0.46
1:B:189:ARG:HB2	1:B:272:ILE:HG21	1.98	0.46
1:A:22:GLN:NE2	1:A:408:PHE:O	2.44	0.46
1:C:402:TRP:HA	1:C:403:SER:HA	1.55	0.46
1:A:167:GLU:HG2	1:A:223:ASN:HB3	1.98	0.45
1:D:122:HIS:NE2	6:D:604:HOH:O	2.34	0.45
1:D:48:TYR:CZ	1:D:49:GLN:HG3	2.52	0.45
1:D:332:HIS:CE1	1:D:335:SER:HG	2.34	0.45
1:A:189:ARG:HH11	1:A:272:ILE:HG22	1.82	0.45
1:C:22:GLN:O	1:C:407:ASN:HB2	2.17	0.45
1:D:411:ALA:HB3	2:D:510:EDO:H22	1.99	0.45
1:B:58:ASP:O	1:B:62:ARG:HG3	2.17	0.44
1:C:363:ASP:OD2	1:C:375:ARG:NH2	2.50	0.44
1:A:103:ARG:NE	1:A:107:GLU:OE1	2.46	0.44
1:B:226:TRP:NE1	1:B:228:ASP:OD1	2.49	0.44
1:B:299:THR:OG1	1:B:300:ARG:N	2.50	0.44
1:B:103:ARG:O	1:B:107:GLU:HG3	2.17	0.44
1:D:32:ARG:HG3	1:D:86:ARG:HG2	1.99	0.44
1:D:249:ARG:NE	1:D:253:GLU:OE2	2.48	0.44
1:A:420:MET:O	1:A:433:LYS:HG3	2.18	0.43
1:B:27:VAL:HA	1:B:32:ARG:HD3	2.00	0.43
1:B:403:SER:OG	1:B:404:PHE:N	2.50	0.43
1:C:309:ASP:HB3	1:C:313:GLY:HA2	2.00	0.43
1:D:71:LYS:NZ	6:D:603:HOH:O	2.33	0.43
1:D:224:PHE:HB2	1:D:339:LEU:HD21	2.00	0.43
1:B:319:ALA:HB1	1:B:330:GLU:HB2	2.00	0.43
1:B:370:VAL:HG23	1:B:431:LEU:HD23	2.01	0.43
1:A:19:ALA:O	1:A:23:ILE:HG12	2.18	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:202:HIS:CE1	1:D:220:ILE:HB	2.54	0.43
1:A:350:LEU:HD12	1:A:351:PRO:HD2	1.99	0.43
1:A:296:ASN:CG	1:A:356:GLU:HB2	2.39	0.43
1:A:100:ASP:O	1:A:104:ARG:HG3	2.19	0.42
1:D:165:HIS:NE2	1:D:201:SER:OG	2.50	0.42
1:A:66:ASP:O	1:A:70:MET:HG3	2.19	0.42
1:A:224:PHE:HB2	1:A:339:LEU:HD21	2.02	0.42
1:A:325:THR:OG1	1:A:360:ALA:O	2.37	0.42
1:D:90:GLU:HA	1:D:128:TRP:CD1	2.54	0.42
1:D:402:TRP:HA	1:D:403:SER:HA	1.52	0.42
1:A:299:THR:OG1	1:A:300:ARG:N	2.52	0.42
1:C:152:TYR:HB3	1:C:212:SER:HB2	2.01	0.42
1:B:347:THR:HG21	1:B:352:LEU:HD21	2.01	0.42
1:C:271:ARG:HD3	1:C:311:LEU:O	2.20	0.42
1:C:360:ALA:HB2	1:C:418:PHE:CE1	2.54	0.42
1:C:386:ALA:O	1:C:390:VAL:HG23	2.19	0.42
1:B:189:ARG:HH11	1:B:272:ILE:HG22	1.85	0.42
1:C:209:HIS:HA	1:C:212:SER:HB3	2.01	0.42
1:D:207:GLN:HG3	1:D:288:GLU:HG3	2.01	0.42
1:B:223:ASN:HA	1:B:296:ASN:HB2	2.01	0.42
1:A:403:SER:OG	1:A:404:PHE:N	2.52	0.41
1:B:22:GLN:NE2	1:B:408:PHE:O	2.39	0.41
1:D:370:VAL:HG11	1:D:433:LYS:HG2	2.02	0.41
1:A:325:THR:HG23	1:A:327:MET:N	2.26	0.41
1:D:27:VAL:HG23	1:D:32:ARG:HE	1.85	0.41
1:D:280:GLN:H	1:D:280:GLN:HG2	1.62	0.41
1:B:350:LEU:O	6:B:601:HOH:O	2.22	0.41
1:B:124:ASP:N	1:B:124:ASP:OD1	2.48	0.41
1:D:63:TYR:HB2	1:D:105:LEU:HD13	2.03	0.41
1:A:419:GLY:O	1:A:433:LYS:NZ	2.40	0.41
4:A:510:PGE:H2	4:A:510:PGE:H4	1.81	0.41
1:C:157:ASP:OD2	1:C:157:ASP:N	2.54	0.41
1:D:138:ARG:NH2	1:D:282:ASP:OD2	2.54	0.41
1:D:189:ARG:HB2	1:D:272:ILE:HG21	2.03	0.41
1:D:296:ASN:OD1	1:D:355:THR:OG1	2.28	0.41
1:B:119:THR:HA	1:B:163:ILE:O	2.21	0.41
1:A:136:ALA:O	1:A:193:GLN:NE2	2.54	0.40
1:B:384:GLU:O	1:B:388:ARG:HG3	2.21	0.40
1:D:100:ASP:O	1:D:104[A]:ARG:HG3	2.21	0.40
1:A:227:VAL:HG21	1:A:244:HIS:HB2	2.04	0.40
1:C:4:GLU:HG3	1:C:5:PHE:O	2.21	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:296:ASN:CG	1:D:356:GLU:HB2	2.42	0.40
1:A:354:ILE:HG13	1:A:396:LEU:HD11	2.04	0.40
1:A:87:ILE:HG22	1:A:88:PHE:CD2	2.56	0.40

There are no symmetry-related clashes.

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	444/452 (98%)	428 (96%)	16 (4%)	0	100	100
1	B	443/452 (98%)	425 (96%)	18 (4%)	0	100	100
1	C	434/452 (96%)	418 (96%)	16 (4%)	0	100	100
1	D	436/452 (96%)	417 (96%)	19 (4%)	0	100	100
All	All	1757/1808 (97%)	1688 (96%)	69 (4%)	0	100	100

There are no Ramachandran outliers to report.

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	344/364 (94%)	341 (99%)	3 (1%)	78	77
1	B	353/364 (97%)	347 (98%)	6 (2%)	60	53

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	C	340/364 (93%)	333 (98%)	7 (2%)	53	47
1	D	354/364 (97%)	350 (99%)	4 (1%)	73	70
All	All	1391/1456 (96%)	1371 (99%)	20 (1%)	67	62

All (20) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	147	TYR
1	A	283	LEU
1	A	324	ARG
1	B	39	ARG
1	B	62	ARG
1	B	91	LYS
1	B	147	TYR
1	B	189	ARG
1	B	283	LEU
1	C	7	SER
1	C	94	LYS
1	C	157	ASP
1	C	271	ARG
1	C	300	ARG
1	C	301	SER
1	C	344	GLN
1	D	49	GLN
1	D	138	ARG
1	D	157	ASP
1	D	437	ARG

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

Mol	Chain	Res	Type
1	C	428	GLN

5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

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 31 ligands modelled in this entry, 2 are monoatomic - leaving 29 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	EDO	B	502	-	3,3,3	0.45	0	2,2,2	0.36	0
2	EDO	D	510	-	3,3,3	0.42	0	2,2,2	0.39	0
2	EDO	D	501	-	3,3,3	0.43	0	2,2,2	0.36	0
2	EDO	A	502	-	3,3,3	0.43	0	2,2,2	0.38	0
4	PGE	B	505	-	9,9,9	0.32	0	8,8,8	0.28	0
4	PGE	A	510	-	9,9,9	0.32	0	8,8,8	0.32	0
2	EDO	C	501	-	3,3,3	0.43	0	2,2,2	0.39	0
2	EDO	D	508	-	3,3,3	0.41	0	2,2,2	0.43	0
2	EDO	C	504	-	3,3,3	0.43	0	2,2,2	0.38	0
2	EDO	A	507	-	3,3,3	0.43	0	2,2,2	0.38	0
5	PEG	B	506	-	6,6,6	0.51	0	5,5,5	0.21	0
2	EDO	C	503	-	3,3,3	0.43	0	2,2,2	0.36	0
2	EDO	A	504	-	3,3,3	0.43	0	2,2,2	0.37	0
2	EDO	C	505	-	3,3,3	0.42	0	2,2,2	0.42	0
2	EDO	D	505	-	3,3,3	0.43	0	2,2,2	0.40	0
2	EDO	D	509	-	3,3,3	0.43	0	2,2,2	0.38	0
2	EDO	D	504	-	3,3,3	0.43	0	2,2,2	0.40	0
2	EDO	A	501	-	3,3,3	0.41	0	2,2,2	0.42	0
2	EDO	A	506	-	3,3,3	0.43	0	2,2,2	0.37	0
2	EDO	B	501	-	3,3,3	0.42	0	2,2,2	0.40	0
2	EDO	A	503	-	3,3,3	0.43	0	2,2,2	0.41	0
2	EDO	D	506	-	3,3,3	0.43	0	2,2,2	0.38	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
2	EDO	D	503	-	3,3,3	0.42	0	2,2,2	0.39	0
2	EDO	A	505	-	3,3,3	0.43	0	2,2,2	0.37	0
2	EDO	B	503	-	3,3,3	0.42	0	2,2,2	0.39	0
2	EDO	A	508	-	3,3,3	0.44	0	2,2,2	0.35	0
2	EDO	C	502	-	3,3,3	0.43	0	2,2,2	0.37	0
2	EDO	D	502	-	3,3,3	0.39	0	2,2,2	0.61	0
2	EDO	D	507	-	3,3,3	0.42	0	2,2,2	0.37	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	EDO	B	502	-	-	0/1/1/1	-
2	EDO	D	510	-	-	0/1/1/1	-
2	EDO	D	501	-	-	0/1/1/1	-
2	EDO	A	502	-	-	0/1/1/1	-
4	PGE	B	505	-	-	5/7/7/7	-
4	PGE	A	510	-	-	6/7/7/7	-
2	EDO	C	501	-	-	0/1/1/1	-
2	EDO	D	508	-	-	0/1/1/1	-
2	EDO	C	504	-	-	0/1/1/1	-
2	EDO	A	507	-	-	0/1/1/1	-
5	PEG	B	506	-	-	3/4/4/4	-
2	EDO	C	503	-	-	0/1/1/1	-
2	EDO	A	504	-	-	0/1/1/1	-
2	EDO	C	505	-	-	0/1/1/1	-
2	EDO	D	505	-	-	0/1/1/1	-
2	EDO	D	509	-	-	0/1/1/1	-
2	EDO	D	504	-	-	0/1/1/1	-
2	EDO	A	501	-	-	0/1/1/1	-
2	EDO	A	506	-	-	0/1/1/1	-
2	EDO	B	501	-	-	0/1/1/1	-
2	EDO	A	503	-	-	0/1/1/1	-
2	EDO	D	506	-	-	0/1/1/1	-
2	EDO	D	503	-	-	0/1/1/1	-
2	EDO	A	505	-	-	0/1/1/1	-
2	EDO	B	503	-	-	0/1/1/1	-
2	EDO	A	508	-	-	0/1/1/1	-
2	EDO	C	502	-	-	0/1/1/1	-
2	EDO	D	502	-	-	0/1/1/1	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	EDO	D	507	-	-	0/1/1/1	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (14) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	B	505	PGE	C4-C3-O2-C2
4	A	510	PGE	O2-C3-C4-O3
4	B	505	PGE	O2-C3-C4-O3
5	B	506	PEG	O1-C1-C2-O2
4	A	510	PGE	C4-C3-O2-C2
4	A	510	PGE	O1-C1-C2-O2
4	B	505	PGE	O3-C5-C6-O4
4	B	505	PGE	O1-C1-C2-O2
4	A	510	PGE	C6-C5-O3-C4
4	A	510	PGE	C1-C2-O2-C3
4	B	505	PGE	C3-C4-O3-C5
5	B	506	PEG	C4-C3-O2-C2
5	B	506	PEG	C1-C2-O2-C3
4	A	510	PGE	O3-C5-C6-O4

There are no ring outliers.

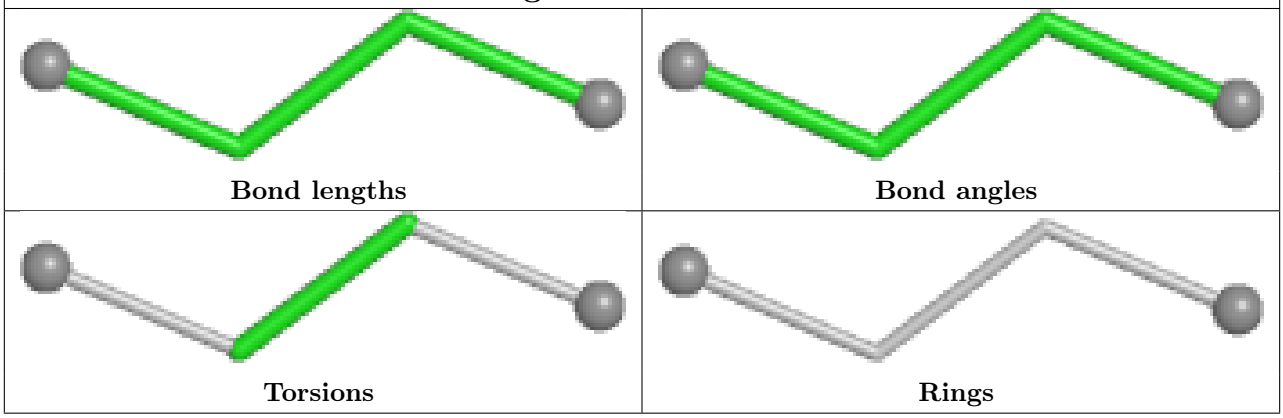
5 monomers are involved in 10 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	510	EDO	1	0
4	A	510	PGE	3	0
2	A	507	EDO	1	0
5	B	506	PEG	3	0
2	A	501	EDO	2	0

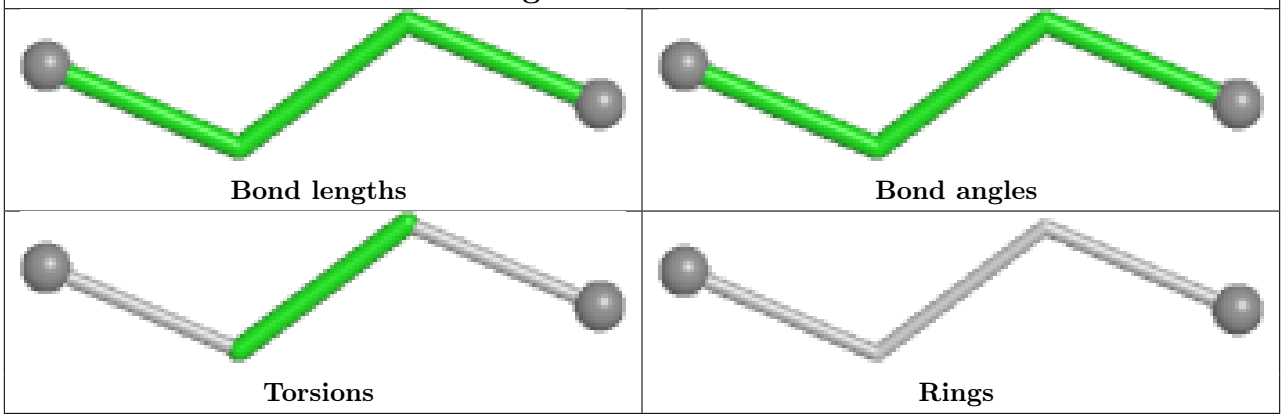
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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.

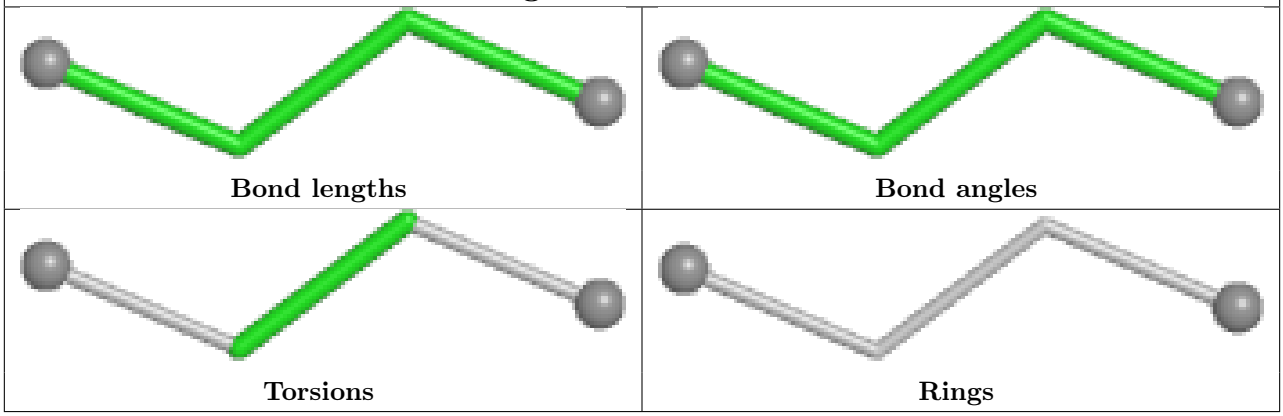
Ligand EDO B 502



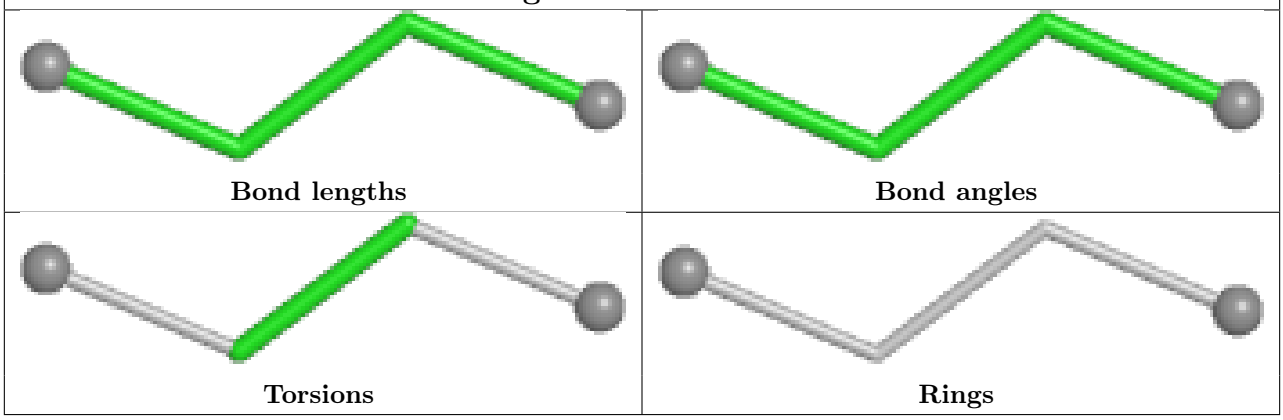
Ligand EDO D 510



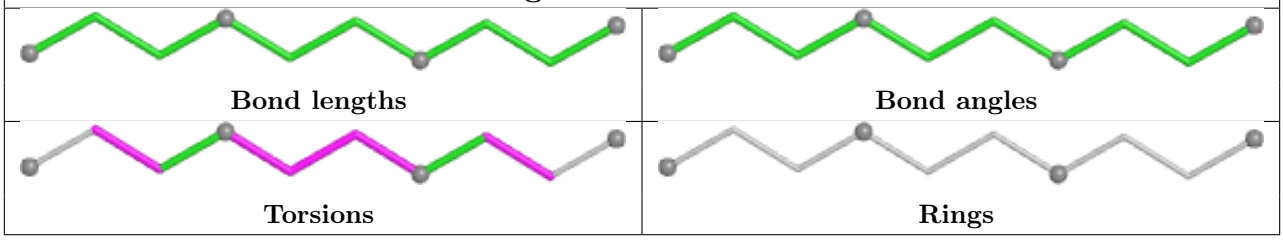
Ligand EDO D 501



Ligand EDO A 502



Ligand PGE B 505



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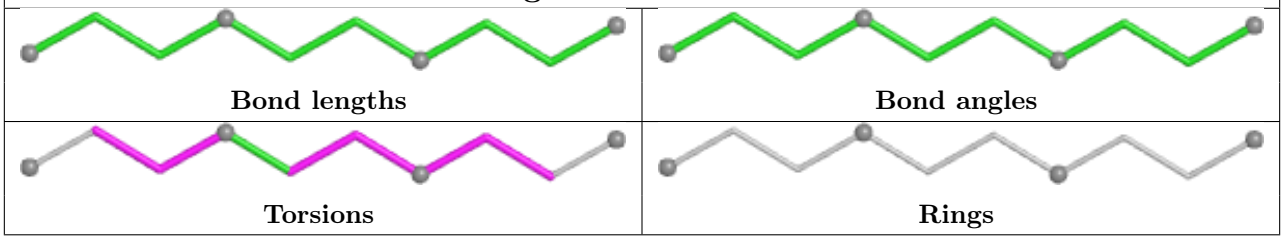

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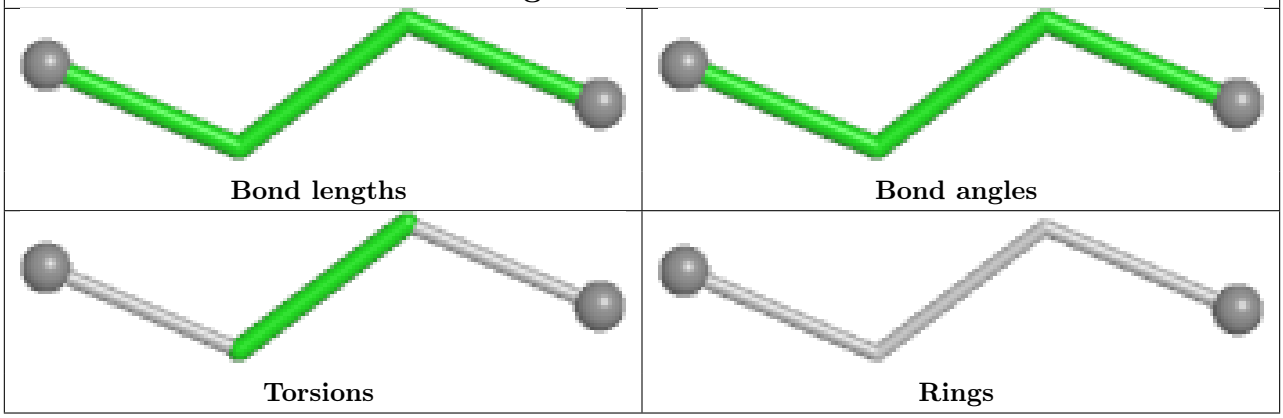

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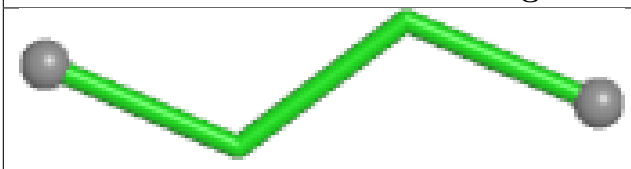
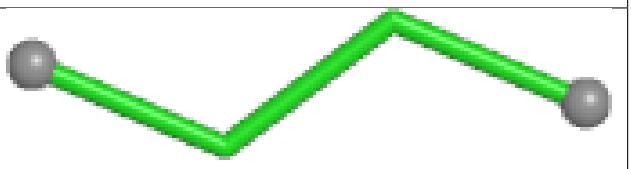
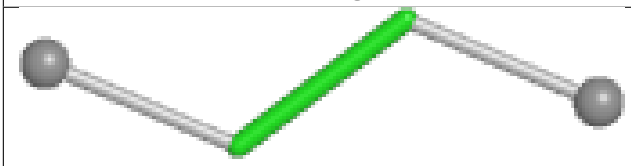
 Bond lengths	 Bond angles
 Torsions	Rings

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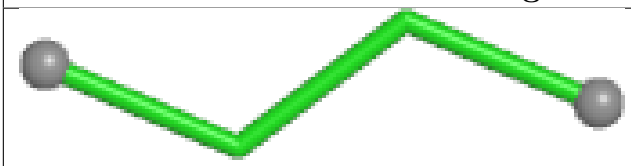
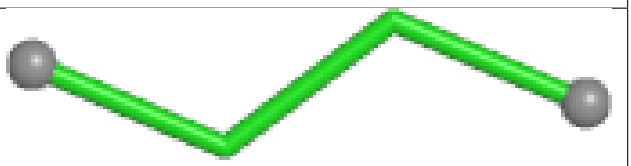
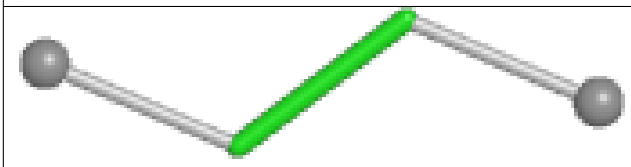
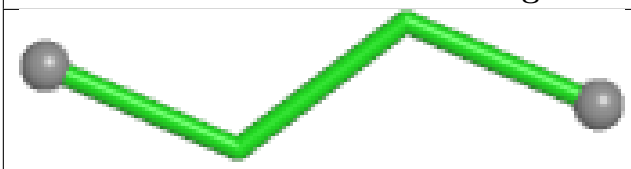
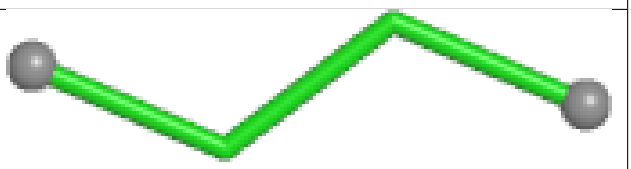
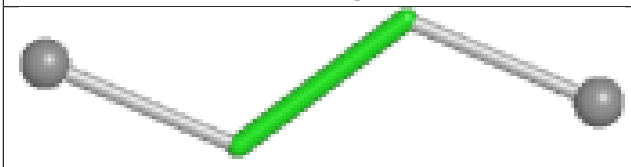
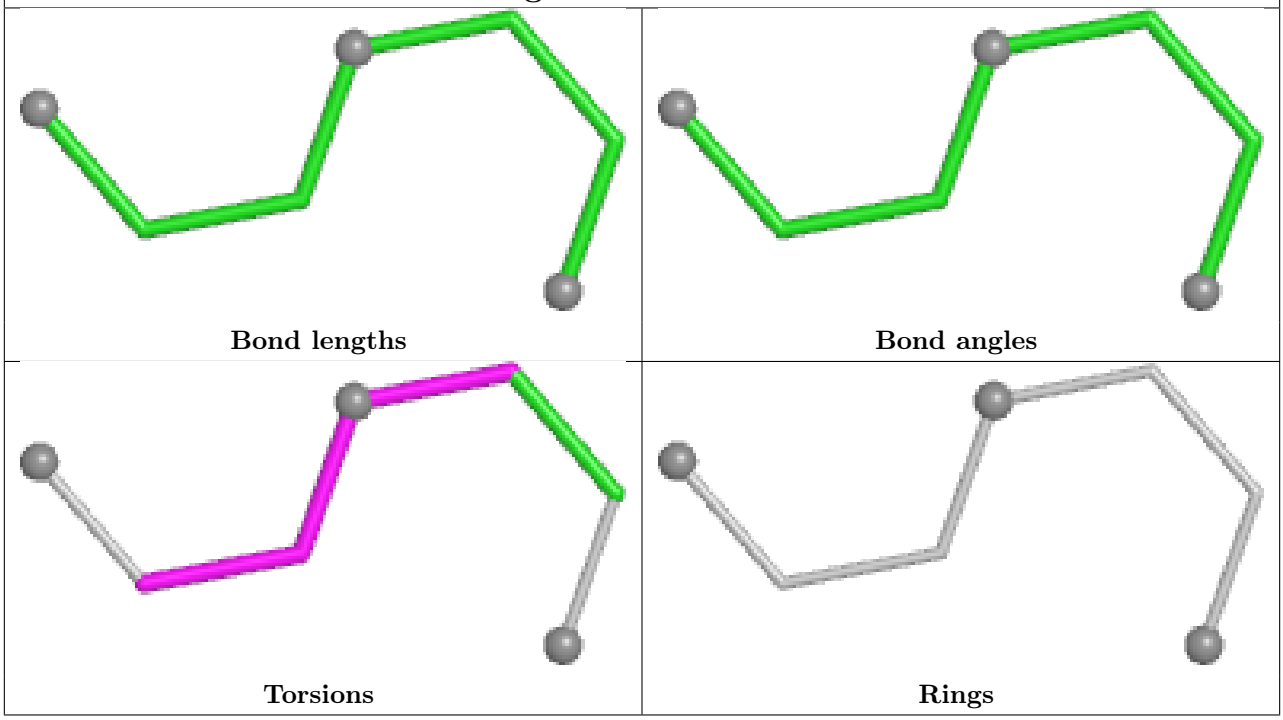
 Bond lengths	 Bond angles
 Torsions	Rings

Ligand EDO A 507	
 Bond lengths	 Bond angles
 Torsions	Rings

Ligand PEG B 506



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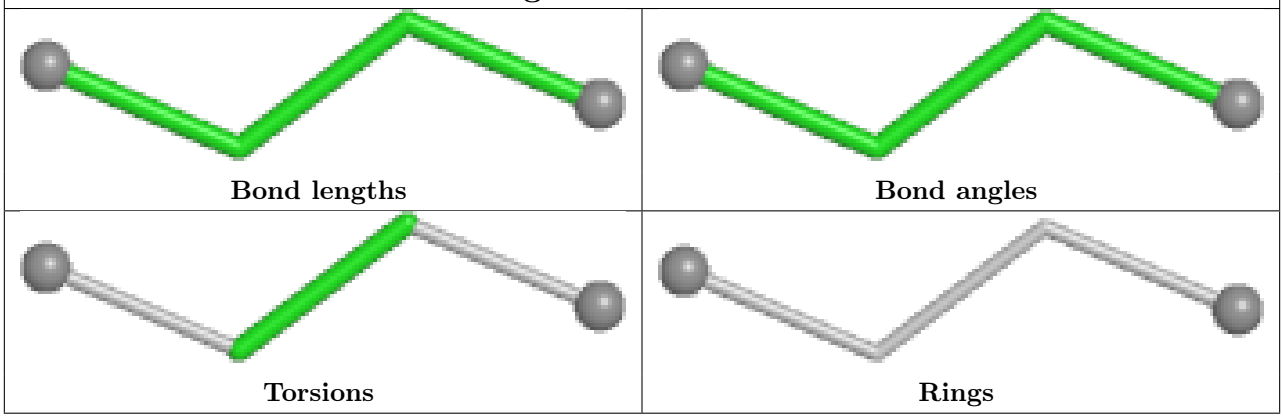
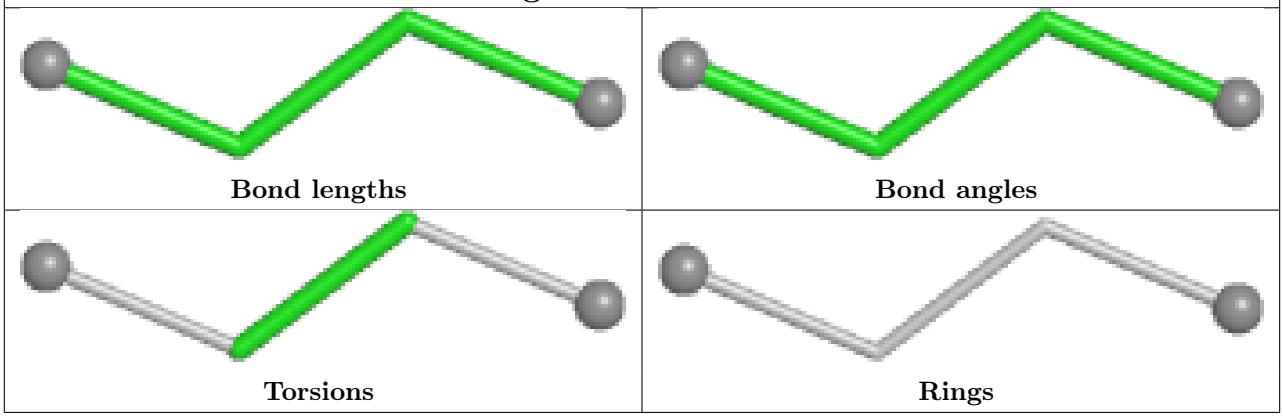


Ligand EDO A 504



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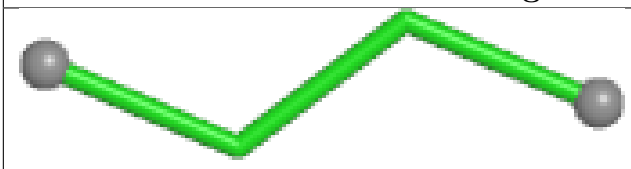
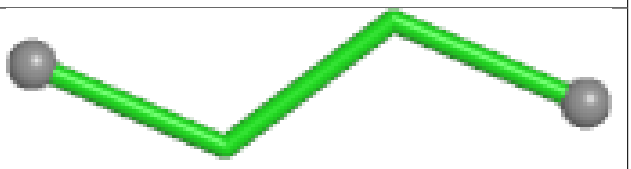
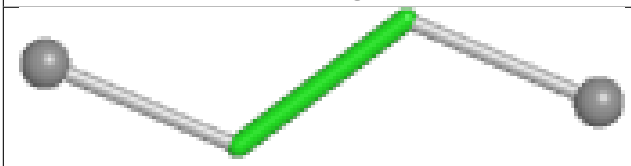
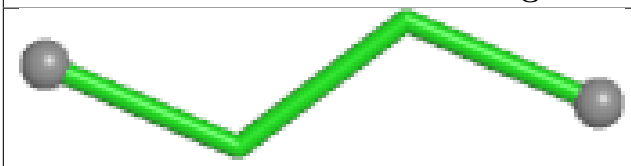
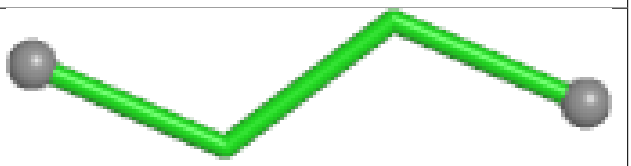
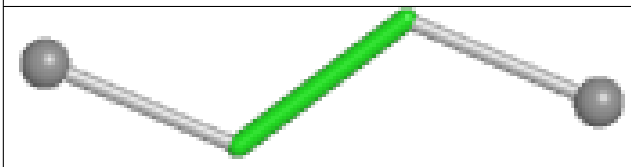
 Bond lengths	 Bond angles
 Torsions	Rings

Ligand EDO D 505	
 Bond lengths	 Bond angles
 Torsions	Rings

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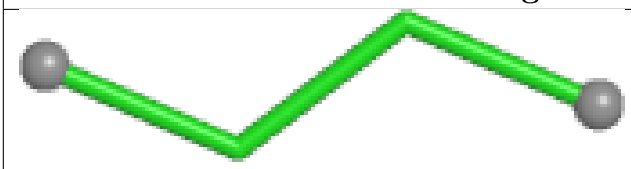
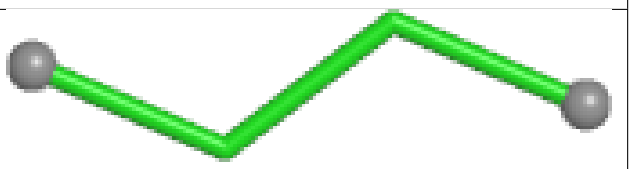
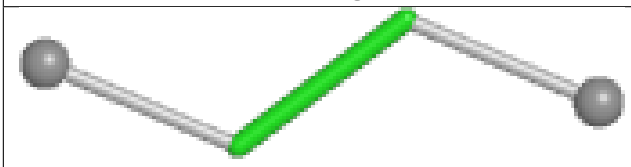
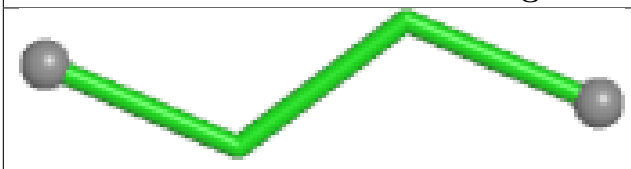
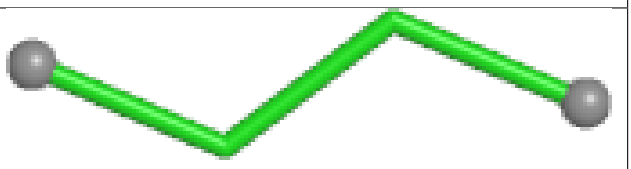
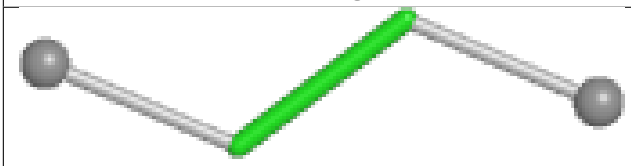
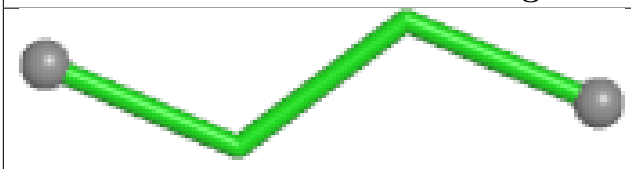
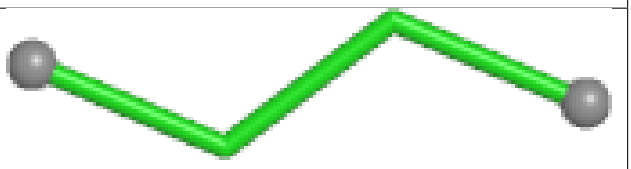
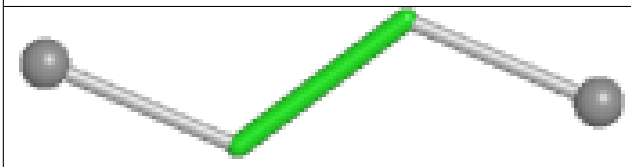
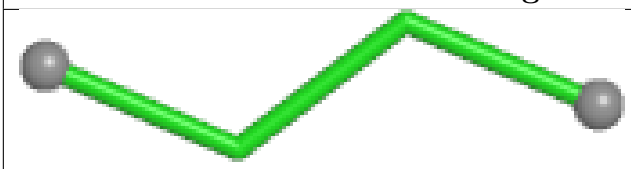
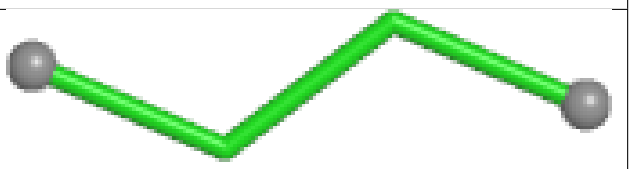
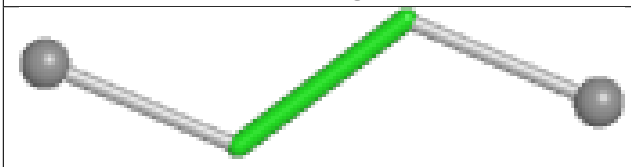
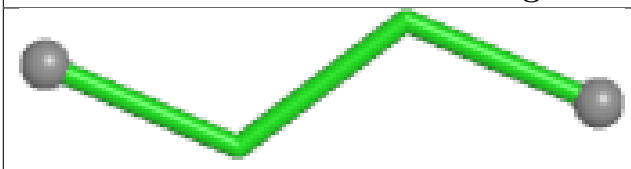
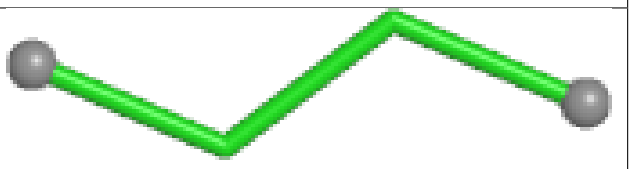
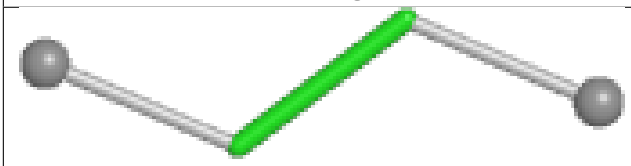
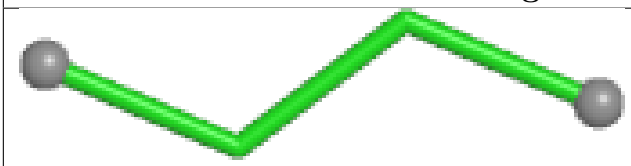
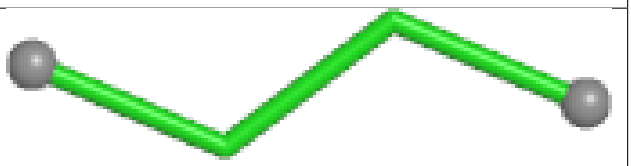
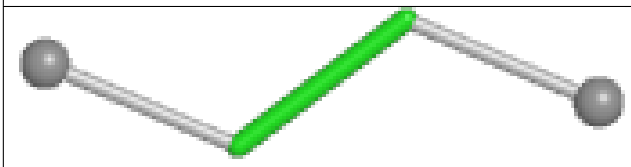
 Bond lengths	 Bond angles
 Torsions	Rings

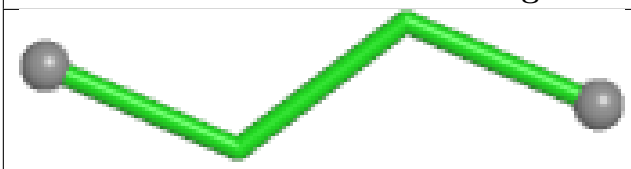
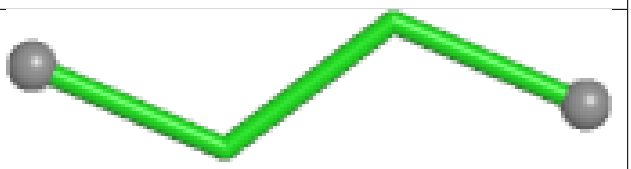
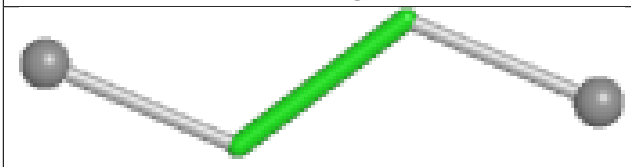
Ligand EDO D 504	
 Bond lengths	 Bond angles
 Torsions	Rings

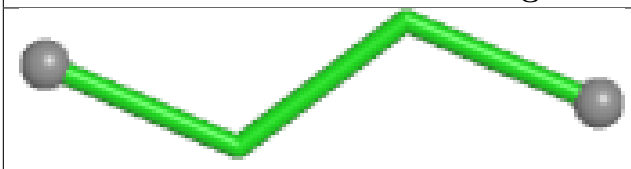
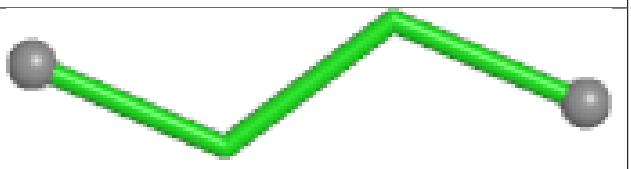
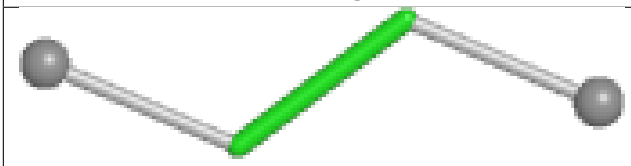
Ligand EDO A 501	
 Bond lengths	 Bond angles
 Torsions	Rings

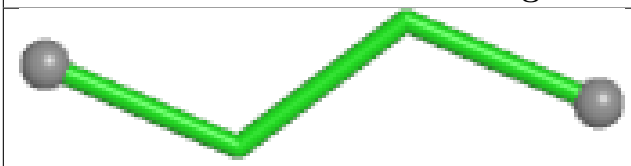
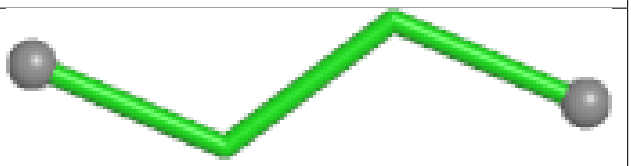
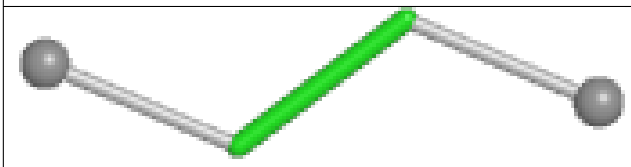
Ligand EDO A 506	
 Bond lengths	 Bond angles
 Torsions	Rings

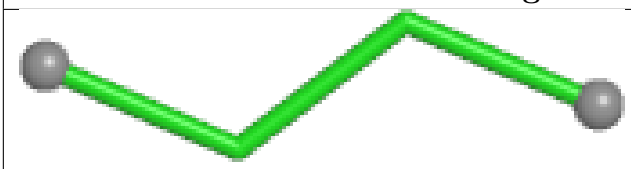
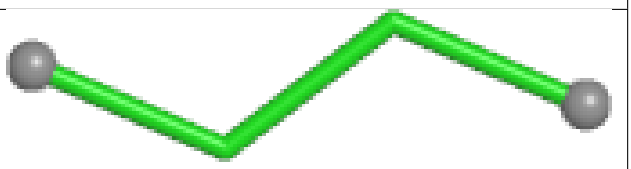
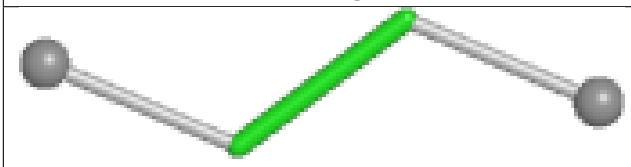
Ligand EDO B 501	
 Bond lengths	 Bond angles
 Torsions	Rings

Ligand EDO A 503	
 Bond lengths	 Bond angles
 Torsions	Rings

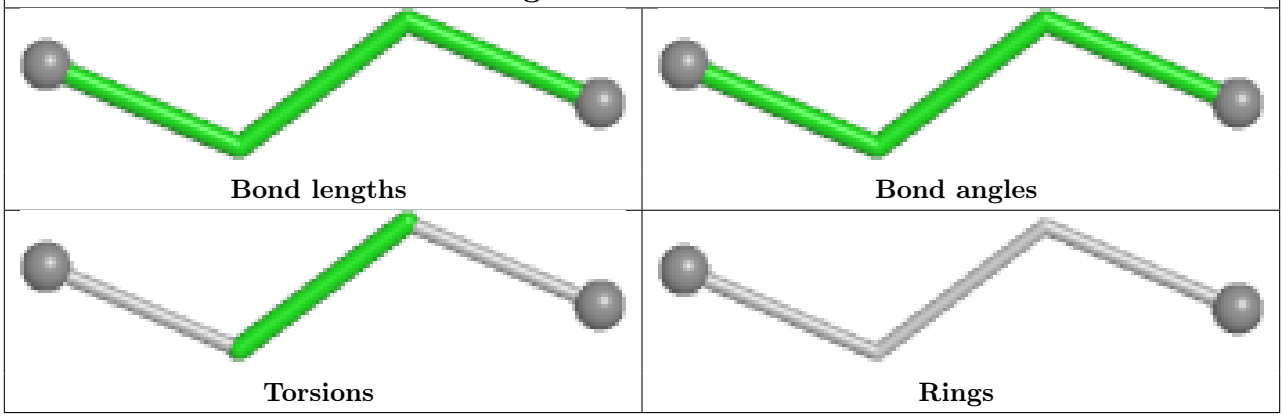
Ligand EDO D 506	
 Bond lengths	 Bond angles
 Torsions	Rings

Ligand EDO D 503	
 Bond lengths	 Bond angles
 Torsions	Rings

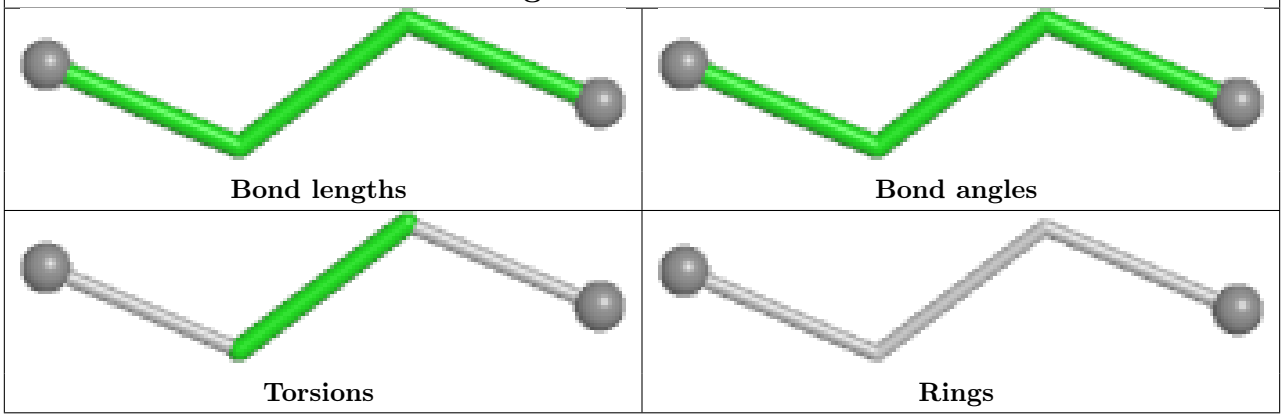
Ligand EDO A 505	
 Bond lengths	 Bond angles
 Torsions	Rings

Ligand EDO B 503	
 Bond lengths	 Bond angles
 Torsions	Rings

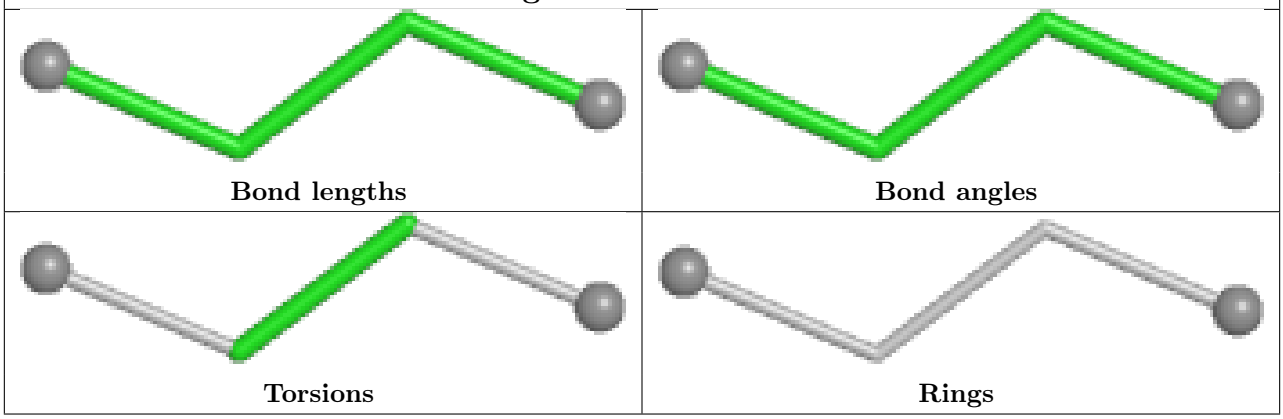
Ligand EDO A 508



Ligand EDO C 502



Ligand EDO D 502



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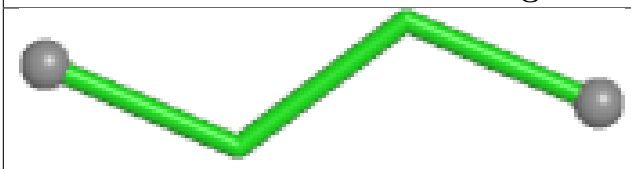
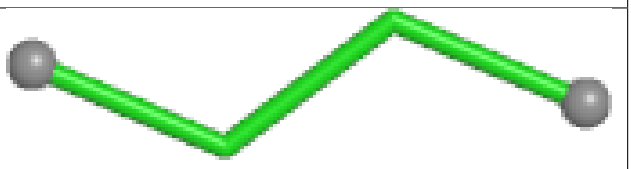
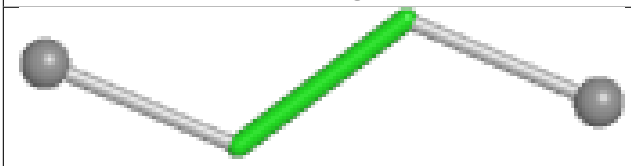
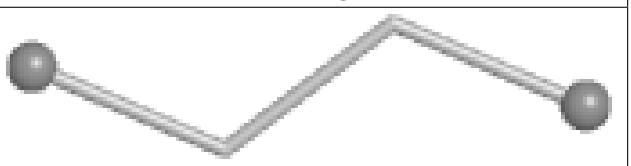
 Bond lengths	 Bond angles
 Torsions	 Rings

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 (i)

6.1 Protein, DNA and RNA chains (i)

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	447/452 (98%)	0.19	8 (1%)	68	69	12, 22, 41, 55	0
1	B	447/452 (98%)	0.23	4 (0%)	84	85	11, 21, 40, 58	0
1	C	440/452 (97%)	0.58	34 (7%)	13	15	13, 30, 50, 59	0
1	D	440/452 (97%)	0.47	20 (4%)	33	35	13, 27, 48, 65	0
All	All	1774/1808 (98%)	0.37	66 (3%)	41	44	11, 25, 46, 65	0

All (66) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	373	VAL	9.9
1	C	391	ASP	4.9
1	C	365	PRO	4.2
1	C	370	VAL	4.0
1	C	75	ILE	3.9
1	D	305	ALA	3.8
1	D	392	ALA	3.7
1	C	231	THR	3.4
1	C	302	VAL	3.3
1	D	367	ASN	3.3
1	D	310	ALA	3.3
1	C	230	ALA	3.1
1	C	362	ALA	3.1
1	D	437	ARG	3.0
1	D	106	LEU	3.0
1	C	342	TRP	3.0
1	D	212	SER	3.0
1	D	114	ILE	2.9
1	A	310	ALA	2.9
1	C	314	LEU	2.9
1	A	307	PRO	2.8

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Mol	Chain	Res	Type	RSRZ
1	D	307	PRO	2.8
1	C	5	PHE	2.8
1	C	114	ILE	2.7
1	C	304	ALA	2.7
1	C	438	TRP	2.7
1	D	370	VAL	2.6
1	B	367	ASN	2.6
1	C	235	THR	2.6
1	C	445	ALA	2.6
1	C	439	PHE	2.5
1	B	318	GLU	2.5
1	A	305	ALA	2.5
1	C	4	GLU	2.5
1	C	216	GLY	2.4
1	C	437	ARG	2.4
1	D	216	GLY	2.4
1	C	431	LEU	2.4
1	C	68	ALA	2.3
1	C	109	LEU	2.3
1	D	68	ALA	2.3
1	C	315	ARG	2.3
1	C	392	ALA	2.2
1	D	391	ASP	2.2
1	B	272	ILE	2.2
1	D	371	GLU	2.2
1	A	2	THR	2.2
1	B	314	LEU	2.2
1	A	370	VAL	2.2
1	C	301	SER	2.1
1	D	369	ARG	2.1
1	A	362	ALA	2.1
1	C	161	ALA	2.1
1	A	369	ARG	2.1
1	C	441	GLU	2.1
1	C	272	ILE	2.1
1	D	229	ALA	2.1
1	C	324	ARG	2.1
1	C	217	GLN	2.1
1	A	314	LEU	2.1
1	C	215	LYS	2.0
1	D	365	PRO	2.0
1	D	315	ARG	2.0

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Mol	Chain	Res	Type	RSRZ
1	D	376	ILE	2.0
1	D	109	LEU	2.0
1	C	364	GLU	2.0

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

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

6.3 Carbohydrates (i)

There are no monosaccharides in this entry.

6.4 Ligands (i)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 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	PGE	B	505	10/10	0.77	0.17	32,36,48,50	0
5	PEG	B	506	7/7	0.77	0.21	32,33,36,37	0
2	EDO	A	504	4/4	0.80	0.13	31,34,38,46	0
2	EDO	C	503	4/4	0.82	0.13	34,36,36,44	0
2	EDO	D	506	4/4	0.82	0.10	42,42,42,44	0
4	PGE	A	510	10/10	0.87	0.10	28,38,47,49	0
2	EDO	A	508	4/4	0.88	0.11	21,24,26,29	0
2	EDO	D	501	4/4	0.89	0.10	28,32,32,34	0
2	EDO	D	509	4/4	0.90	0.12	26,26,35,41	0
2	EDO	D	505	4/4	0.90	0.11	28,33,34,34	0
2	EDO	D	504	4/4	0.91	0.11	23,32,32,34	0
2	EDO	B	502	4/4	0.91	0.13	20,27,29,31	0
2	EDO	D	503	4/4	0.91	0.16	28,29,31,43	0
2	EDO	D	507	4/4	0.91	0.18	24,24,32,34	0
2	EDO	D	502	4/4	0.92	0.11	23,25,30,36	0
2	EDO	B	501	4/4	0.92	0.10	24,25,32,39	0
2	EDO	C	504	4/4	0.92	0.13	24,27,28,36	0
2	EDO	C	505	4/4	0.92	0.12	22,23,26,38	0
2	EDO	C	502	4/4	0.92	0.12	24,27,28,30	0
2	EDO	C	501	4/4	0.93	0.15	24,25,32,37	0

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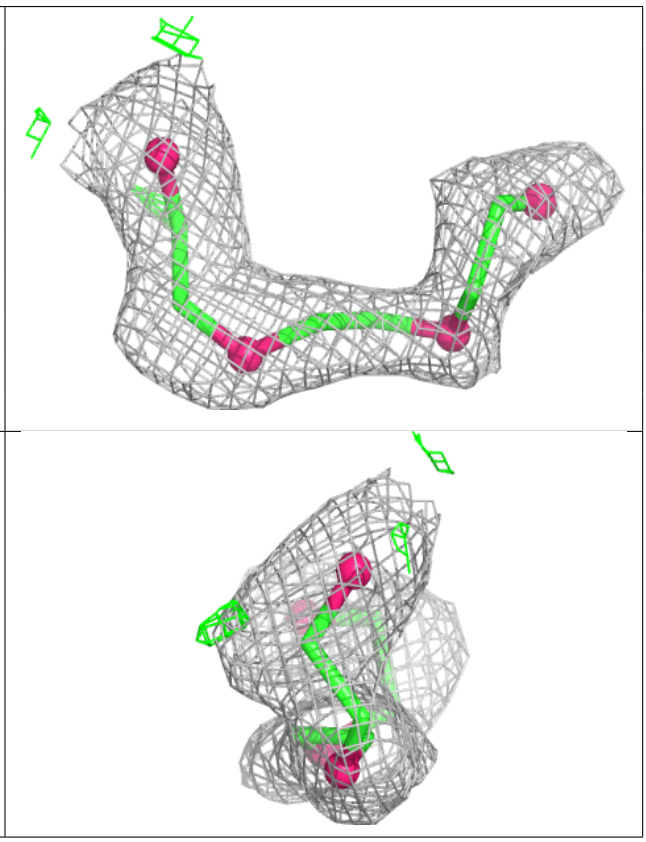
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	EDO	A	507	4/4	0.93	0.13	33,33,38,41	0
2	EDO	D	510	4/4	0.94	0.13	14,28,30,30	0
2	EDO	A	502	4/4	0.94	0.08	29,31,34,36	0
2	EDO	B	503	4/4	0.94	0.10	28,31,31,37	0
2	EDO	A	503	4/4	0.94	0.08	28,28,29,30	0
2	EDO	D	508	4/4	0.96	0.11	22,23,24,24	0
2	EDO	A	501	4/4	0.96	0.12	19,19,21,26	0
2	EDO	A	506	4/4	0.97	0.10	17,20,38,47	0
2	EDO	A	505	4/4	0.98	0.16	14,15,16,20	0
3	NI	B	504	1/1	1.00	0.10	15,15,15,15	0
3	NI	A	509	1/1	1.00	0.09	14,14,14,14	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.

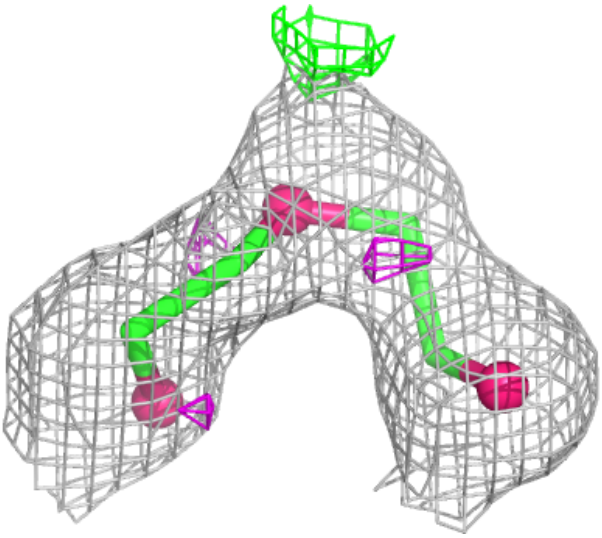
Electron density around PGE B 505:

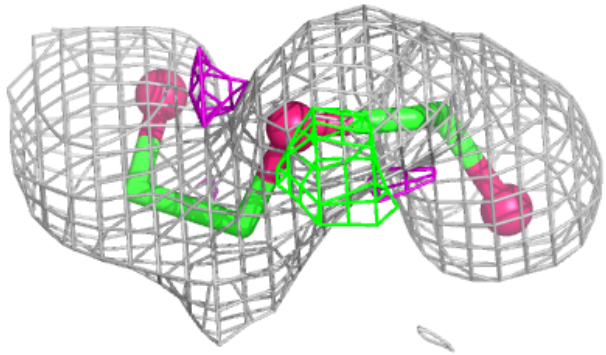
2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)

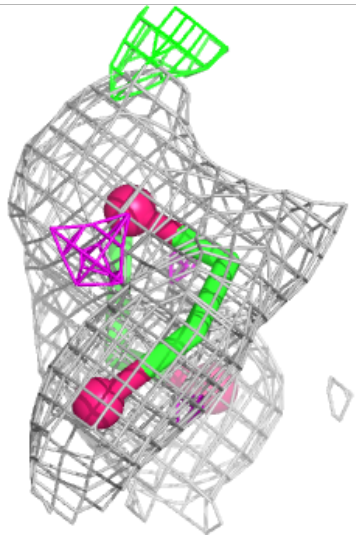


Electron density around PEG B 506:

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

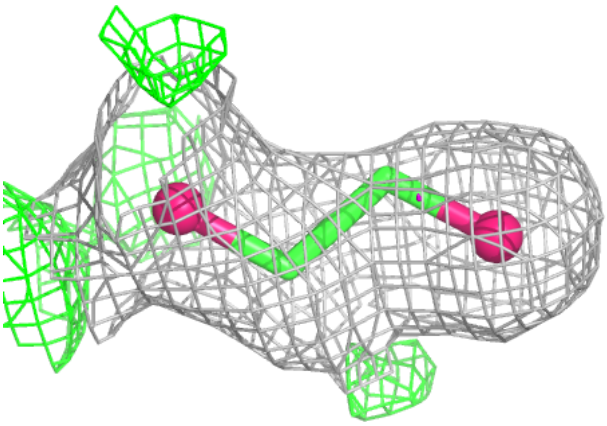


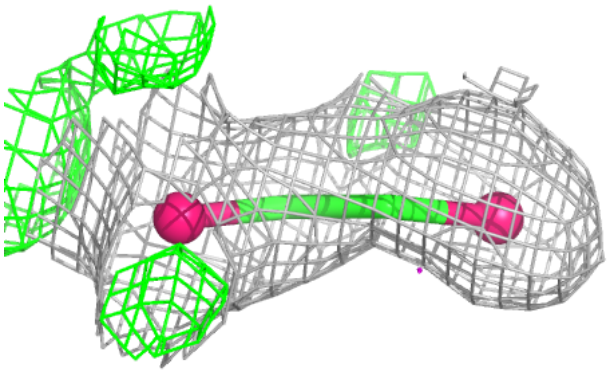


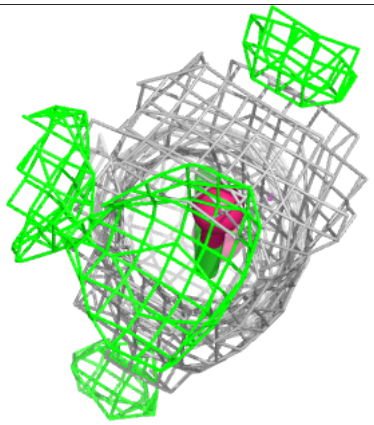


Electron density around EDO A 504:

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

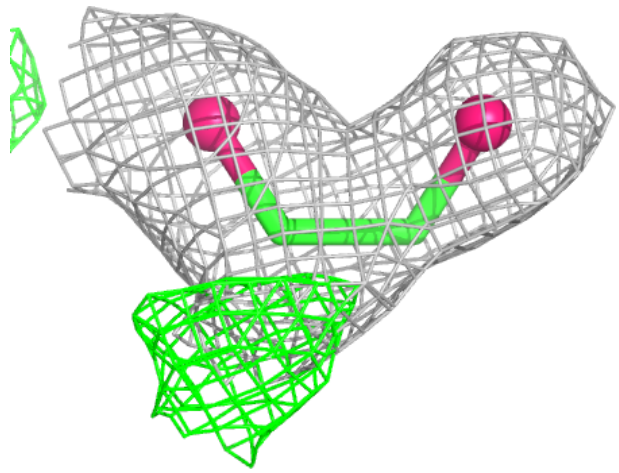


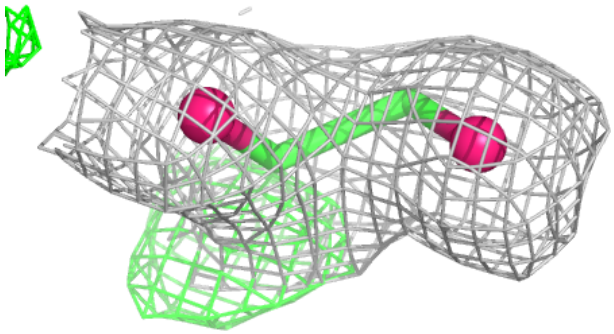


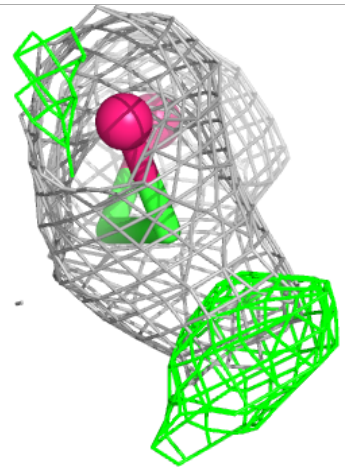


Electron density around EDO C 503:

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

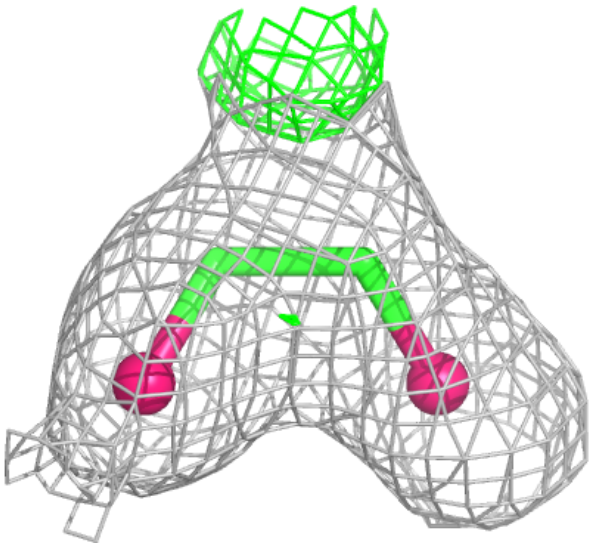


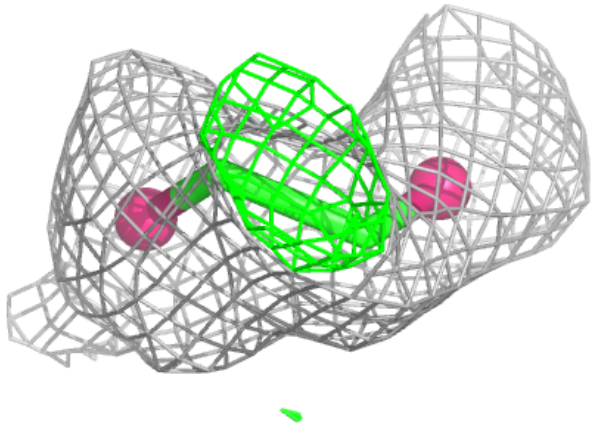


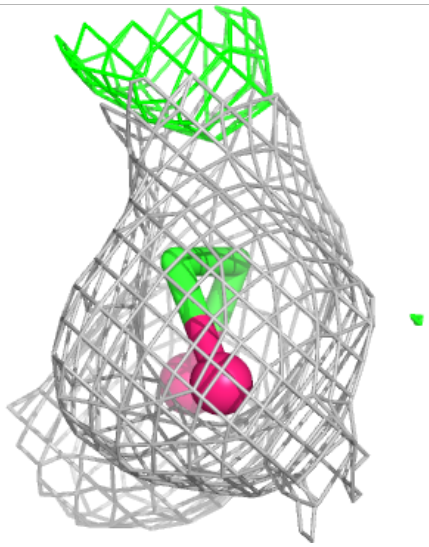


Electron density around EDO D 506:

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

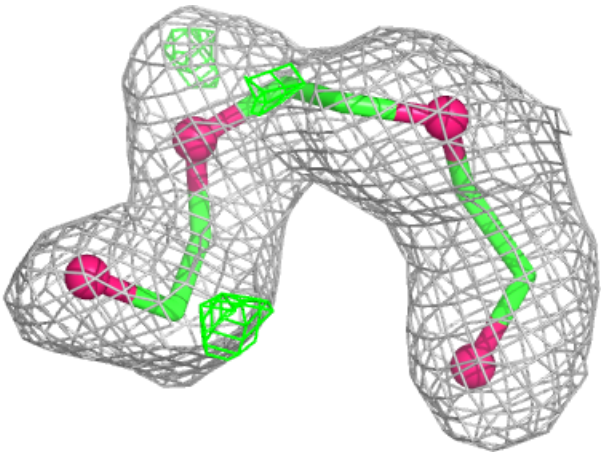


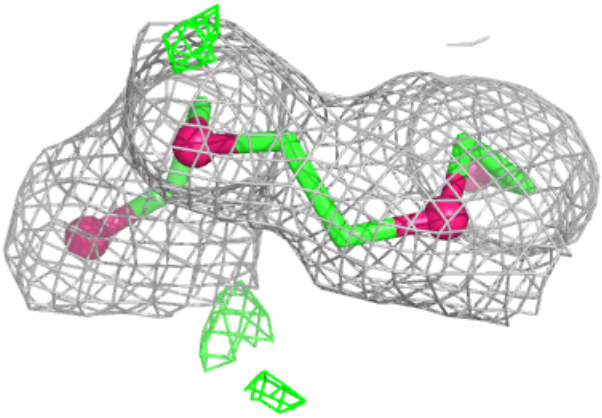


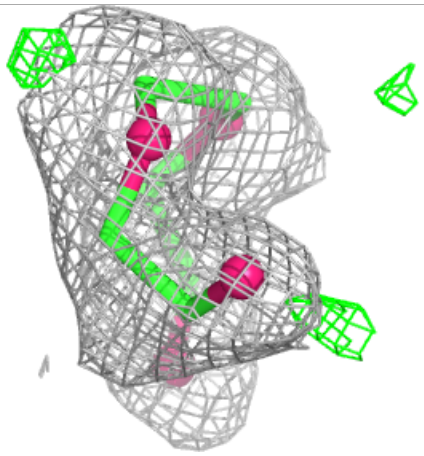


Electron density around PGE A 510:

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

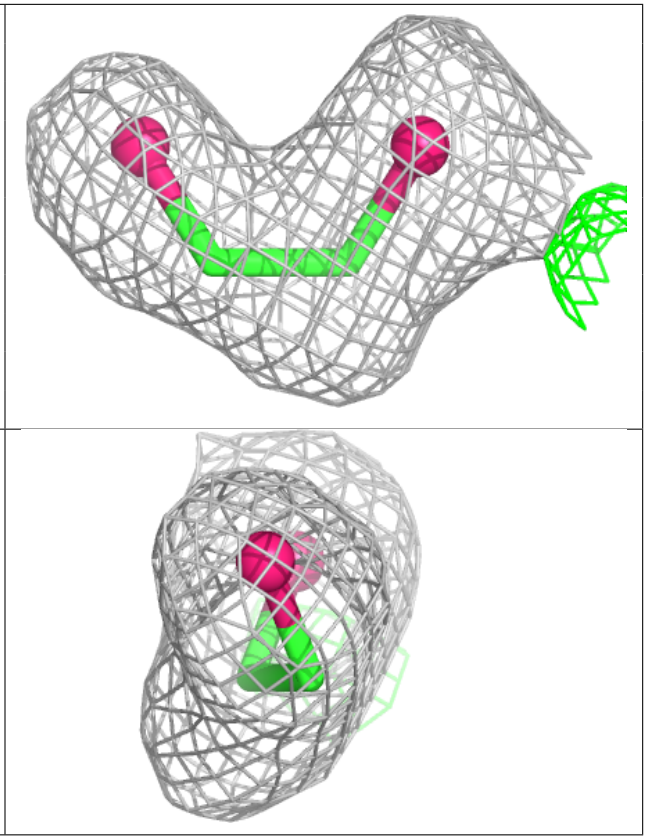






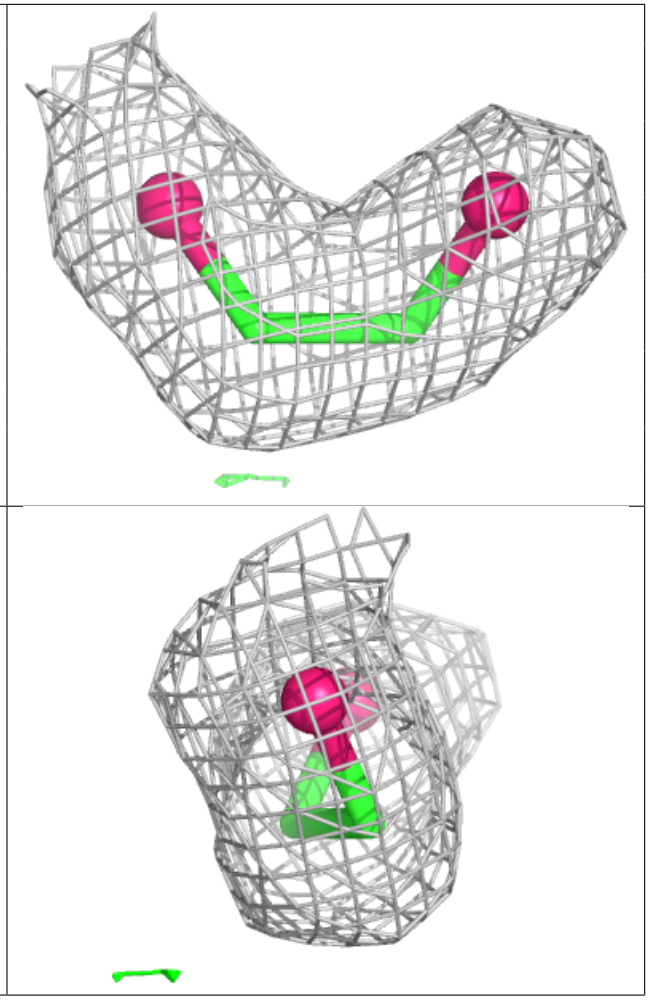
Electron density around EDO A 508:

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



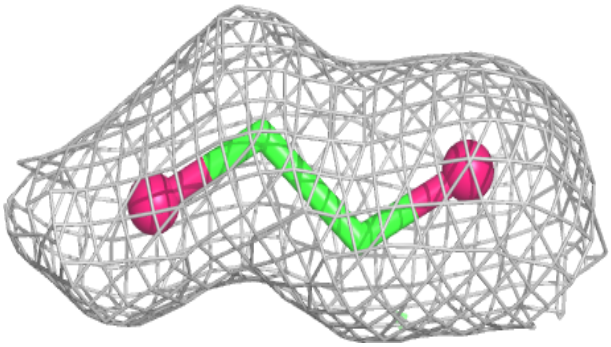
Electron density around EDO D 501:

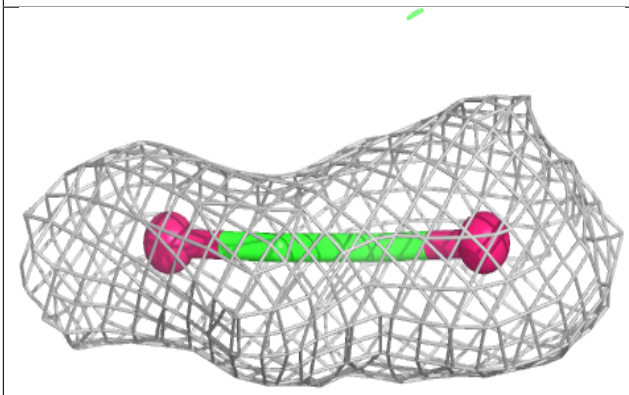
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

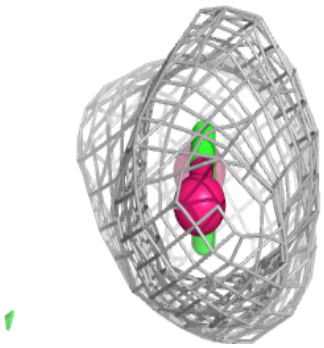


Electron density around EDO D 509:

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

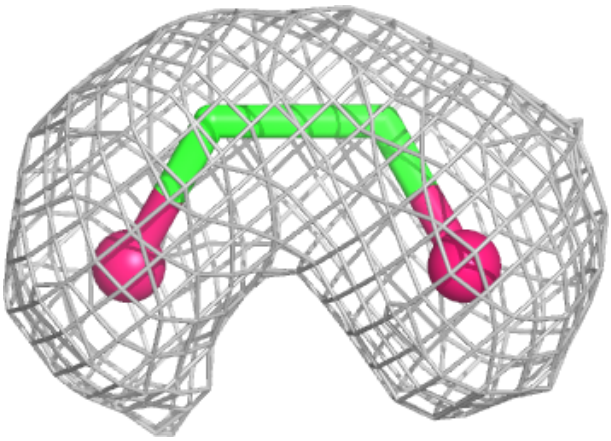


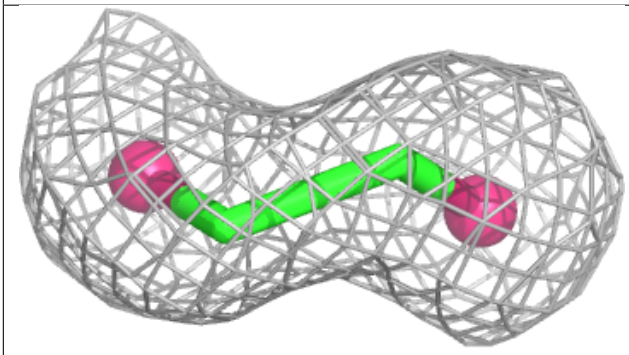


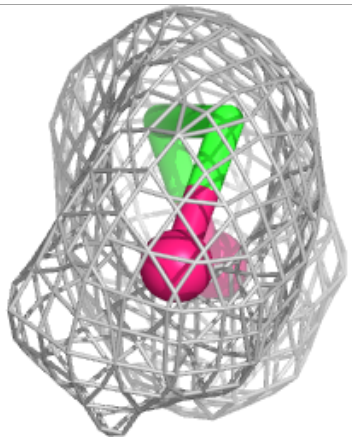


Electron density around EDO D 505:

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

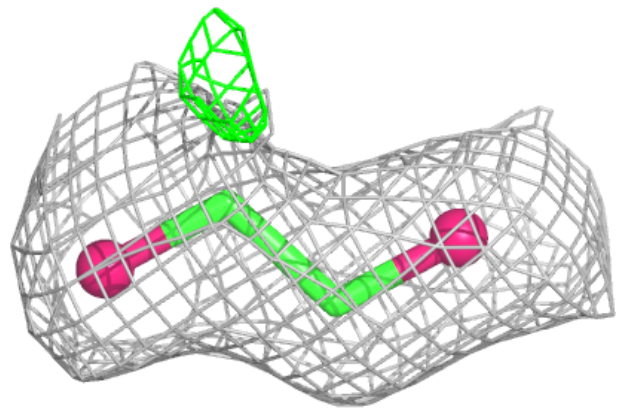


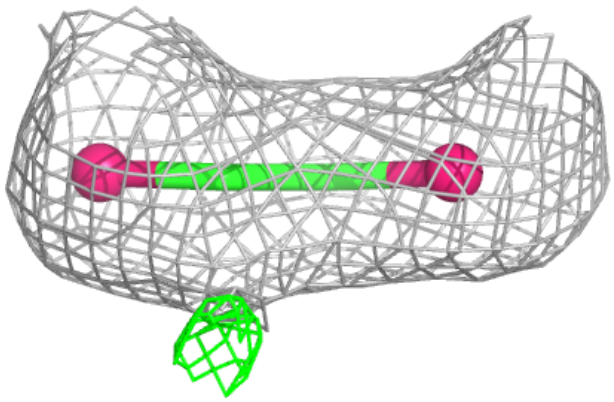


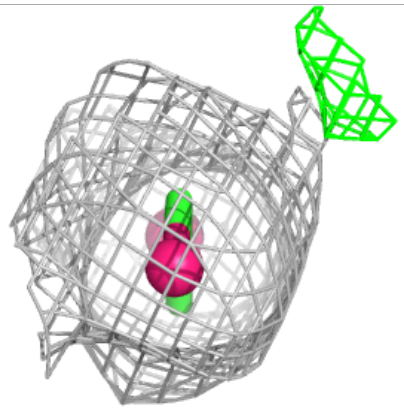


Electron density around EDO D 504:

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

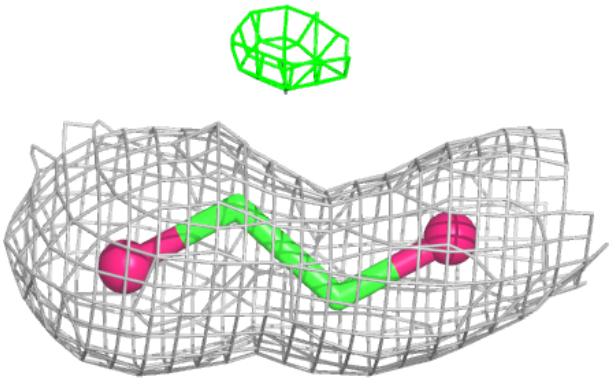


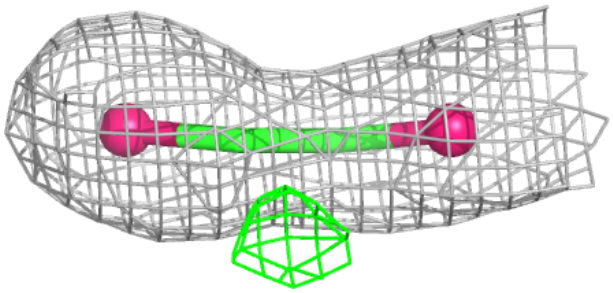


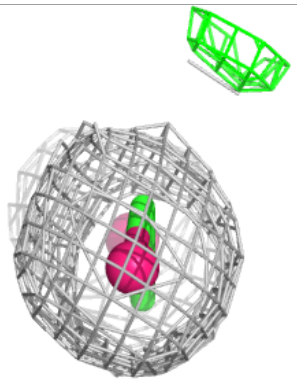


Electron density around EDO B 502:

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

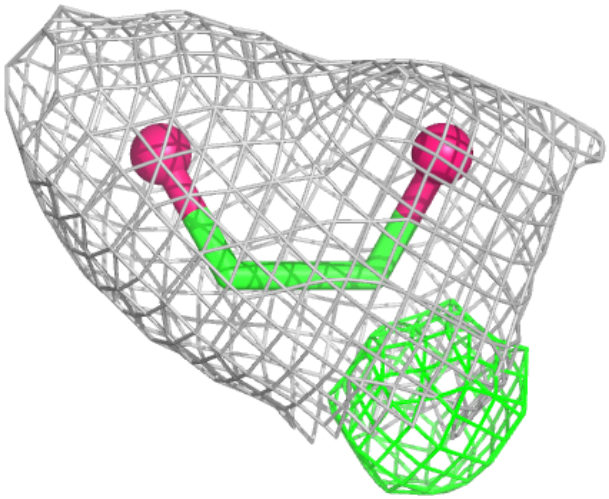


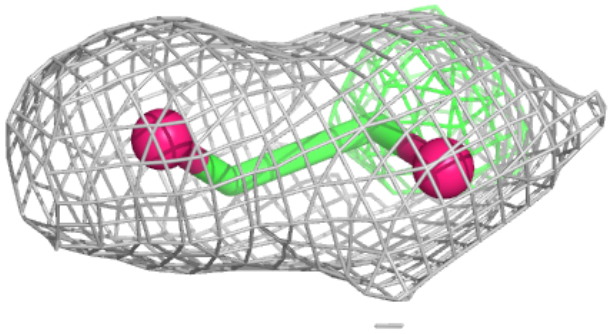


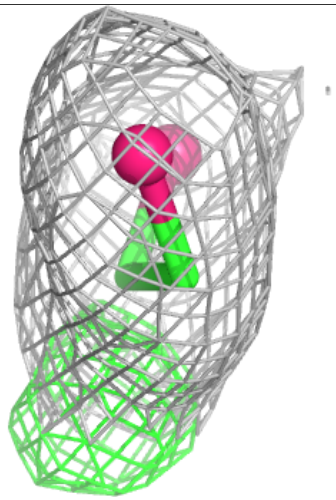


Electron density around EDO D 503:

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

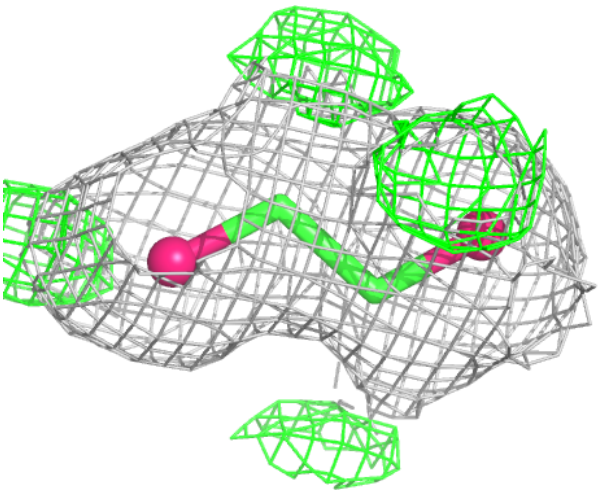


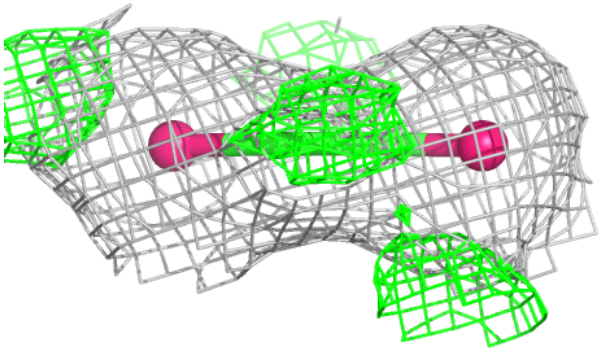


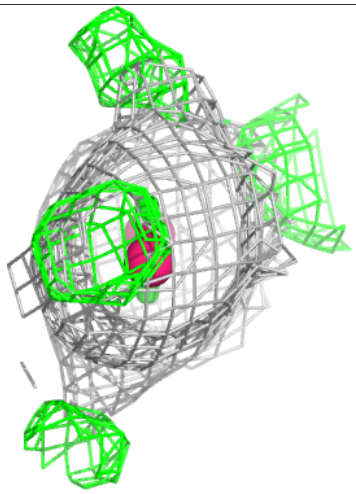


Electron density around EDO D 507:

$2mF_o$-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 D 502:

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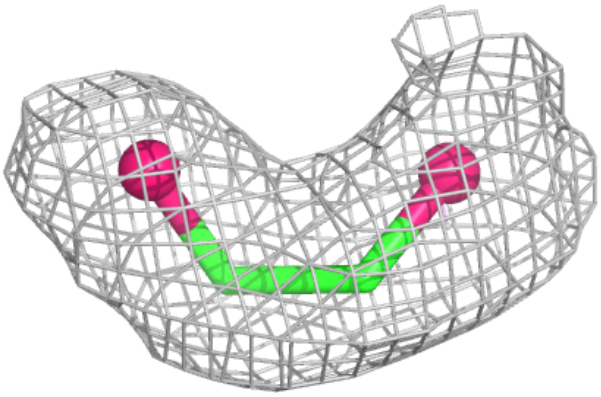
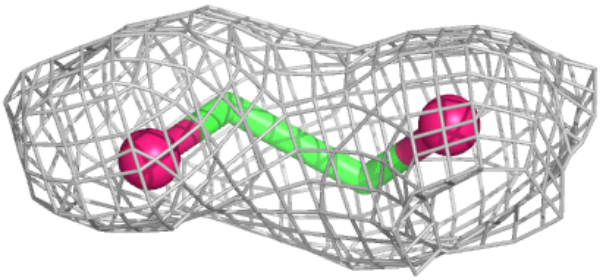
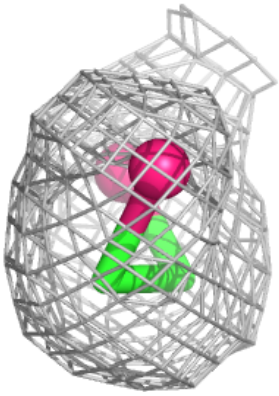
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

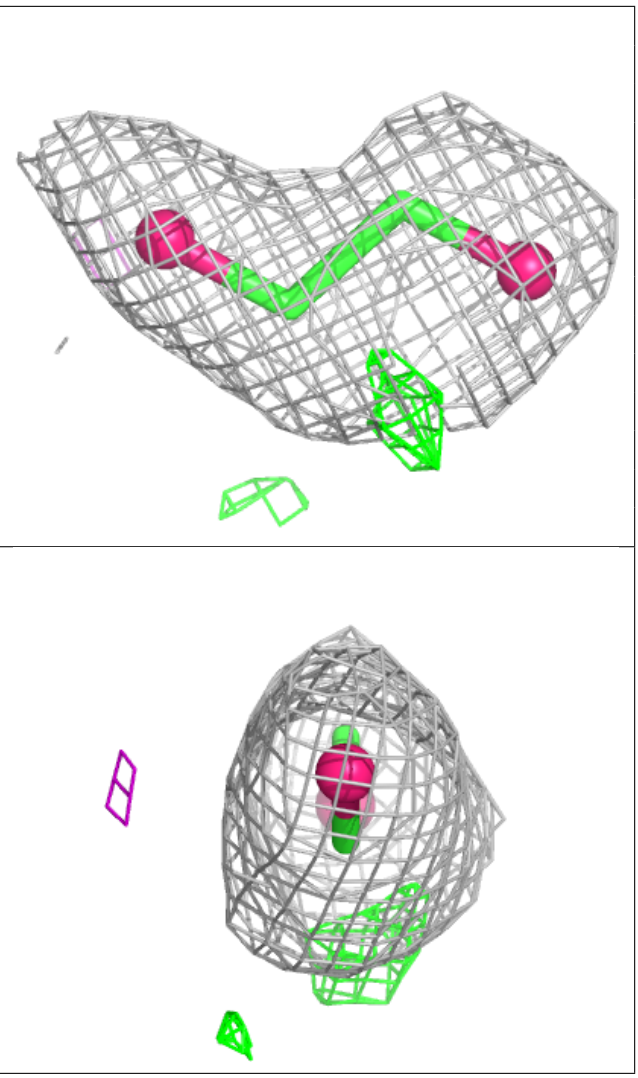






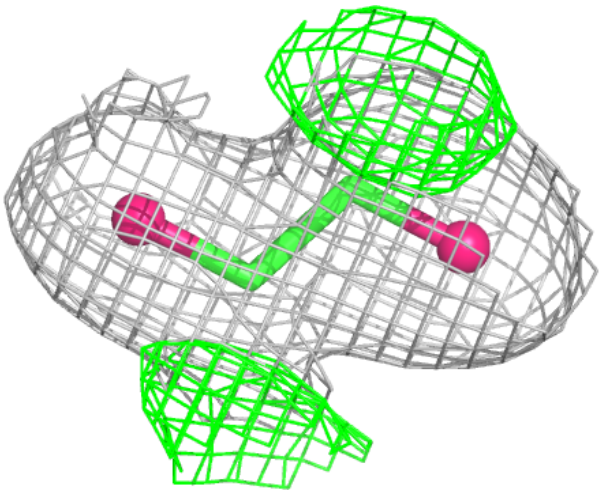
Electron density around EDO B 501:

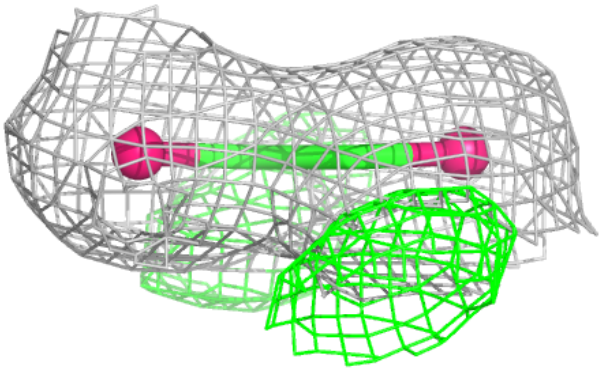
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

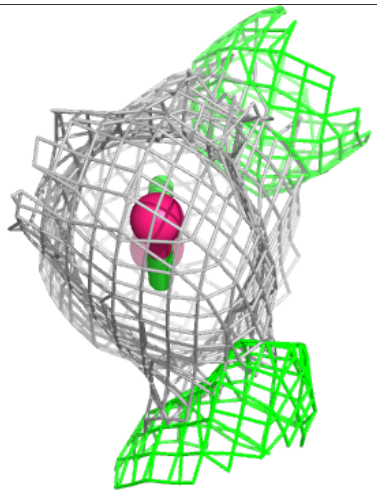


Electron density around EDO C 504:

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

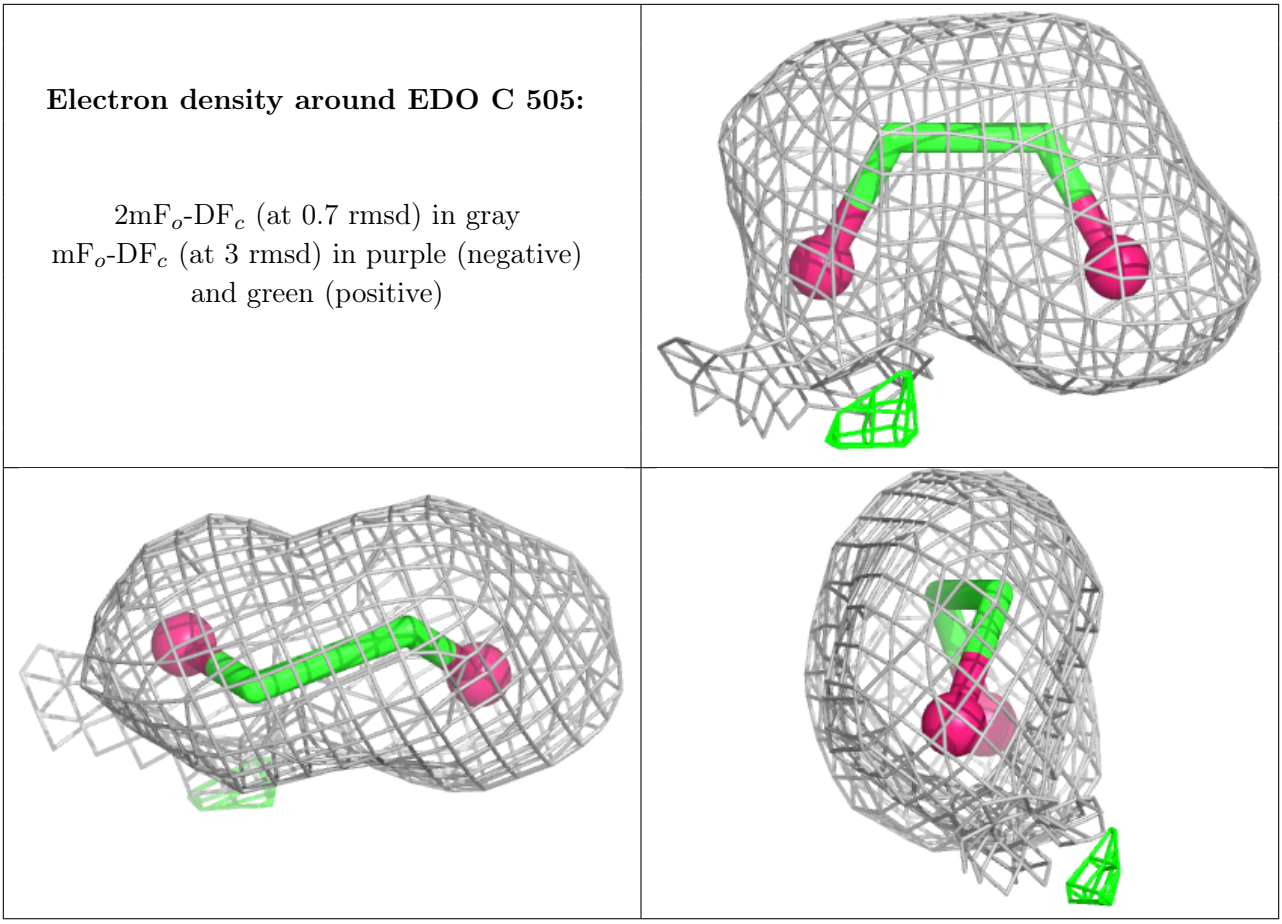






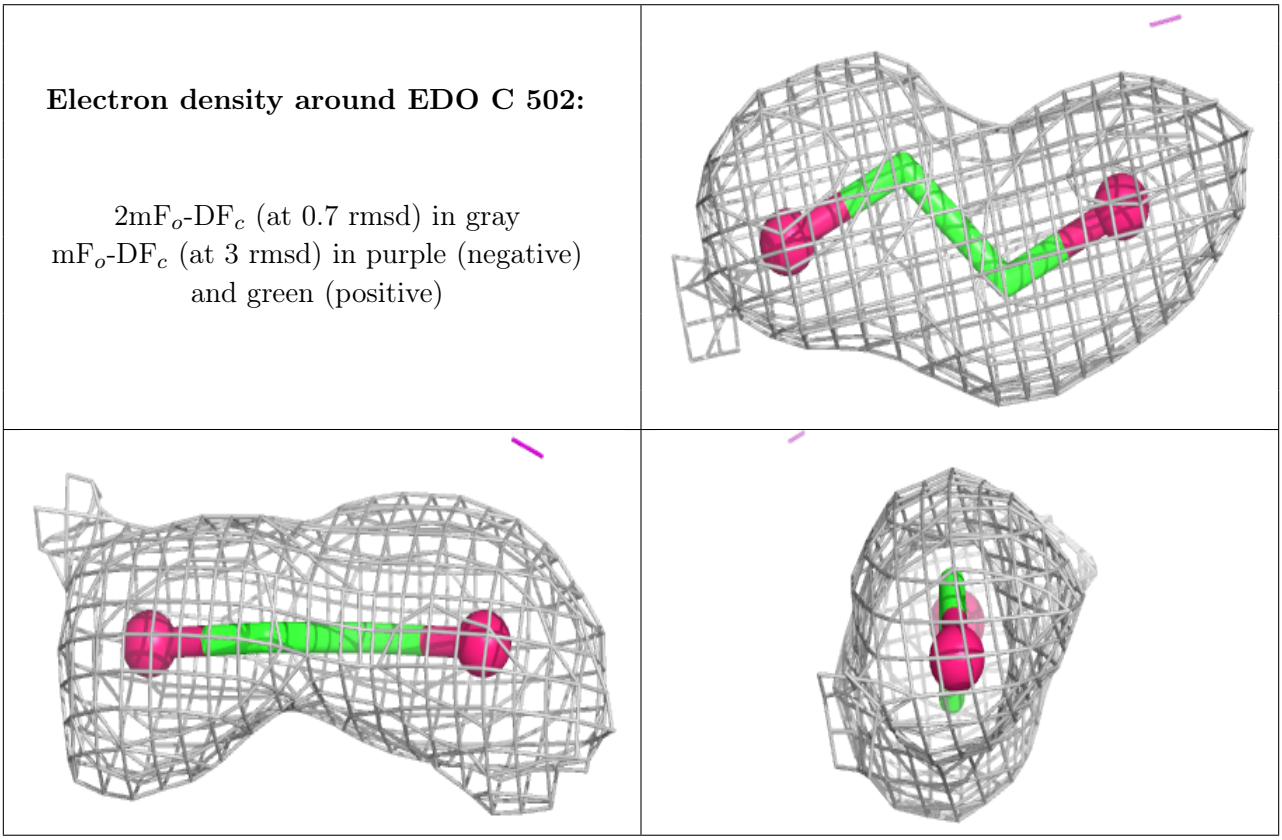
Electron density around EDO C 505:

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



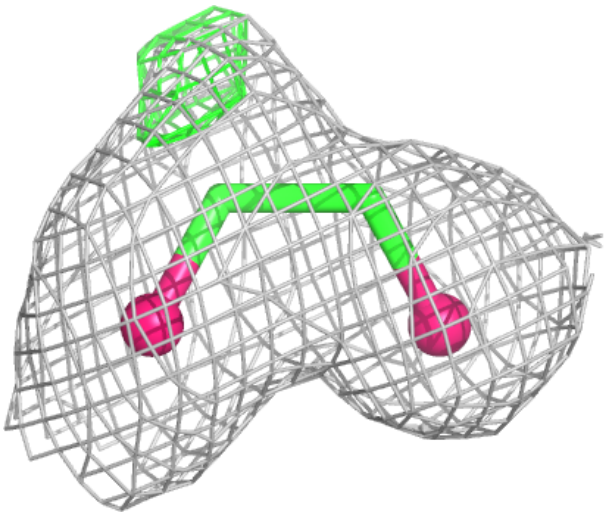
Electron density around EDO C 502:

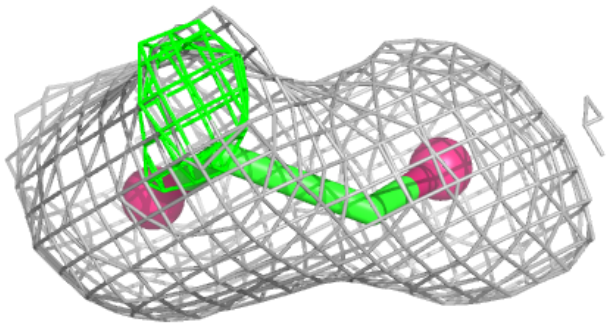
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

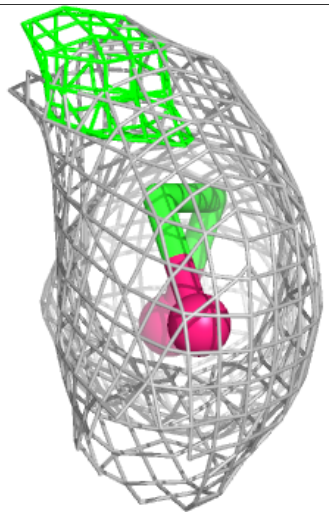


Electron density around EDO C 501:

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

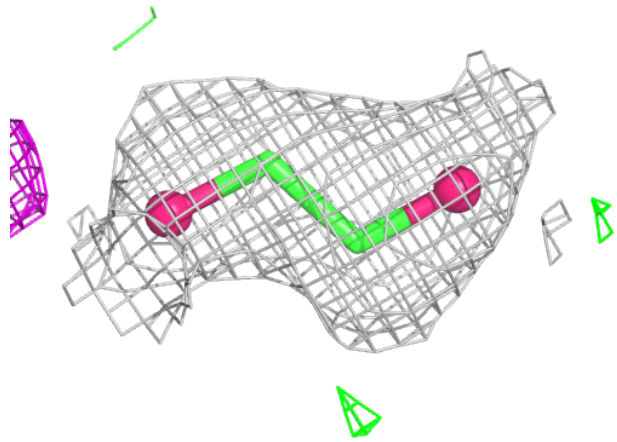


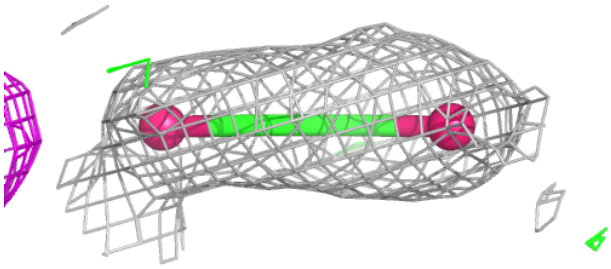


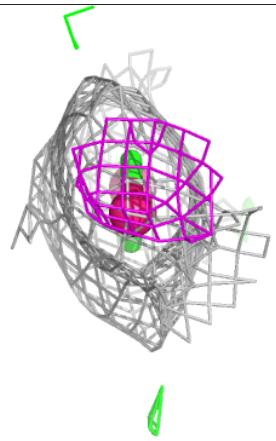


Electron density around EDO A 507:

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

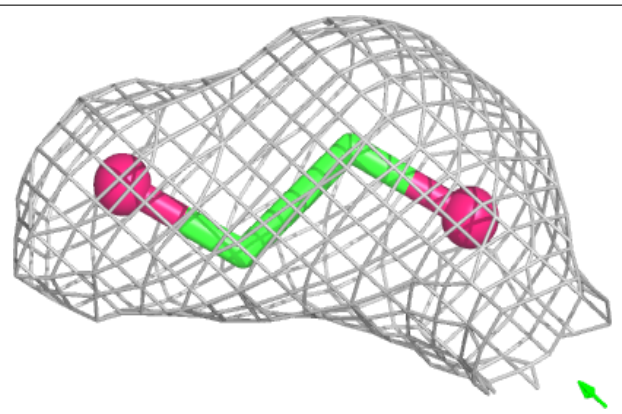


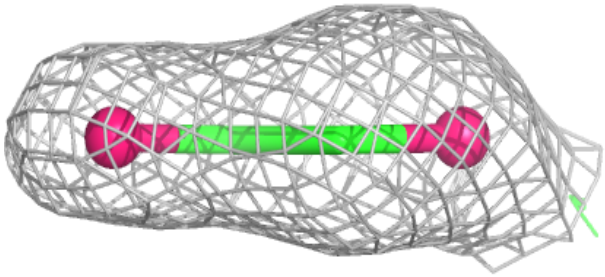


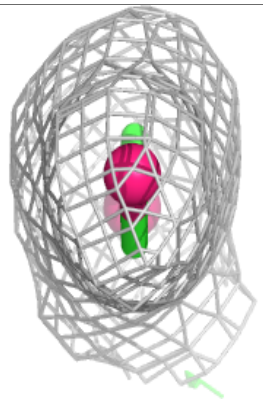


Electron density around EDO D 510:

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

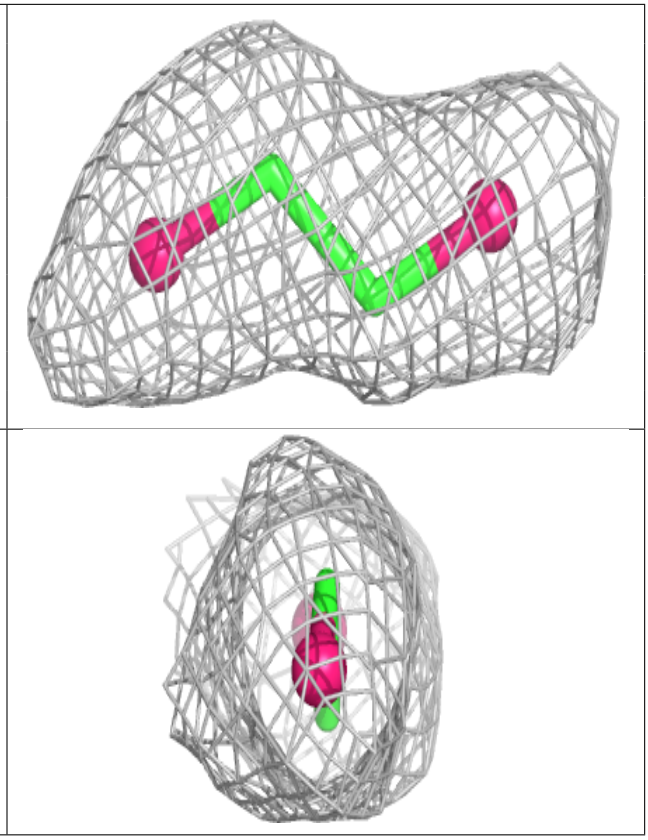






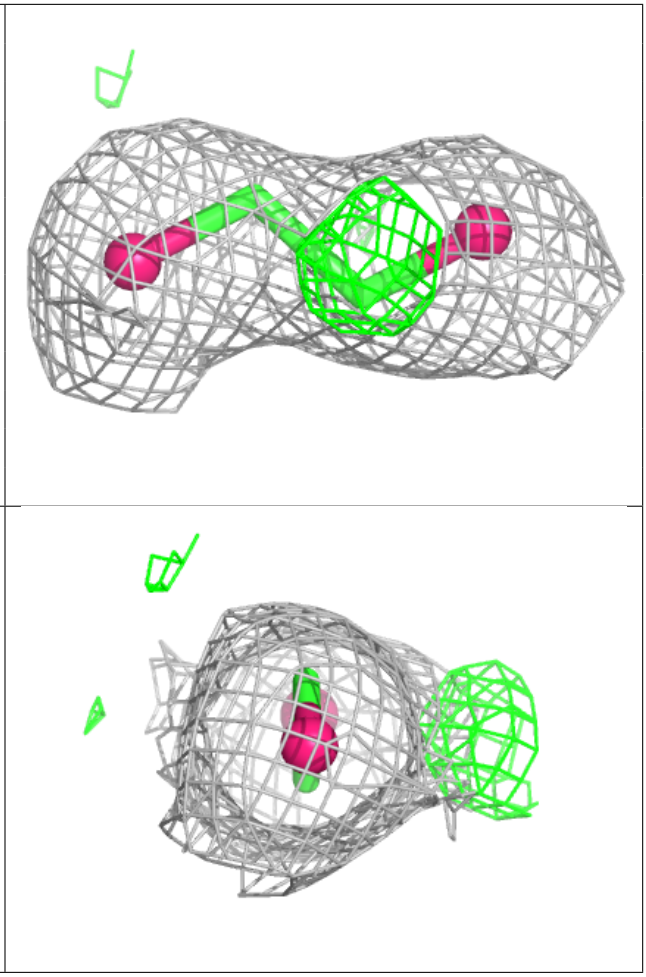
Electron density around EDO A 502:

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



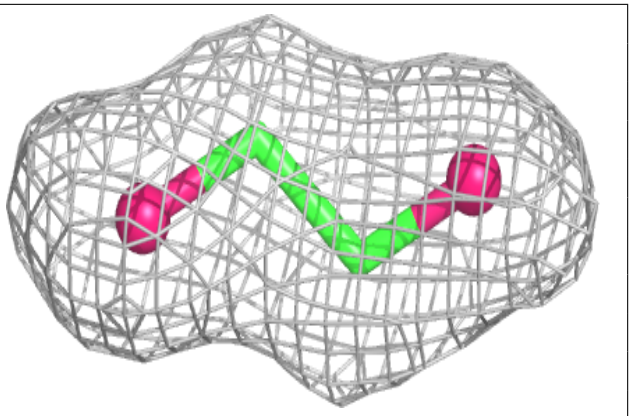
Electron density around EDO B 503:

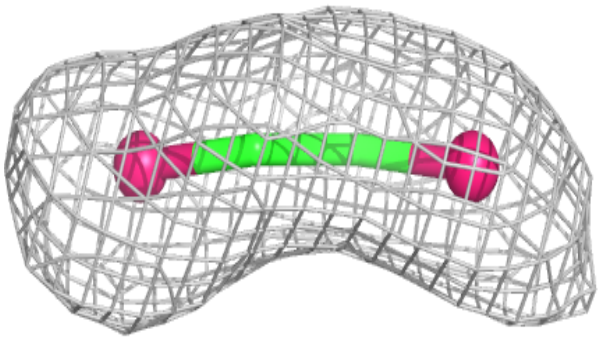
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

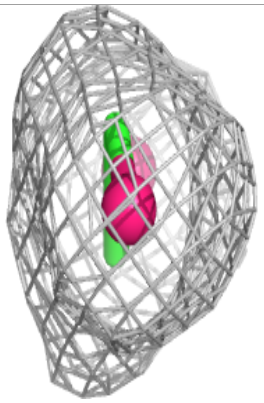


Electron density around EDO A 503:

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

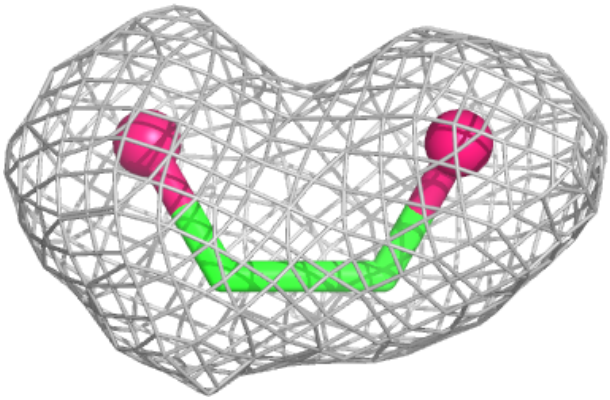


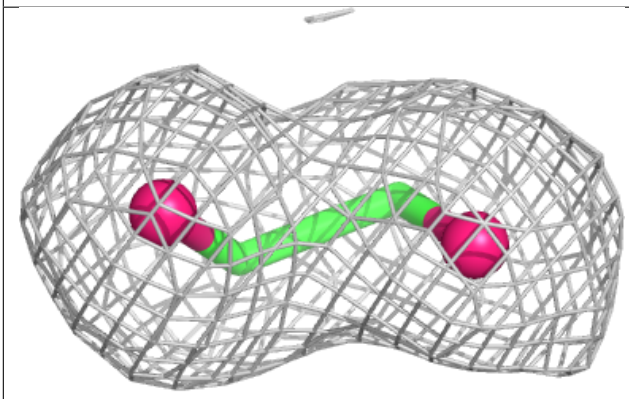


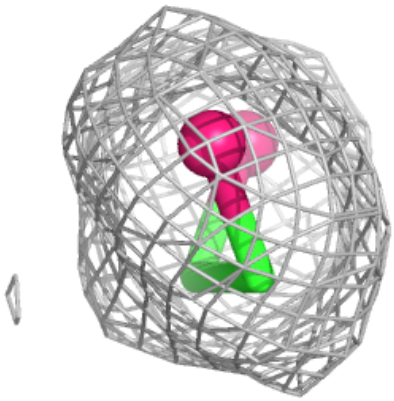


Electron density around EDO D 508:

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

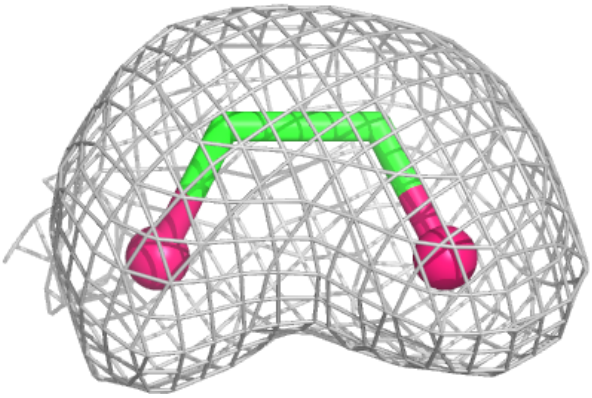


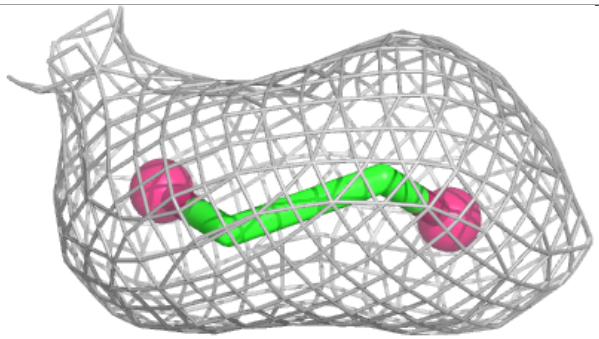


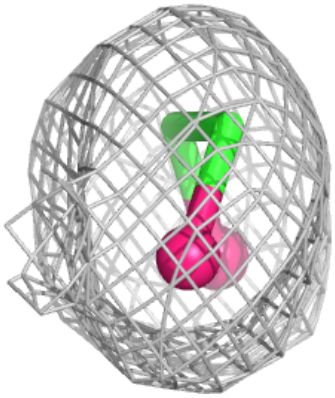


Electron density around EDO A 501:

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

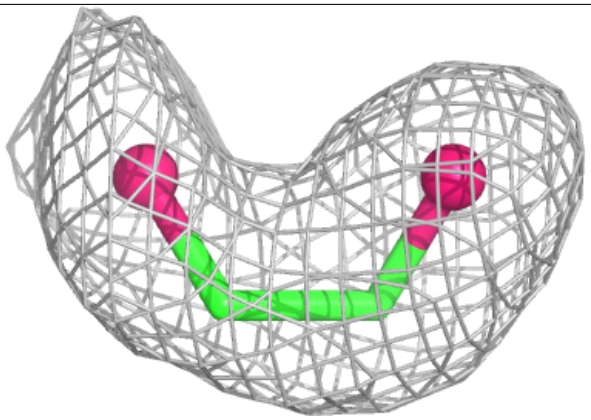


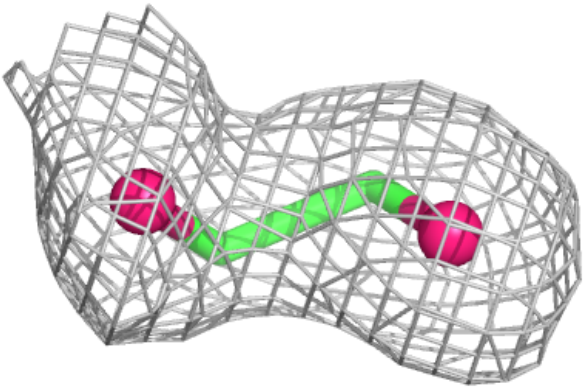


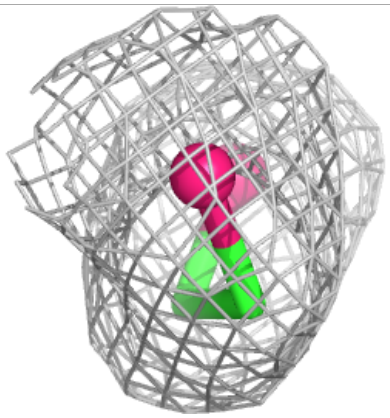


Electron density around EDO A 506:

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

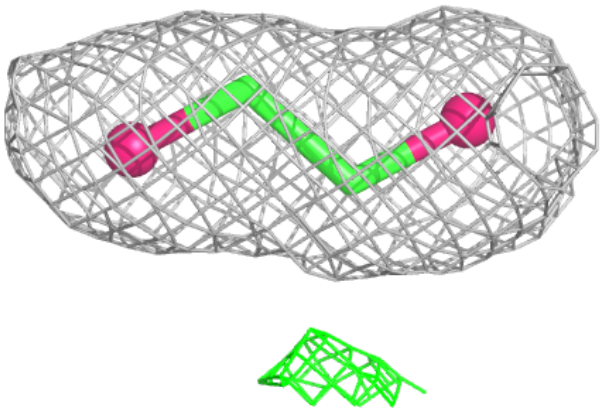


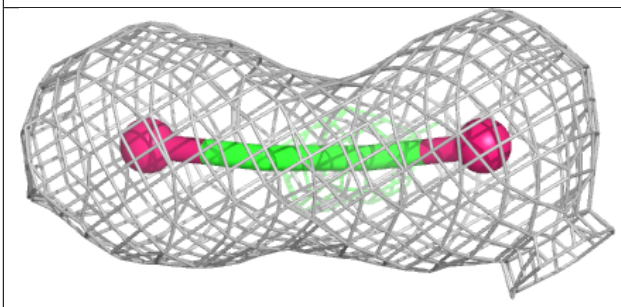


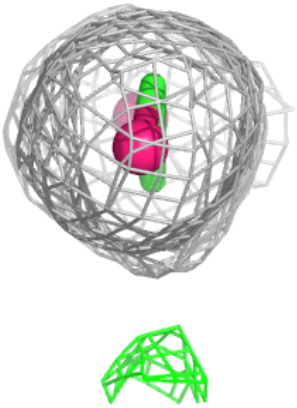


Electron density around EDO A 505:

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

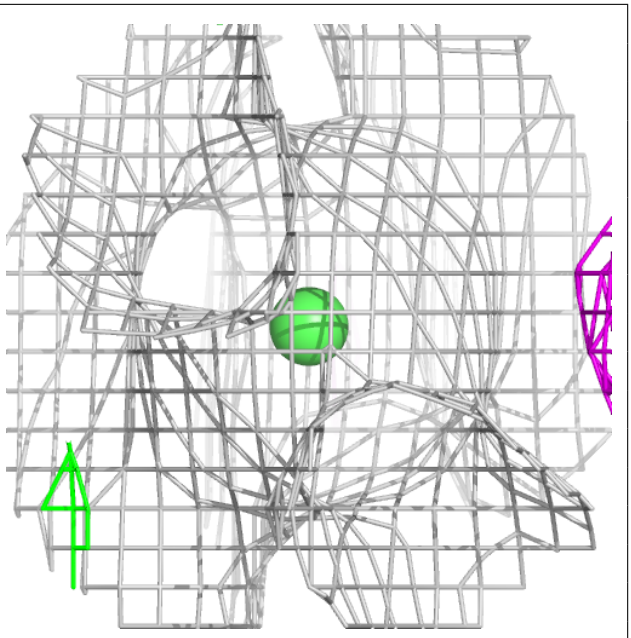


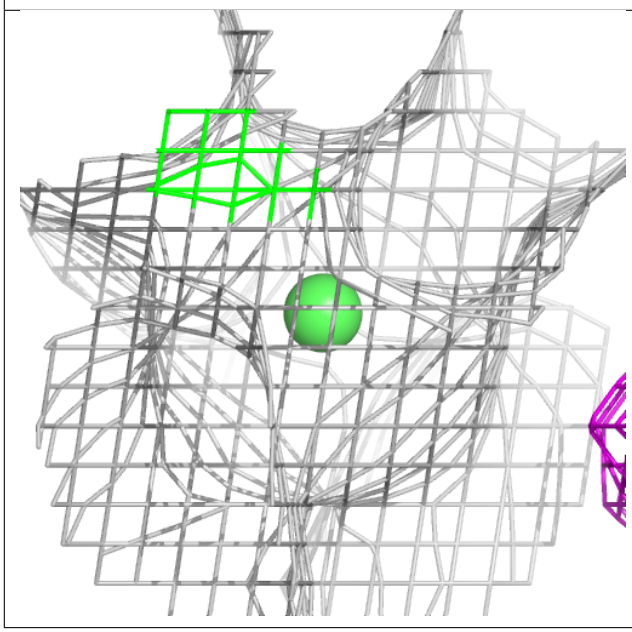


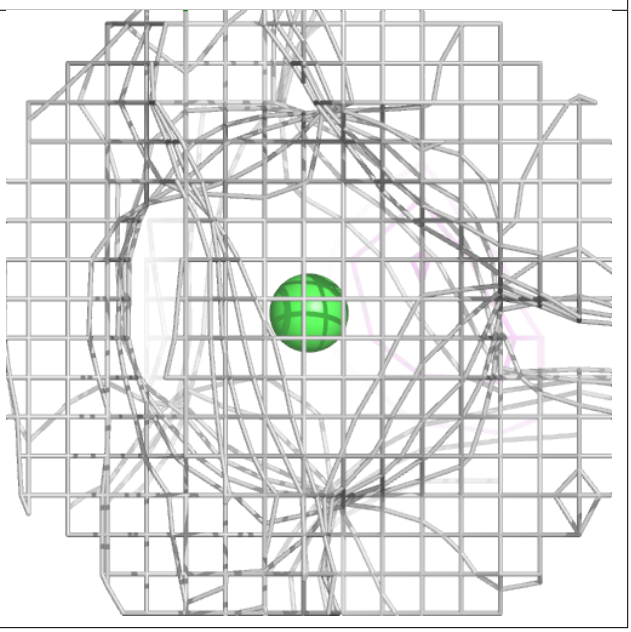


Electron density around NI B 504:

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

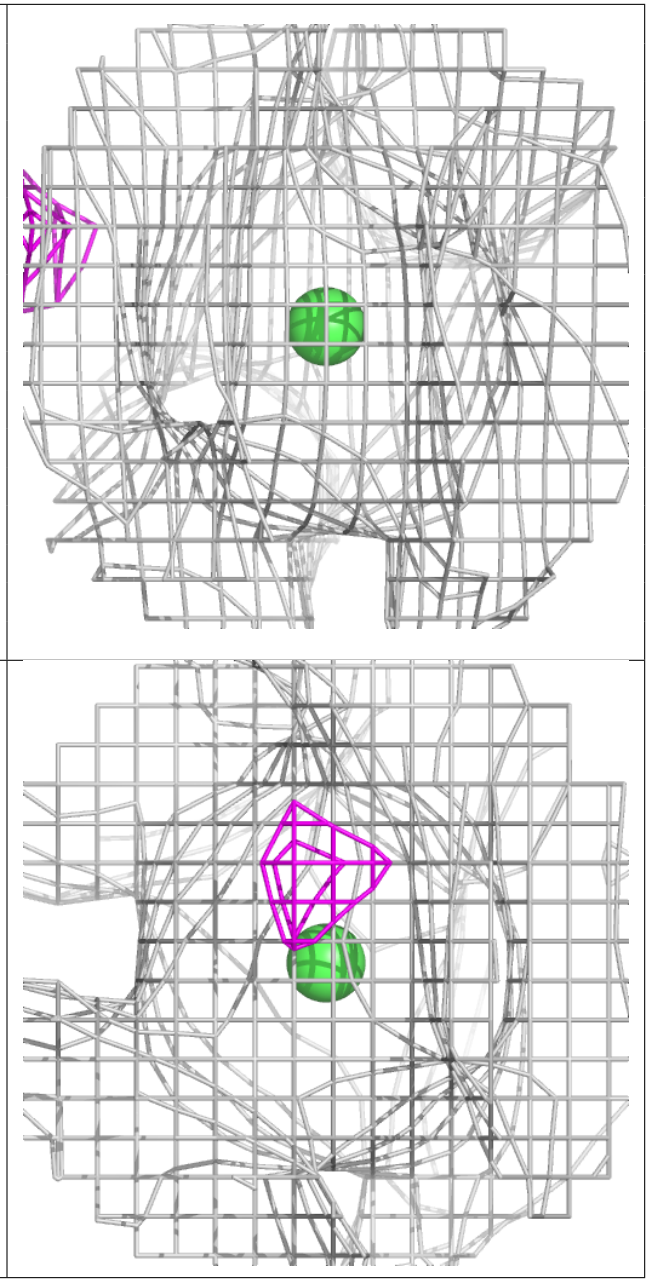






Electron density around NI A 509:

$2mF_o$-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 (i)

There are no such residues in this entry.