



# Full wwPDB X-ray Structure Validation Report ⓘ

Dec 22, 2020 – 03:12 pm GMT

PDB ID : 7AV7  
Title : Crystal structure of S-nitrosylated nitrosogluthione reductase(GSNOR)from Chlamydomonas reinhardtii, in complex with NAD+  
Authors : Fermani, S.; Zaffagnini, M.; Falini, G.; Lemaire, S.D.  
Deposited on : 2020-11-04  
Resolution : 2.90 Å(reported)

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

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.16  
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) : 2.16

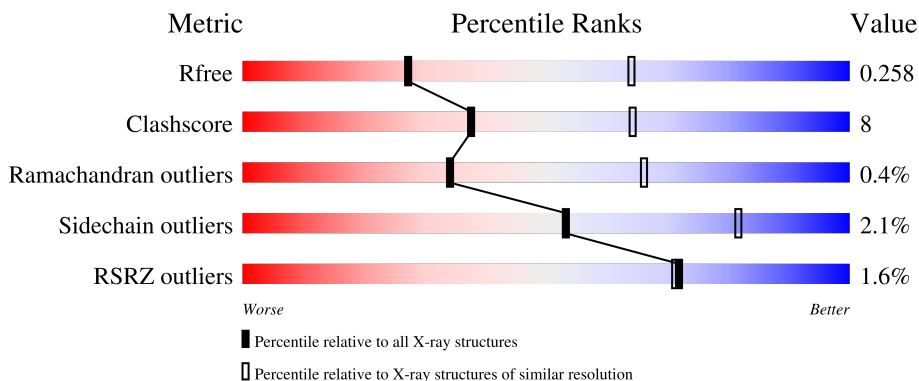
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.90 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



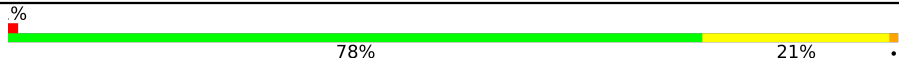
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	130704	1957 (2.90-2.90)
Clashscore	141614	2172 (2.90-2.90)
Ramachandran outliers	138981	2115 (2.90-2.90)
Sidechain outliers	138945	2117 (2.90-2.90)
RSRZ outliers	127900	1906 (2.90-2.90)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . 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	378	
1	B	378	
1	C	378	
1	D	378	
1	E	378	

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Mol	Chain	Length	Quality of chain
1	F	378	 <p>A horizontal bar chart representing the quality of the chain. The bar is divided into two segments: a green segment on the left representing 78% and a yellow segment on the right representing 21%. A small red square is at the beginning of the bar, and a small black dot is at the end. A '%' symbol is positioned above the start of the bar.</p>

## 2 Entry composition i

There are 5 unique types of molecules in this entry. The entry contains 17275 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 S-(hydroxymethyl)glutathione dehydrogenase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	377	Total 2828	C 1790	N 483	O 531	S 24	0	1	0
1	B	377	Total 2833	C 1793	N 486	O 531	S 23	0	1	0
1	C	377	Total 2828	C 1790	N 483	O 531	S 24	0	1	0
1	D	377	Total 2825	C 1788	N 483	O 531	S 23	0	0	0
1	E	374	Total 2803	C 1776	N 480	O 524	S 23	0	0	0
1	F	377	Total 2833	C 1792	N 484	O 534	S 23	0	1	0

- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	D	2	Total 2	Zn 2	0	0
2	E	2	Total 2	Zn 2	0	0
2	B	2	Total 2	Zn 2	0	0
2	C	2	Total 2	Zn 2	0	0
2	A	2	Total 2	Zn 2	0	0
2	F	2	Total 2	Zn 2	0	0

- Molecule 3 is NICOTINAMIDE-ADENINE-DINUCLEOTIDE (three-letter code: NAD) (formula: C<sub>21</sub>H<sub>27</sub>N<sub>7</sub>O<sub>14</sub>P<sub>2</sub>) (labeled as "Ligand of Interest" by depositor).



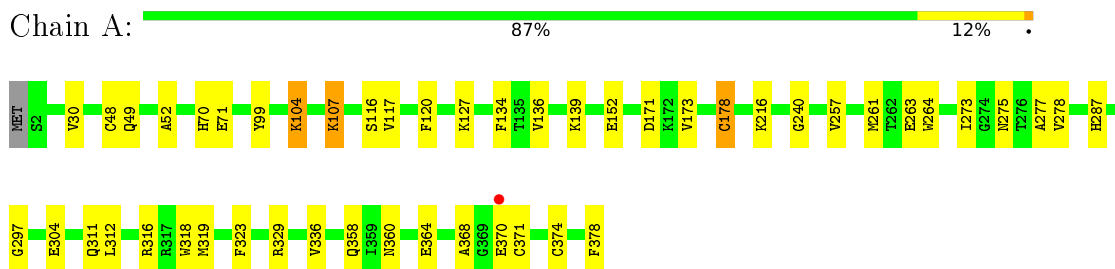
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<b>Mol</b>	<b>Chain</b>	<b>Residues</b>	<b>Atoms</b>	<b>ZeroOcc</b>	<b>AltConf</b>
5	C	4	Total O 4 4	0	0
5	D	7	Total O 7 7	0	0
5	E	2	Total O 2 2	0	0
5	F	4	Total O 4 4	0	0

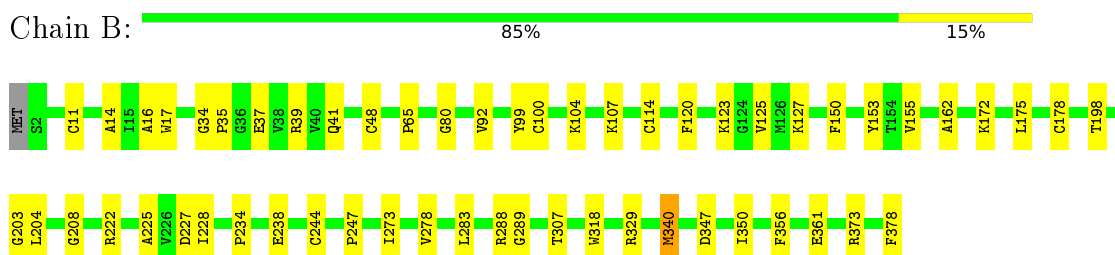
### 3 Residue-property plots

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

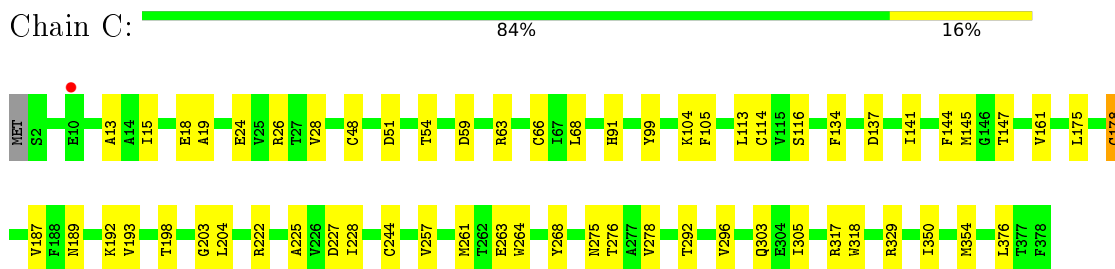
- Molecule 1: S-(hydroxymethyl)glutathione dehydrogenase



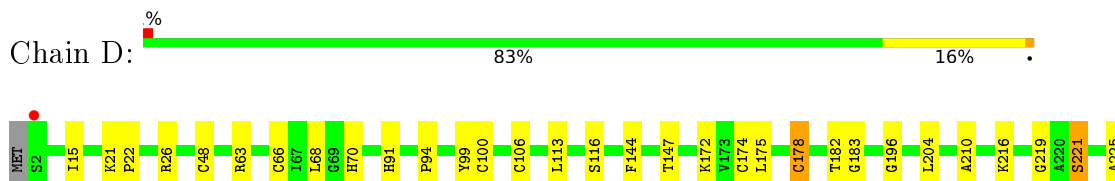
- Molecule 1: S-(hydroxymethyl)glutathione dehydrogenase

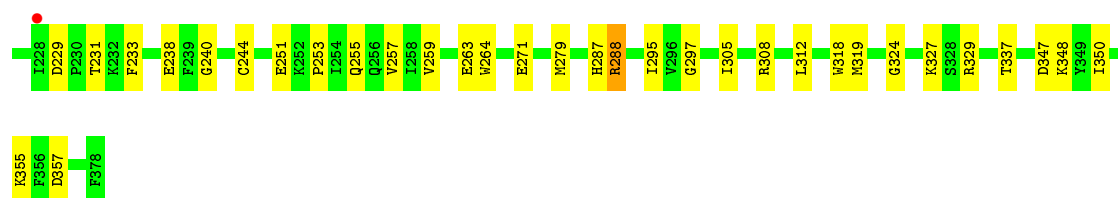


- Molecule 1: S-(hydroxymethyl)glutathione dehydrogenase

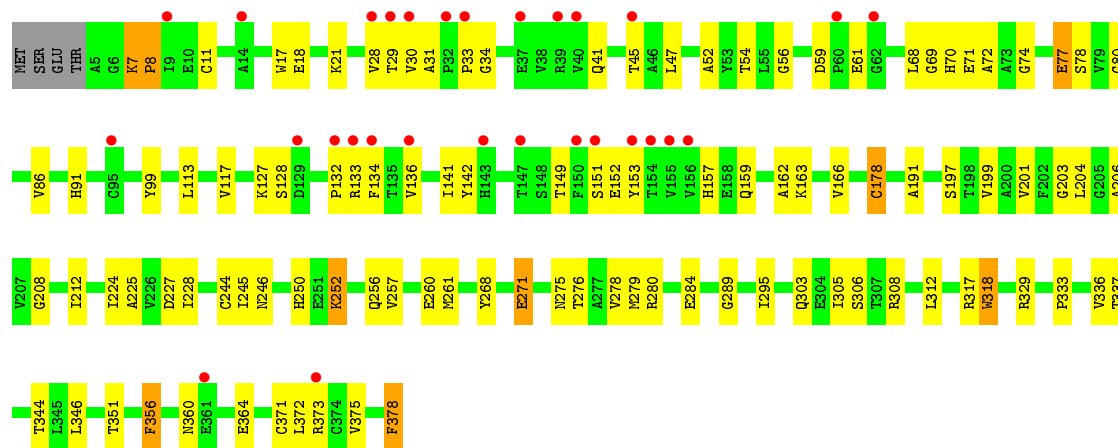


- Molecule 1: S-(hydroxymethyl)glutathione dehydrogenase

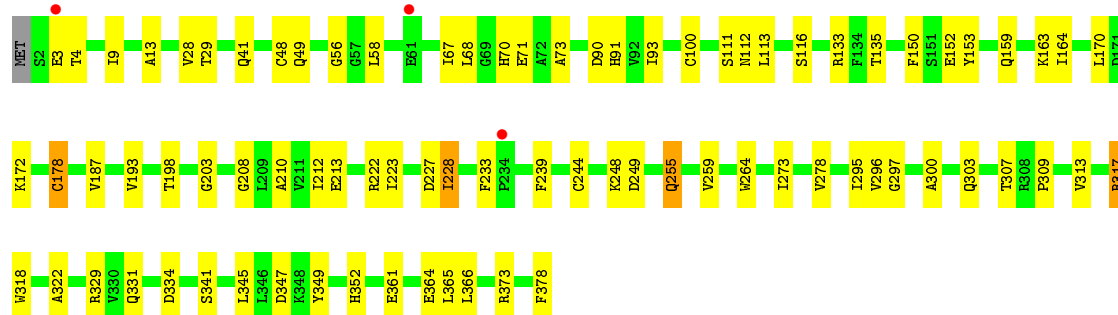
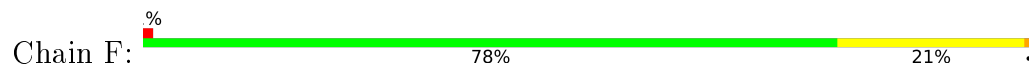




• Molecule 1: S-(hydroxymethyl)glutathione dehydrogenase



• Molecule 1: S-(hydroxymethyl)glutathione dehydrogenase





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	78.39Å 143.29Å 206.27Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.53 – 2.90 48.62 – 2.90	Depositor EDS
% Data completeness (in resolution range)	99.7 (48.53-2.90) 99.7 (48.62-2.90)	Depositor EDS
$R_{merge}$	0.12	Depositor
$R_{sym}$	0.12	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.13 (at 2.91Å)	Xtrriage
Refinement program	PHENIX 1.14_3260	Depositor
R, $R_{free}$	0.180 , 0.257 0.178 , 0.258	Depositor DCC
$R_{free}$ test set	2558 reflections (4.90%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	41.3	Xtrriage
Anisotropy	0.149	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.31 , 35.0	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	17275	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	37.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 15.07% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

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

## 5 Model quality

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: ZN, SNC, NAD, CL

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	0.51	0/2884	0.63	0/3913
1	B	0.52	0/2889	0.63	0/3919
1	C	0.49	0/2884	0.62	0/3913
1	D	0.51	1/2878 (0.0%)	0.60	0/3905
1	E	0.42	0/2856	0.58	0/3875
1	F	0.47	0/2886	0.61	0/3916
All	All	0.49	1/17277 (0.0%)	0.61	0/23441

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	D	0	1
1	E	0	2
All	All	0	3

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	174	CYS	CB-SG	-5.01	1.73	1.81

There are no bond angle outliers.

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	D	251	GLU	Peptide

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Mol	Chain	Res	Type	Group
1	E	250	HIS	Peptide
1	E	7	LYS	Peptide

## 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	2828	0	2801	39	0
1	B	2833	0	2808	37	0
1	C	2828	0	2800	37	0
1	D	2825	0	2798	38	0
1	E	2803	0	2780	85	0
1	F	2833	0	2801	50	0
2	A	2	0	0	0	0
2	B	2	0	0	0	0
2	C	2	0	0	0	0
2	D	2	0	0	0	0
2	E	2	0	0	0	0
2	F	2	0	0	0	0
3	A	44	0	26	4	0
3	B	44	0	25	1	0
3	C	44	0	26	3	0
3	D	44	0	26	2	0
3	E	44	0	26	2	0
3	F	44	0	26	3	0
4	D	1	0	0	0	0
5	A	14	0	0	1	0
5	B	17	0	0	0	0
5	C	4	0	0	0	0
5	D	7	0	0	0	0
5	E	2	0	0	0	0
5	F	4	0	0	0	0
All	All	17275	0	16943	264	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 8.

All (264) 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:E:206:ALA:CB	1:E:373:ARG:HH11	1.07	1.65
1:E:206:ALA:CB	1:E:373:ARG:NH1	1.73	1.26
1:E:206:ALA:HB3	1:E:373:ARG:NH1	0.87	1.18
1:E:99:TYR:HB3	1:E:329:ARG:HG3	1.52	0.91
1:E:206:ALA:HB3	1:E:373:ARG:HH12	1.08	0.88
1:F:90:ASP:OD2	1:F:163:LYS:HE2	1.75	0.86
1:F:300:ALA:HB3	1:F:303:GLN:HG3	1.59	0.85
1:E:206:ALA:HB1	1:E:373:ARG:HH11	1.41	0.84
1:E:152:GLU:HB3	1:E:378:PHE:CZ	2.13	0.84
1:D:21:LYS:HG2	1:D:22:PRO:HD2	1.62	0.79
1:E:275:ASN:HB3	1:E:278:VAL:HG12	1.68	0.75
1:C:178:CYS:SG	3:C:403:NAD:H5N	2.28	0.73
1:E:7:LYS:HB3	1:E:8:PRO:HD2	1.71	0.72
1:A:277:ALA:HB2	1:B:340:MET:CE	2.21	0.70
1:B:340:MET:CE	1:B:340:MET:HA	2.20	0.70
1:C:99:TYR:O	1:C:329:ARG:NH1	2.25	0.69
1:F:198:THR:HG22	1:F:222:ARG:HB3	1.72	0.69
1:E:227:ASP:OD1	3:E:403:NAD:O2B	2.11	0.69
1:F:255:GLN:O	1:F:259:VAL:HG23	1.93	0.68
1:C:275:ASN:HB3	1:C:278:VAL:HG22	1.76	0.67
1:E:276:THR:HG21	1:E:303:GLN:HB3	1.76	0.66
1:E:228:ILE:HA	1:E:246:ASN:OD1	1.96	0.66
1:E:72:ALA:HB2	1:E:149:THR:HG23	1.79	0.65
1:E:256:GLN:O	1:E:260:GLU:HG3	1.97	0.65
1:E:356:PHE:HB2	1:E:378:PHE:O	1.96	0.64
1:C:24:GLU:HG2	1:C:26:ARG:HG2	1.79	0.64
1:F:93:ILE:HD12	1:F:164:ILE:HG21	1.79	0.64
1:D:21:LYS:HG2	1:D:22:PRO:CD	2.27	0.64
1:E:72:ALA:HB2	1:E:149:THR:CG2	2.27	0.64
1:C:54:THR:HA	1:C:59:ASP:HB2	1.79	0.64
1:A:277:ALA:HB2	1:B:340:MET:HE1	1.78	0.63
1:D:175:LEU:HD11	1:D:350:ILE:HG13	1.81	0.63
1:E:28:VAL:HG23	1:E:136:VAL:HG13	1.81	0.62
1:C:198:THR:HG22	1:C:222:ARG:HB3	1.82	0.62
1:F:56:GLY:O	1:F:58:LEU:HD22	2.00	0.61
1:C:54:THR:OG1	1:C:59:ASP:OD2	2.16	0.61
1:E:178:CYS:SG	3:E:403:NAD:H5N	2.41	0.61
1:D:238:GLU:OE1	1:D:348:LYS:NZ	2.32	0.60
1:D:106:CYS:O	1:D:327:LYS:NZ	2.34	0.60
1:E:41:GLN:O	1:E:74:GLY:HA3	2.02	0.60
1:E:206:ALA:HB1	1:E:373:ARG:NH1	2.01	0.59
1:D:63:ARG:O	1:D:66:CYS:HB3	2.02	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:308:ARG:HG2	1:E:303:GLN:O	2.01	0.59
1:F:152:GLU:HG3	1:F:378:PHE:CD2	2.37	0.59
1:E:360:ASN:O	1:E:364:GLU:HG2	2.03	0.59
1:E:279:MET:HG2	1:E:295:ILE:HG12	1.84	0.58
1:C:257:VAL:O	1:C:261:MET:HG3	2.03	0.58
1:F:212:ILE:HG23	1:F:223:ILE:HG21	1.85	0.58
1:F:352:HIS:CE1	1:F:365:LEU:HD21	2.39	0.58
1:E:41:GLN:HB2	1:E:153:TYR:CE1	2.39	0.57
1:B:228:ILE:HG22	1:B:247:PRO:HD2	1.86	0.57
1:B:289:GLY:HA2	1:C:113:LEU:HD12	1.85	0.57
1:B:340:MET:HE3	1:B:340:MET:HA	1.85	0.57
1:B:178:CYS:SG	3:B:403:NAD:H5N	2.45	0.56
1:A:30:VAL:HG22	1:A:134:PHE:CD1	2.41	0.56
1:A:297:GLY:HA2	3:A:403:NAD:H1D	1.86	0.55
1:A:99:TYR:HB3	1:A:329:ARG:HB2	1.89	0.55
1:F:361:GLU:OE2	1:F:364:GLU:OE1	2.24	0.55
1:D:178:CYS:SG	3:D:403:NAD:H5N	2.47	0.55
1:F:4:THR:HB	1:F:9:ILE:HD11	1.87	0.55
1:F:73:ALA:HB1	1:F:170:LEU:HD22	1.89	0.55
1:E:244:SNC:C	1:E:245:ILE:HG13	2.35	0.55
1:F:227:ASP:OD1	3:F:403:NAD:O2B	2.19	0.55
1:D:255:GLN:O	1:D:259:VAL:HG23	2.06	0.54
1:E:134:PHE:HB2	1:E:141:ILE:HB	1.88	0.54
1:D:263:GLU:HB3	1:D:264:TRP:CD1	2.42	0.54
1:E:34:GLY:O	1:E:80:GLY:HA3	2.06	0.54
1:D:312:LEU:HD12	1:E:295:ILE:HD12	1.89	0.54
1:A:277:ALA:HB2	1:B:340:MET:HE2	1.89	0.54
1:F:58:LEU:N	1:F:58:LEU:HD22	2.23	0.54
1:E:132:PRO:HG3	1:E:142:TYR:CD1	2.42	0.54
1:B:41:GLN:HG3	1:B:153:TYR:CZ	2.43	0.54
1:A:257:VAL:O	1:A:261:MET:HG3	2.07	0.54
1:D:196:GLY:O	1:D:221:SER:HB3	2.08	0.54
1:E:11:CYS:HB2	1:E:152:GLU:CG	2.38	0.54
1:E:11:CYS:HB2	1:E:152:GLU:HG3	1.89	0.54
1:E:77:GLU:OE1	1:E:78:SER:HB2	2.08	0.53
1:F:100:CYS:HB3	1:F:116:SER:HB3	1.90	0.53
1:A:104:LYS:CE	1:F:264:TRP:HE1	2.22	0.53
1:B:172:LYS:HD2	1:B:347:ASP:OD1	2.07	0.53
1:E:275:ASN:HB3	1:E:278:VAL:CG1	2.36	0.53
1:D:229:ASP:OD1	1:D:231:THR:HG23	2.09	0.53
1:E:86:VAL:HG12	1:E:163:LYS:HE2	1.89	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:175:LEU:HD22	1:B:373:ARG:HG3	1.89	0.53
1:A:277:ALA:CB	1:B:340:MET:CE	2.87	0.53
1:B:198:THR:HG22	1:B:222:ARG:HB3	1.90	0.52
1:C:354:MET:HB2	1:C:376:LEU:HD23	1.91	0.52
1:A:368:ALA:HB3	1:A:370:GLU:HG2	1.90	0.52
1:F:48:CYS:HB3	1:F:70:HIS:CE1	2.45	0.52
1:F:56:GLY:C	1:F:58:LEU:HD22	2.30	0.52
1:C:296:VAL:O	3:C:403:NAD:H2N	2.09	0.52
1:F:361:GLU:HA	1:F:364:GLU:HG2	1.92	0.52
1:E:271:GLU:CD	1:E:279:MET:HG3	2.29	0.52
1:F:213:GLU:HG3	1:F:345:LEU:HD12	1.91	0.52
1:B:17:TRP:HA	1:B:65:PRO:HB3	1.92	0.52
1:D:204:LEU:HD11	1:D:225:ALA:HB1	1.93	0.52
1:E:17:TRP:HH2	1:E:136:VAL:HG21	1.75	0.52
1:E:70:HIS:CD2	1:E:71:GLU:HG2	2.45	0.51
1:E:276:THR:CG2	1:E:303:GLN:HB3	2.39	0.51
1:A:120:PHE:CE2	1:A:127:LYS:HG3	2.45	0.51
1:D:196:GLY:N	1:D:219:GLY:O	2.41	0.51
1:A:173:VAL:HG11	1:A:336:VAL:HG13	1.93	0.51
1:D:99:TYR:HB3	1:D:329:ARG:HB2	1.92	0.51
1:C:204:LEU:N	1:C:227:ASP:OD2	2.45	0.50
1:E:344:THR:HG22	1:E:346:LEU:H	1.76	0.50
1:C:15:ILE:HD11	1:C:28:VAL:HG22	1.92	0.50
1:A:48:CYS:HB2	1:A:71:GLU:OE2	2.11	0.50
1:B:283:LEU:HG	1:B:283:LEU:O	2.10	0.50
1:F:48:CYS:HB3	1:F:70:HIS:HE1	1.76	0.50
1:D:48:CYS:HB3	1:D:70:HIS:CE1	2.46	0.50
1:B:361:GLU:OE1	1:B:361:GLU:N	2.45	0.49
1:E:333:PRO:O	1:E:336:VAL:HG22	2.12	0.49
1:E:257:VAL:O	1:E:261:MET:HG3	2.13	0.49
1:A:277:ALA:CB	1:B:340:MET:HE2	2.43	0.49
1:D:183:GLY:HA3	1:D:210:ALA:HB3	1.94	0.49
1:D:295:ILE:HD12	1:E:312:LEU:HD12	1.94	0.49
1:A:30:VAL:HG22	1:A:134:PHE:HD1	1.77	0.49
1:E:18:GLU:OE1	1:E:21:LYS:HD2	2.13	0.49
1:C:189:ASN:O	1:C:192:LYS:NZ	2.41	0.48
1:C:48:CYS:O	1:C:51:ASP:HB2	2.12	0.48
1:B:120:PHE:CE1	1:B:127:LYS:HG3	2.48	0.48
1:C:18:GLU:HG2	1:C:19:ALA:H	1.79	0.48
1:D:253:PRO:O	1:D:257:VAL:HG23	2.14	0.48
1:E:157:HIS:HB3	1:E:159:GLN:OE1	2.13	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:152:GLU:HG3	1:A:378:PHE:CD1	2.49	0.48
1:A:178:CYS:SG	3:A:403:NAD:H5N	2.54	0.48
1:F:233:PHE:CD2	1:F:244:SNC:HB2	2.49	0.48
1:C:28:VAL:HG11	1:C:134:PHE:HB3	1.96	0.48
1:E:333:PRO:O	1:E:337:THR:HG23	2.14	0.48
1:E:191:ALA:HB1	1:E:268:TYR:CD2	2.49	0.48
1:E:31:ALA:HB3	1:E:133:ARG:HD3	1.94	0.47
1:B:204:LEU:HD11	1:B:225:ALA:HB1	1.96	0.47
1:E:199:VAL:HA	1:E:268:TYR:O	2.15	0.47
1:D:113:LEU:HD12	1:E:289:GLY:HA2	1.96	0.47
1:F:29:THR:HG23	1:F:135:THR:HB	1.96	0.47
1:E:59:ASP:OD2	1:E:61:GLU:HB2	2.15	0.47
1:F:159:GLN:O	1:F:329:ARG:HD2	2.14	0.47
1:A:311:GLN:HG3	1:A:316:ARG:HD2	1.97	0.47
1:F:113:LEU:HD21	1:F:322:ALA:HB3	1.96	0.47
1:A:104:LYS:NZ	1:F:264:TRP:HE1	2.13	0.47
1:F:111:SER:OG	1:F:112:ASN:N	2.48	0.47
1:A:216:LYS:HD2	1:A:240:GLY:HA3	1.96	0.46
1:E:204:LEU:HD11	1:E:225:ALA:HB1	1.96	0.46
1:D:271:GLU:HG3	1:D:279:MET:HA	1.97	0.46
1:D:297:GLY:HA2	3:D:403:NAD:H1D	1.97	0.46
1:E:351:THR:HG23	1:E:372:LEU:HB2	1.98	0.46
1:F:228:ILE:HB	1:F:248:LYS:HE2	1.97	0.46
1:A:99:TYR:O	1:A:329:ARG:NH1	2.48	0.46
1:E:162:ALA:HB1	1:E:333:PRO:HD3	1.97	0.46
1:A:171:ASP:N	1:A:171:ASP:OD1	2.48	0.46
1:B:273:ILE:HD12	1:B:278:VAL:HG11	1.97	0.46
1:C:13:ALA:HB3	1:C:28:VAL:HG23	1.98	0.46
1:B:14:ALA:HB3	1:B:150:PHE:HB3	1.97	0.46
1:E:117:VAL:HG12	1:E:127:LYS:HD3	1.96	0.46
1:F:49:GLN:CD	1:F:366:LEU:HD21	2.37	0.46
1:A:275:ASN:OD1	1:A:278:VAL:HG23	2.16	0.46
1:D:94:PRO:HB2	1:D:147:THR:HG22	1.98	0.46
1:E:41:GLN:HB2	1:E:153:TYR:CZ	2.51	0.46
1:F:210:ALA:HA	1:F:349:TYR:OH	2.16	0.46
1:B:39:ARG:HB2	1:B:155:VAL:HG22	1.97	0.45
1:E:30:VAL:HG11	1:E:153:TYR:O	2.17	0.45
1:F:239:PHE:HE2	1:F:349:TYR:CZ	2.34	0.45
1:F:361:GLU:OE2	1:F:364:GLU:CD	2.55	0.45
1:B:107:LYS:HE2	1:B:107:LYS:HB3	1.83	0.45
1:B:92:VAL:HA	1:B:162:ALA:O	2.16	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:41:GLN:HA	1:E:152:GLU:O	2.16	0.45
1:E:132:PRO:O	1:E:133:ARG:NH1	2.49	0.45
1:E:52:ALA:O	1:E:56:GLY:N	2.41	0.45
1:F:273:ILE:HD12	1:F:278:VAL:HG11	1.97	0.45
1:C:204:LEU:HD11	1:C:225:ALA:HB1	1.97	0.45
1:C:276:THR:HG21	1:C:303:GLN:HB3	1.99	0.45
1:A:136:VAL:O	1:A:139:LYS:HG2	2.17	0.44
1:B:234:PRO:O	1:B:238:GLU:HG3	2.16	0.44
1:A:263:GLU:HB3	1:A:264:TRP:CD1	2.52	0.44
1:C:268:TYR:HA	1:C:292:THR:O	2.17	0.44
1:A:323:PHE:N	3:A:403:NAD:O7N	2.47	0.44
1:A:107:LYS:O	1:D:337:THR:HG21	2.18	0.44
1:E:201:VAL:HG21	1:E:212:ILE:HG12	2.00	0.44
1:A:48:CYS:HB3	1:A:70:HIS:CE1	2.53	0.44
1:A:264:TRP:O	1:A:287:HIS:HA	2.18	0.44
1:C:227:ASP:HA	3:C:403:NAD:N3A	2.33	0.44
1:C:263:GLU:HG2	1:C:264:TRP:CD1	2.53	0.43
1:E:344:THR:HG22	1:E:346:LEU:N	2.33	0.43
1:A:360:ASN:O	1:A:364:GLU:HG3	2.18	0.43
1:D:172:LYS:HD2	1:D:347:ASP:OD1	2.18	0.43
1:D:264:TRP:HB2	1:D:287:HIS:CE1	2.53	0.43
1:E:204:LEU:HD21	1:E:225:ALA:HB1	2.00	0.43
1:B:288:ARG:HD3	1:C:105:PHE:CZ	2.53	0.43
1:F:172:LYS:HD2	1:F:347:ASP:OD1	2.18	0.43
1:B:16:ALA:O	1:B:65:PRO:HA	2.18	0.43
1:C:161:VAL:O	1:C:329:ARG:HG2	2.19	0.43
1:E:28:VAL:HG22	1:E:29:THR:N	2.33	0.43
1:A:371:CYS:SG	1:A:374[A]:CYS:HB2	2.58	0.43
1:E:224:ILE:HG23	1:E:245:ILE:HD12	2.00	0.43
1:D:305:ILE:O	1:E:306:SER:HA	2.18	0.43
1:D:68:LEU:HD23	1:D:144:PHE:CG	2.52	0.43
1:E:91:HIS:CD2	1:E:166:VAL:HA	2.54	0.43
1:E:163:LYS:O	1:E:333:PRO:HG3	2.18	0.43
1:F:203:GLY:O	1:F:208:GLY:HA3	2.19	0.43
1:C:63:ARG:O	1:C:66:CYS:HB3	2.19	0.43
1:D:216:LYS:HE2	1:D:240:GLY:HA3	2.01	0.43
1:F:297:GLY:HA2	3:F:403:NAD:H1D	2.01	0.43
1:C:145:MET:O	1:C:147:THR:HG23	2.18	0.43
1:E:280:ARG:HE	1:E:284:GLU:CD	2.22	0.43
1:E:159:GLN:N	1:E:159:GLN:OE1	2.44	0.42
1:E:203:GLY:O	1:E:208:GLY:HA3	2.19	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:45:THR:O	1:E:375:VAL:HA	2.20	0.42
1:B:175:LEU:HD11	1:B:350:ILE:HG13	2.01	0.42
1:B:227:ASP:OD1	1:B:228:ILE:N	2.53	0.42
1:A:49:GLN:HG3	1:A:52:ALA:HB3	1.99	0.42
1:F:67:ILE:HG22	1:F:150:PHE:HB2	2.00	0.42
1:E:197:SER:OG	1:E:268:TYR:HE1	2.01	0.42
1:A:319:MET:HE2	1:F:317:ARG:HG2	2.01	0.42
1:E:17:TRP:CH2	1:E:136:VAL:HG21	2.55	0.42
1:F:41:GLN:HG3	1:F:153:TYR:CZ	2.54	0.42
1:A:316:ARG:O	5:A:501:HOH:O	2.21	0.42
1:F:187:VAL:HG13	1:F:193:VAL:HB	2.01	0.42
1:B:307:THR:O	1:C:305:ILE:HG12	2.20	0.42
1:D:100:CYS:HB3	1:D:116:SER:HB3	2.02	0.42
1:E:244:SNC:O	1:E:245:ILE:HG13	2.20	0.42
1:B:356:PHE:CD2	1:B:378:PHE:CZ	3.08	0.42
1:E:69:GLY:C	1:E:149:THR:HB	2.40	0.42
1:E:7:LYS:HB3	1:E:8:PRO:CD	2.46	0.42
1:A:304:GLU:HG2	1:F:307:THR:O	2.20	0.42
1:D:264:TRP:O	1:D:287:HIS:HA	2.20	0.41
1:F:13:ALA:HB2	1:F:28:VAL:HG11	2.02	0.41
1:C:134:PHE:HB2	1:C:141:ILE:HB	2.01	0.41
1:B:123:LYS:O	1:B:125:VAL:HG13	2.20	0.41
1:D:15:ILE:HD12	1:D:26:ARG:HD3	2.01	0.41
1:D:233:PHE:CD2	1:D:244:SNC:HB2	2.55	0.41
1:D:319:MET:HG2	1:E:317:ARG:HG3	2.01	0.41
1:E:280:ARG:O	1:E:284:GLU:HG3	2.19	0.41
1:E:54:THR:HB	1:E:68:LEU:HD21	2.02	0.41
1:F:331:GLN:O	1:F:334:ASP:HB2	2.20	0.41
1:F:3:GLU:HG3	1:F:4:THR:HG23	2.02	0.41
1:B:203:GLY:O	1:B:208:GLY:HA3	2.20	0.41
1:E:305:ILE:HB	1:E:318:TRP:CH2	2.56	0.41
1:C:175:LEU:HD11	1:C:350:ILE:HG13	2.02	0.41
1:C:13:ALA:HB3	1:C:28:VAL:CG2	2.50	0.41
1:D:355:LYS:HD2	1:D:355:LYS:HA	1.73	0.41
1:C:114:CYS:SG	1:C:116:SER:HB2	2.61	0.41
1:A:273:ILE:HD13	3:A:403:NAD:C4A	2.51	0.41
1:B:99:TYR:HB3	1:B:329:ARG:HB2	2.03	0.41
1:C:228:ILE:HG13	1:C:228:ILE:H	1.67	0.41
1:D:182:THR:HG23	1:D:324:GLY:H	1.86	0.41
1:F:71:GLU:HG2	1:F:178:CYS:HB3	2.03	0.41
1:B:100:CYS:HB3	1:B:114:CYS:SG	2.61	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:187:VAL:HG13	1:C:193:VAL:CG2	2.51	0.41
1:C:203:GLY:O	1:C:204:LEU:HD23	2.21	0.41
1:C:261:MET:HB3	1:C:261:MET:HE3	1.92	0.41
1:F:373:ARG:HA	1:F:373:ARG:HD3	1.93	0.41
1:E:134:PHE:CB	1:E:141:ILE:HB	2.50	0.40
1:E:77:GLU:OE1	1:E:78:SER:N	2.54	0.40
1:F:309:PRO:O	1:F:313:VAL:HG23	2.21	0.40
1:C:68:LEU:HD23	1:C:144:PHE:CG	2.56	0.40
1:D:288:ARG:NH1	1:E:113:LEU:HB3	2.36	0.40
1:E:68:LEU:HB3	1:E:69:GLY:H	1.72	0.40
1:A:312:LEU:HD12	1:F:295:ILE:HD12	2.03	0.40
1:F:296:VAL:O	3:F:403:NAD:H2N	2.21	0.40
1:E:33:PRO:HG3	1:E:78:SER:HB3	2.03	0.40
1:A:116:SER:OG	1:A:117:VAL:HG13	2.22	0.40
1:B:35:PRO:O	1:B:37:GLU:HG3	2.21	0.40
1:A:104:LYS:HD2	1:F:264:TRP:CD1	2.56	0.40
1:B:34:GLY:O	1:B:80:GLY:HA3	2.21	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	375/378 (99%)	358 (96%)	16 (4%)	1 (0%)	41	71
1	B	375/378 (99%)	354 (94%)	21 (6%)	0	100	100
1	C	375/378 (99%)	354 (94%)	20 (5%)	1 (0%)	41	71
1	D	374/378 (99%)	358 (96%)	15 (4%)	1 (0%)	41	71
1	E	371/378 (98%)	329 (89%)	39 (10%)	3 (1%)	19	51
1	F	375/378 (99%)	348 (93%)	24 (6%)	3 (1%)	19	51
All	All	2245/2268 (99%)	2101 (94%)	135 (6%)	9 (0%)	34	66

All (9) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	E	8	PRO
1	F	178	CYS
1	C	178	CYS
1	D	178	CYS
1	A	178	CYS
1	E	252	LYS
1	E	178	CYS
1	F	68	LEU
1	F	228	ILE

### 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	299/299 (100%)	295 (99%)	4 (1%)	69	90
1	B	299/299 (100%)	294 (98%)	5 (2%)	60	86
1	C	299/299 (100%)	294 (98%)	5 (2%)	60	86
1	D	298/299 (100%)	293 (98%)	5 (2%)	60	86
1	E	295/299 (99%)	284 (96%)	11 (4%)	34	68
1	F	299/299 (100%)	292 (98%)	7 (2%)	50	80
All	All	1789/1794 (100%)	1752 (98%)	37 (2%)	53	81

All (37) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	104	LYS
1	A	107	LYS
1	A	318	TRP
1	A	358	GLN
1	B	11	CYS
1	B	48	CYS
1	B	104	LYS
1	B	318	TRP

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Mol	Chain	Res	Type
1	B	340	MET
1	C	91	HIS
1	C	104	LYS
1	C	137	ASP
1	C	317	ARG
1	C	318	TRP
1	D	91	HIS
1	D	221	SER
1	D	288	ARG
1	D	318	TRP
1	D	357	ASP
1	E	47	LEU
1	E	77	GLU
1	E	128	SER
1	E	151	SER
1	E	252	LYS
1	E	271	GLU
1	E	308	ARG
1	E	318	TRP
1	E	356	PHE
1	E	371	CYS
1	E	378	PHE
1	F	91	HIS
1	F	133	ARG
1	F	249	ASP
1	F	255	GLN
1	F	317	ARG
1	F	318	TRP
1	F	341	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	49	GLN
1	B	358	GLN
1	F	41	GLN
1	F	256	GLN

### 5.3.3 RNA

There are no RNA molecules in this entry.

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

6 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	SNC	C	244	1	4,7,8	0.81	0	1,7,9	2.92	1 (100%)
1	SNC	E	244	1	4,7,8	0.93	0	1,7,9	0.93	0
1	SNC	A	244	1	4,7,8	0.73	0	1,7,9	0.92	0
1	SNC	D	244	1	4,7,8	0.87	0	1,7,9	0.88	0
1	SNC	F	244	1	4,7,8	0.87	0	1,7,9	1.82	0
1	SNC	B	244	1	4,7,8	0.79	0	1,7,9	2.06	1 (100%)

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	SNC	C	244	1	-	0/0/6/8	-
1	SNC	E	244	1	-	0/0/6/8	-
1	SNC	A	244	1	-	0/0/6/8	-
1	SNC	D	244	1	-	0/0/6/8	-
1	SNC	F	244	1	-	0/0/6/8	-
1	SNC	B	244	1	-	0/0/6/8	-

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	244	SNC	CA-CB-SG	-2.92	106.68	112.76
1	B	244	SNC	CA-CB-SG	-2.06	108.47	112.76

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

3 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	E	244	SNC	2	0
1	D	244	SNC	1	0
1	F	244	SNC	1	0

## 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 19 ligands modelled in this entry, 13 are monoatomic - leaving 6 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	NAD	F	403	-	42,48,48	1.96	10 (23%)	50,73,73	1.61	11 (22%)
3	NAD	D	403	-	42,48,48	2.25	12 (28%)	50,73,73	1.56	11 (22%)
3	NAD	B	403	1	42,48,48	2.15	13 (30%)	50,73,73	1.62	12 (24%)
3	NAD	C	403	1	42,48,48	2.88	14 (33%)	50,73,73	2.14	15 (30%)
3	NAD	A	403	-	42,48,48	2.21	10 (23%)	50,73,73	1.58	11 (22%)
3	NAD	E	403	-	42,48,48	2.00	11 (26%)	50,73,73	1.64	11 (22%)

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	NAD	F	403	-	-	11/26/62/62	0/5/5/5
3	NAD	D	403	-	-	11/26/62/62	0/5/5/5
3	NAD	B	403	1	-	12/26/62/62	0/5/5/5

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	NAD	C	403	1	-	11/26/62/62	0/5/5/5
3	NAD	A	403	-	-	9/26/62/62	0/5/5/5
3	NAD	E	403	-	-	8/26/62/62	0/5/5/5

All (70) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	403	NAD	C2N-N1N	10.02	1.47	1.35
3	A	403	NAD	PN-O5D	6.99	1.87	1.59
3	D	403	NAD	PN-O5D	6.66	1.86	1.59
3	E	403	NAD	PN-O5D	6.63	1.86	1.59
3	C	403	NAD	O7N-C7N	6.58	1.36	1.24
3	C	403	NAD	C3N-C7N	6.29	1.60	1.50
3	C	403	NAD	PN-O5D	5.95	1.83	1.59
3	F	403	NAD	PN-O5D	5.88	1.83	1.59
3	B	403	NAD	PN-O5D	5.75	1.82	1.59
3	B	403	NAD	PA-O5B	5.62	1.82	1.59
3	D	403	NAD	PA-O5B	5.56	1.81	1.59
3	C	403	NAD	C2N-C3N	5.46	1.47	1.39
3	A	403	NAD	PA-O5B	5.45	1.81	1.59
3	A	403	NAD	C2D-C1D	5.06	1.61	1.53
3	D	403	NAD	C2D-C1D	4.97	1.61	1.53
3	E	403	NAD	PA-O5B	4.58	1.77	1.59
3	B	403	NAD	C7N-N7N	4.34	1.41	1.33
3	B	403	NAD	C3N-C7N	4.34	1.57	1.50
3	F	403	NAD	C7N-N7N	4.31	1.41	1.33
3	F	403	NAD	C2N-N1N	4.31	1.40	1.35
3	B	403	NAD	C2D-C1D	4.14	1.60	1.53
3	D	403	NAD	C7N-N7N	4.14	1.40	1.33
3	F	403	NAD	PA-O5B	4.05	1.75	1.59
3	C	403	NAD	PA-O5B	3.99	1.75	1.59
3	E	403	NAD	C7N-N7N	3.91	1.40	1.33
3	C	403	NAD	C7N-N7N	3.91	1.40	1.33
3	D	403	NAD	C3N-C7N	3.80	1.56	1.50
3	E	403	NAD	C2D-C1D	3.69	1.59	1.53
3	E	403	NAD	C2N-N1N	3.59	1.39	1.35
3	A	403	NAD	C2N-N1N	3.53	1.39	1.35
3	C	403	NAD	C2B-C1B	3.50	1.59	1.53
3	D	403	NAD	C2N-N1N	3.38	1.39	1.35
3	A	403	NAD	C2A-N3A	3.35	1.37	1.32
3	A	403	NAD	C7N-N7N	3.33	1.39	1.33
3	F	403	NAD	C4A-N3A	3.17	1.40	1.35

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	F	403	NAD	C2A-N1A	3.10	1.39	1.33
3	E	403	NAD	C2A-N3A	3.07	1.37	1.32
3	A	403	NAD	C3D-C4D	2.97	1.60	1.53
3	F	403	NAD	C2A-N3A	2.96	1.36	1.32
3	B	403	NAD	C3D-C4D	2.94	1.60	1.53
3	B	403	NAD	C2N-N1N	2.82	1.38	1.35
3	D	403	NAD	C4A-N3A	2.75	1.39	1.35
3	D	403	NAD	C2A-N3A	2.73	1.36	1.32
3	C	403	NAD	C2A-N3A	2.70	1.36	1.32
3	A	403	NAD	C2A-N1A	2.67	1.38	1.33
3	B	403	NAD	C2A-N1A	2.66	1.38	1.33
3	A	403	NAD	C2N-C3N	2.59	1.43	1.39
3	B	403	NAD	C4N-C3N	2.59	1.43	1.39
3	E	403	NAD	C4A-N3A	2.49	1.39	1.35
3	D	403	NAD	C3D-C4D	2.48	1.59	1.53
3	D	403	NAD	O3B-C3B	-2.46	1.37	1.43
3	F	403	NAD	C2D-C1D	2.44	1.57	1.53
3	E	403	NAD	C2A-N1A	2.43	1.38	1.33
3	C	403	NAD	C3B-C4B	2.39	1.59	1.53
3	F	403	NAD	C2N-C3N	2.37	1.42	1.39
3	D	403	NAD	C2A-N1A	2.36	1.38	1.33
3	E	403	NAD	C3N-C7N	2.36	1.54	1.50
3	C	403	NAD	C2D-C1D	2.33	1.57	1.53
3	B	403	NAD	C4A-N3A	2.22	1.38	1.35
3	E	403	NAD	C3D-C4D	2.22	1.58	1.53
3	D	403	NAD	O4D-C4D	2.21	1.49	1.45
3	E	403	NAD	C2N-C3N	2.17	1.42	1.39
3	C	403	NAD	C2A-N1A	2.16	1.37	1.33
3	C	403	NAD	O4D-C4D	2.09	1.49	1.45
3	B	403	NAD	C2N-C3N	2.07	1.42	1.39
3	A	403	NAD	C4A-N3A	2.07	1.38	1.35
3	C	403	NAD	O2D-C2D	-2.06	1.38	1.43
3	B	403	NAD	C5B-C4B	2.03	1.57	1.51
3	B	403	NAD	C2A-N3A	2.00	1.35	1.32
3	F	403	NAD	C3D-C4D	2.00	1.58	1.53

All (71) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	403	NAD	O7N-C7N-C3N	6.26	127.12	119.63
3	C	403	NAD	C3N-C7N-N7N	-6.01	110.53	117.75
3	C	403	NAD	O4D-C1D-C2D	-4.53	100.31	106.93

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	403	NAD	PN-O3-PA	-4.20	118.41	132.83
3	E	403	NAD	O4B-C1B-C2B	-4.18	100.81	106.93
3	D	403	NAD	PN-O3-PA	-3.95	119.29	132.83
3	F	403	NAD	PN-O3-PA	-3.94	119.30	132.83
3	E	403	NAD	O2A-PA-O1A	3.86	131.34	112.24
3	E	403	NAD	PN-O3-PA	-3.83	119.68	132.83
3	A	403	NAD	O2A-PA-O1A	3.82	131.15	112.24
3	F	403	NAD	O2A-PA-O1A	3.79	130.99	112.24
3	C	403	NAD	O2A-PA-O1A	3.73	130.69	112.24
3	A	403	NAD	PN-O3-PA	-3.66	120.27	132.83
3	D	403	NAD	O2A-PA-O1A	3.59	130.01	112.24
3	B	403	NAD	O2A-PA-O1A	3.59	129.97	112.24
3	D	403	NAD	O2N-PN-O1N	3.50	129.53	112.24
3	A	403	NAD	O4B-C1B-C2B	-3.45	101.89	106.93
3	F	403	NAD	O2N-PN-O1N	3.41	129.12	112.24
3	C	403	NAD	O2N-PN-O1N	3.37	128.91	112.24
3	E	403	NAD	O2N-PN-O1N	3.31	128.62	112.24
3	F	403	NAD	O4B-C1B-C2B	-3.25	102.18	106.93
3	B	403	NAD	O2N-PN-O1N	3.14	127.76	112.24
3	C	403	NAD	O5B-PA-O1A	-3.10	96.95	109.07
3	E	403	NAD	O5B-PA-O1A	-3.06	97.11	109.07
3	B	403	NAD	O5B-PA-O1A	-3.05	97.15	109.07
3	A	403	NAD	O2N-PN-O1N	3.03	127.23	112.24
3	B	403	NAD	PN-O3-PA	-2.98	122.60	132.83
3	B	403	NAD	O2N-PN-O5D	-2.87	94.40	107.75
3	C	403	NAD	O4B-C1B-C2B	-2.82	102.81	106.93
3	A	403	NAD	O5B-PA-O1A	-2.81	98.08	109.07
3	D	403	NAD	O3B-C3B-C4B	-2.80	102.94	111.05
3	F	403	NAD	O5B-PA-O1A	-2.76	98.30	109.07
3	B	403	NAD	O5D-PN-O1N	-2.75	98.32	109.07
3	E	403	NAD	O5D-PN-O1N	-2.73	98.39	109.07
3	C	403	NAD	O5D-PN-O1N	-2.71	98.49	109.07
3	D	403	NAD	O5B-PA-O1A	-2.68	98.61	109.07
3	B	403	NAD	O7N-C7N-C3N	2.67	122.83	119.63
3	B	403	NAD	PN-O5D-C5D	-2.65	106.16	121.68
3	D	403	NAD	O5D-PN-O1N	-2.63	98.78	109.07
3	F	403	NAD	O5D-PN-O1N	-2.58	98.99	109.07
3	C	403	NAD	C1B-N9A-C4A	-2.54	122.18	126.64
3	B	403	NAD	C2N-N1N-C1D	-2.52	113.53	119.14
3	D	403	NAD	O4B-C1B-C2B	-2.46	103.33	106.93
3	A	403	NAD	PN-O5D-C5D	-2.45	107.29	121.68
3	A	403	NAD	O5D-PN-O1N	-2.42	99.61	109.07

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	403	NAD	PN-O5D-C5D	-2.39	107.67	121.68
3	F	403	NAD	O2N-PN-O5D	-2.37	96.72	107.75
3	D	403	NAD	O2N-PN-O5D	-2.34	96.87	107.75
3	E	403	NAD	O2N-PN-O5D	-2.34	96.89	107.75
3	A	403	NAD	O3B-C3B-C4B	-2.33	104.30	111.05
3	F	403	NAD	C5B-C4B-C3B	-2.33	106.44	115.18
3	C	403	NAD	O2N-PN-O5D	-2.30	97.04	107.75
3	A	403	NAD	O2N-PN-O5D	-2.30	97.08	107.75
3	F	403	NAD	PA-O5B-C5B	-2.30	108.22	121.68
3	F	403	NAD	PN-O5D-C5D	-2.28	108.31	121.68
3	E	403	NAD	PA-O5B-C5B	-2.27	108.36	121.68
3	A	403	NAD	C2A-N1A-C6A	-2.25	114.91	118.75
3	C	403	NAD	C5B-C4B-C3B	-2.24	106.78	115.18
3	B	403	NAD	C4N-C3N-C7N	2.19	126.91	121.04
3	E	403	NAD	C5B-C4B-C3B	-2.17	107.06	115.18
3	F	403	NAD	O3B-C3B-C4B	-2.15	104.84	111.05
3	C	403	NAD	C5D-C4D-C3D	-2.12	107.24	115.18
3	E	403	NAD	PN-O5D-C5D	-2.12	109.27	121.68
3	D	403	NAD	C5B-C4B-C3B	-2.09	107.35	115.18
3	C	403	NAD	PA-O5B-C5B	-2.08	109.49	121.68
3	B	403	NAD	C5B-C4B-C3B	-2.06	107.47	115.18
3	A	403	NAD	O7N-C7N-C3N	2.04	122.08	119.63
3	B	403	NAD	C4A-C5A-N7A	2.04	111.52	109.40
3	E	403	NAD	O3B-C3B-C4B	-2.02	105.22	111.05
3	D	403	NAD	C3D-C2D-C1D	-2.01	97.95	100.98
3	C	403	NAD	C6N-C5N-C4N	2.01	122.36	119.44

There are no chirality outliers.

All (62) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	F	403	NAD	C5B-O5B-PA-O1A
3	F	403	NAD	C5D-O5D-PN-O3
3	F	403	NAD	O4D-C1D-N1N-C2N
3	F	403	NAD	O4D-C1D-N1N-C6N
3	F	403	NAD	C2D-C1D-N1N-C2N
3	F	403	NAD	C2D-C1D-N1N-C6N
3	D	403	NAD	C5B-O5B-PA-O1A
3	D	403	NAD	O4D-C1D-N1N-C2N
3	D	403	NAD	O4D-C1D-N1N-C6N
3	D	403	NAD	C2D-C1D-N1N-C2N
3	D	403	NAD	C2D-C1D-N1N-C6N

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Mol	Chain	Res	Type	Atoms
3	B	403	NAD	C5B-O5B-PA-O1A
3	B	403	NAD	O4D-C1D-N1N-C2N
3	B	403	NAD	O4D-C1D-N1N-C6N
3	B	403	NAD	C2D-C1D-N1N-C2N
3	C	403	NAD	C5B-O5B-PA-O1A
3	C	403	NAD	O4B-C4B-C5B-O5B
3	C	403	NAD	O4D-C1D-N1N-C2N
3	C	403	NAD	O4D-C1D-N1N-C6N
3	C	403	NAD	C2D-C1D-N1N-C2N
3	C	403	NAD	C2D-C1D-N1N-C6N
3	A	403	NAD	C5B-O5B-PA-O1A
3	A	403	NAD	C5B-O5B-PA-O2A
3	A	403	NAD	O4D-C1D-N1N-C6N
3	E	403	NAD	C5B-O5B-PA-O2A
3	E	403	NAD	C5B-O5B-PA-O3
3	E	403	NAD	O4B-C4B-C5B-O5B
3	E	403	NAD	C3B-C4B-C5B-O5B
3	E	403	NAD	O4D-C1D-N1N-C2N
3	E	403	NAD	O4D-C1D-N1N-C6N
3	E	403	NAD	C2D-C1D-N1N-C2N
3	E	403	NAD	C2D-C1D-N1N-C6N
3	F	403	NAD	O4B-C4B-C5B-O5B
3	F	403	NAD	C3B-C4B-C5B-O5B
3	D	403	NAD	O4B-C4B-C5B-O5B
3	D	403	NAD	C3B-C4B-C5B-O5B
3	B	403	NAD	O4B-C4B-C5B-O5B
3	B	403	NAD	C3B-C4B-C5B-O5B
3	C	403	NAD	C3B-C4B-C5B-O5B
3	A	403	NAD	O4B-C4B-C5B-O5B
3	A	403	NAD	C3B-C4B-C5B-O5B
3	B	403	NAD	O4D-C4D-C5D-O5D
3	B	403	NAD	C3D-C4D-C5D-O5D
3	A	403	NAD	O4D-C4D-C5D-O5D
3	A	403	NAD	C3D-C4D-C5D-O5D
3	D	403	NAD	O4D-C4D-C5D-O5D
3	F	403	NAD	C5B-O5B-PA-O3
3	D	403	NAD	C5B-O5B-PA-O3
3	B	403	NAD	C5B-O5B-PA-O3
3	B	403	NAD	C5D-O5D-PN-O3
3	C	403	NAD	C5B-O5B-PA-O3
3	C	403	NAD	C5D-O5D-PN-O3
3	A	403	NAD	C5B-O5B-PA-O3

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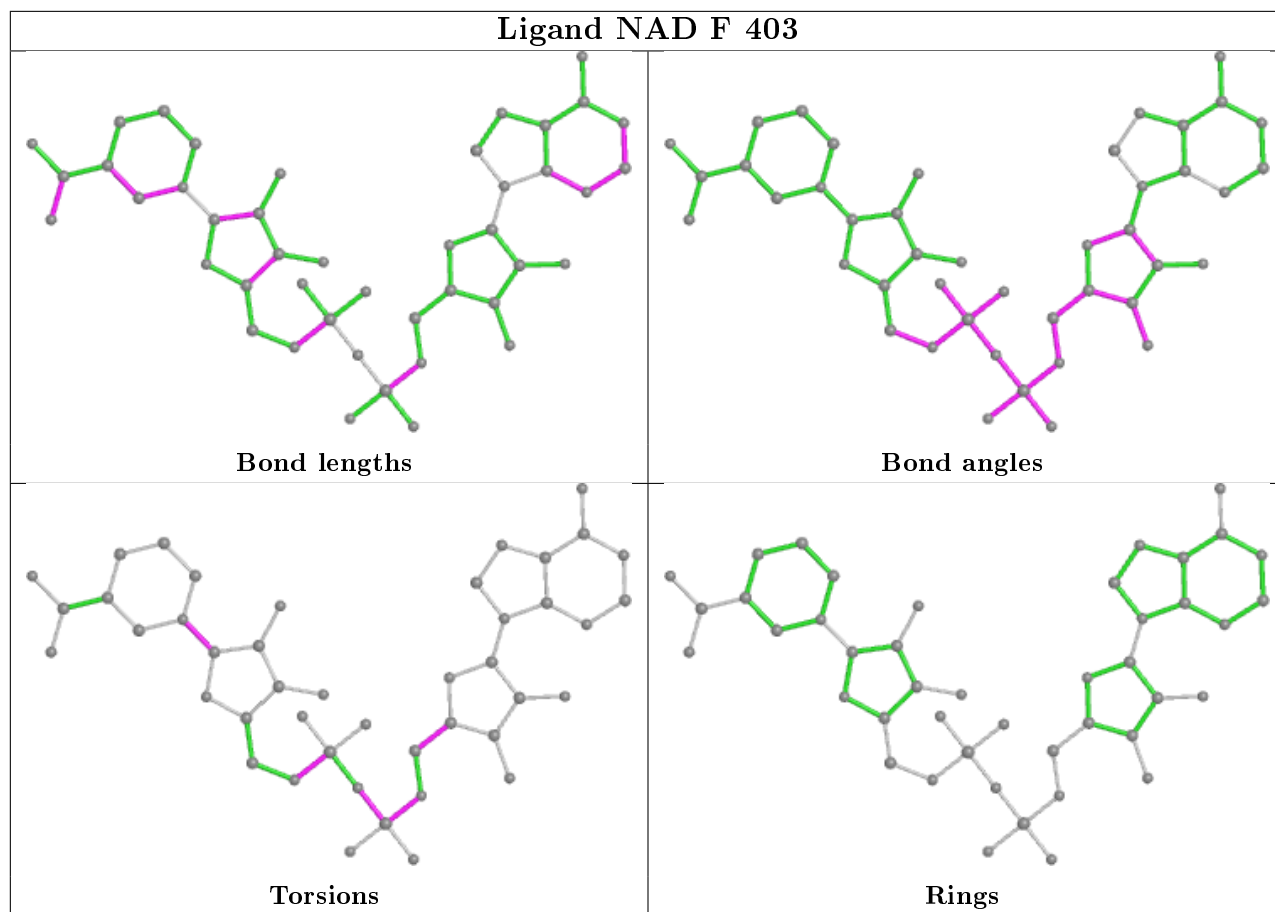
Mol	Chain	Res	Type	Atoms
3	C	403	NAD	O4D-C4D-C5D-O5D
3	F	403	NAD	C5B-O5B-PA-O2A
3	D	403	NAD	C5B-O5B-PA-O2A
3	B	403	NAD	C5B-O5B-PA-O2A
3	C	403	NAD	C5B-O5B-PA-O2A
3	D	403	NAD	C3D-C4D-C5D-O5D
3	B	403	NAD	C2D-C1D-N1N-C6N
3	A	403	NAD	C2D-C1D-N1N-C2N
3	F	403	NAD	PN-O3-PA-O2A

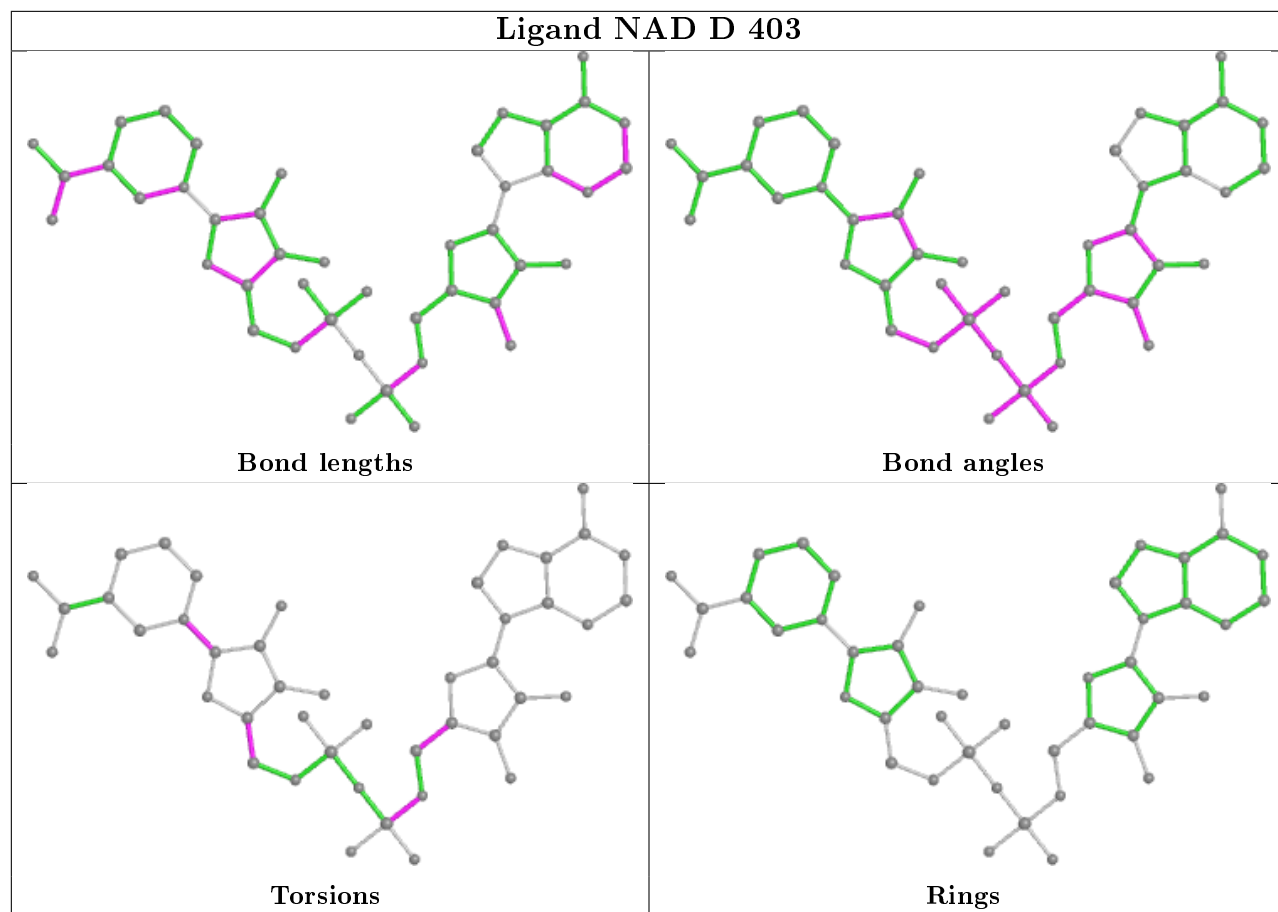
There are no ring outliers.

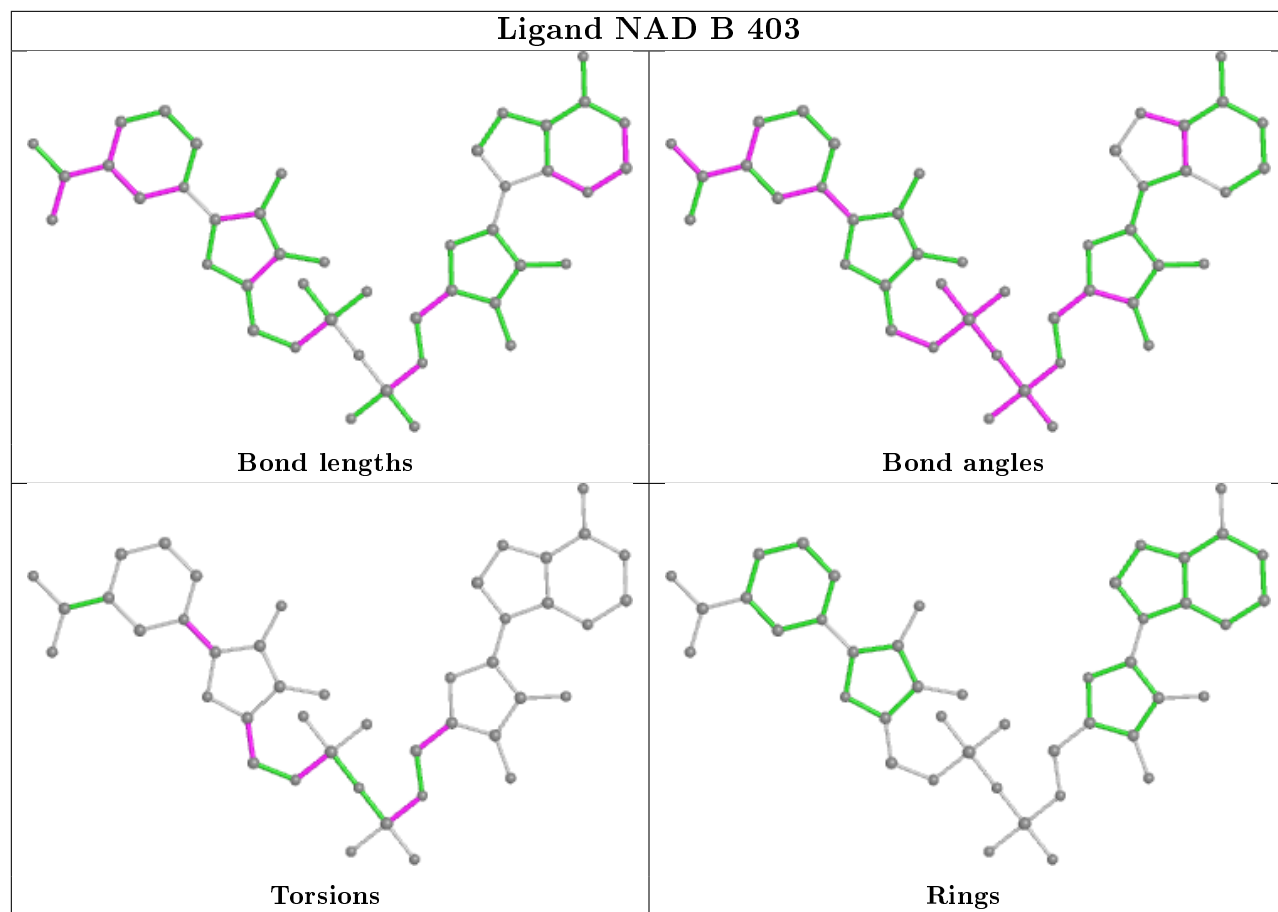
6 monomers are involved in 15 short contacts:

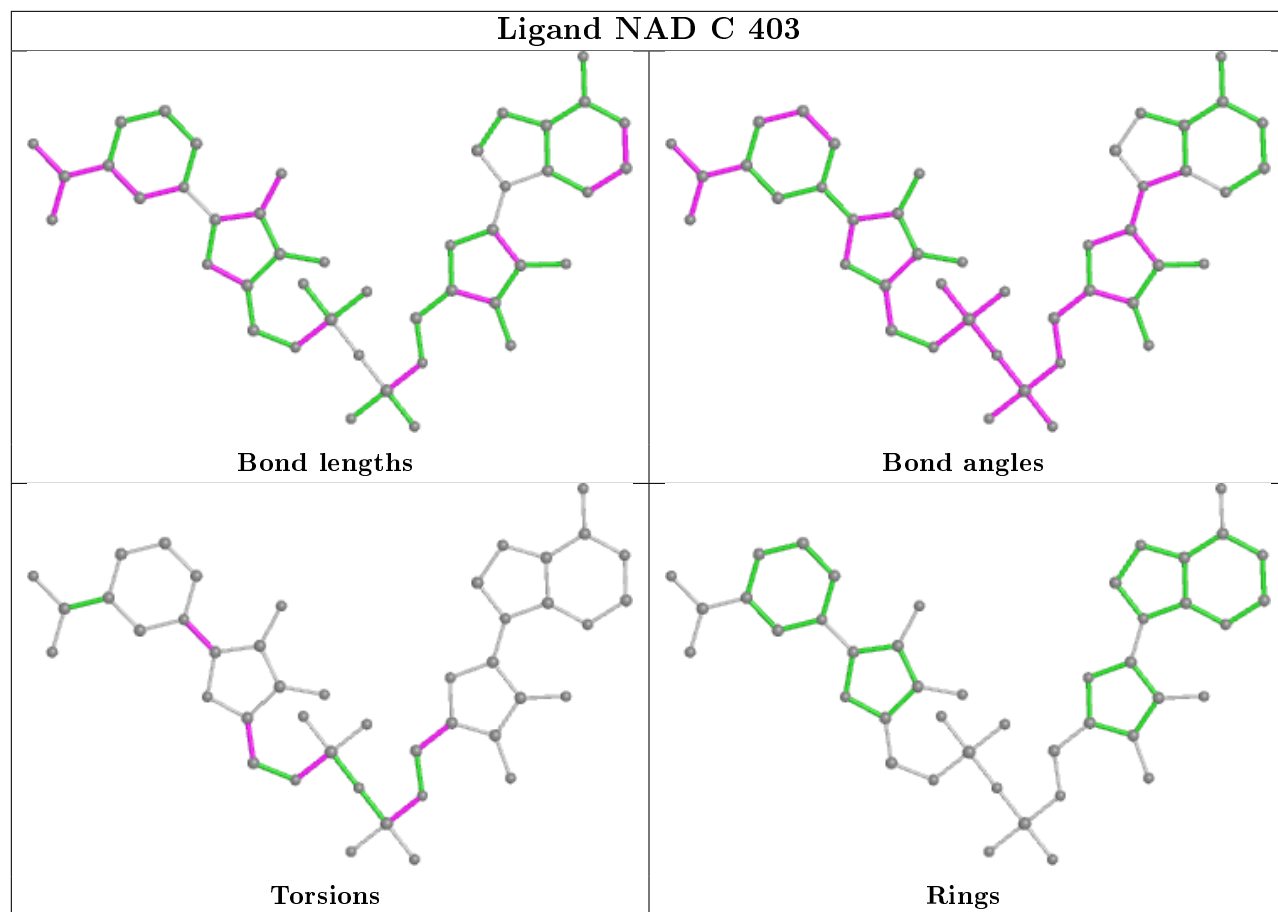
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	F	403	NAD	3	0
3	D	403	NAD	2	0
3	B	403	NAD	1	0
3	C	403	NAD	3	0
3	A	403	NAD	4	0
3	E	403	NAD	2	0

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 than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

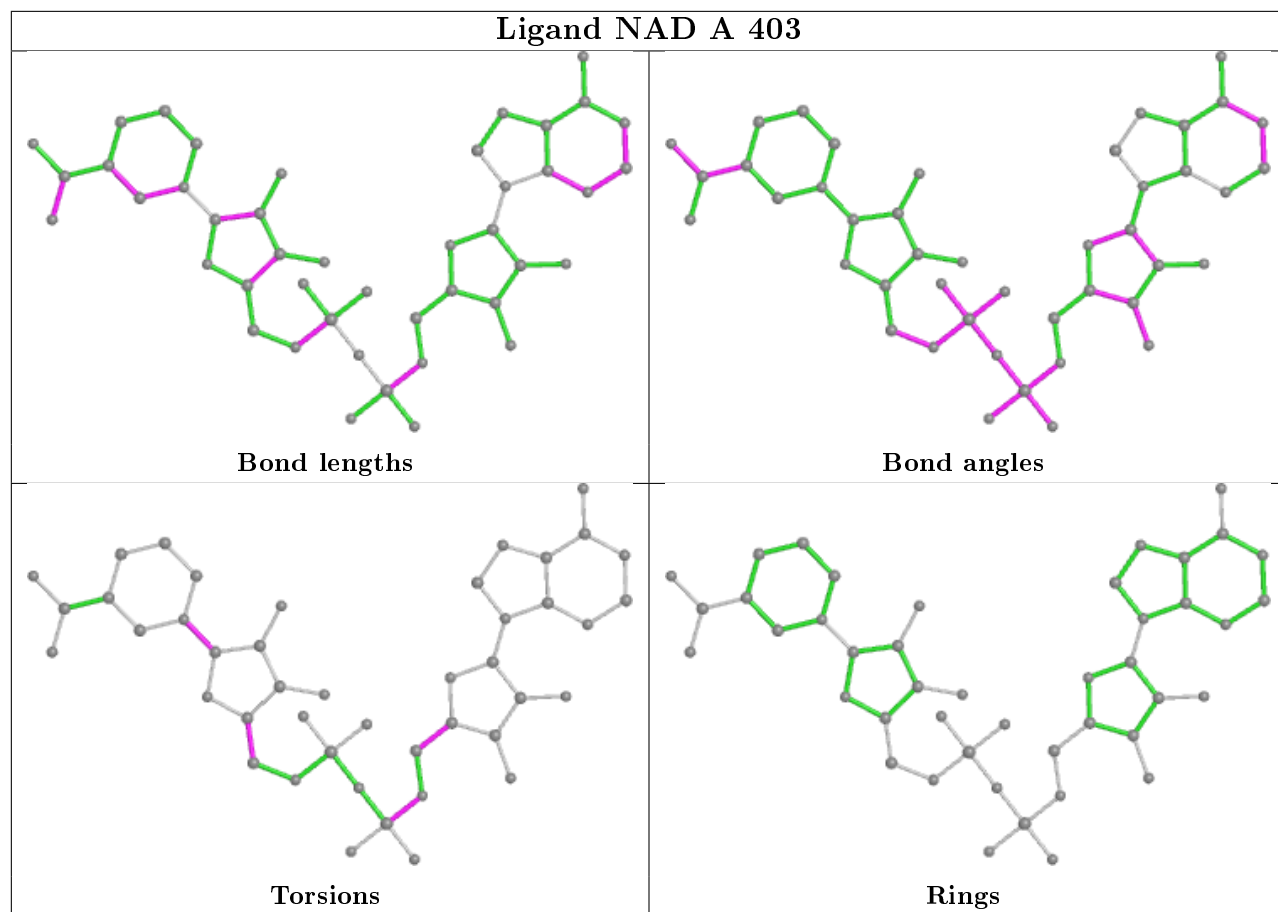


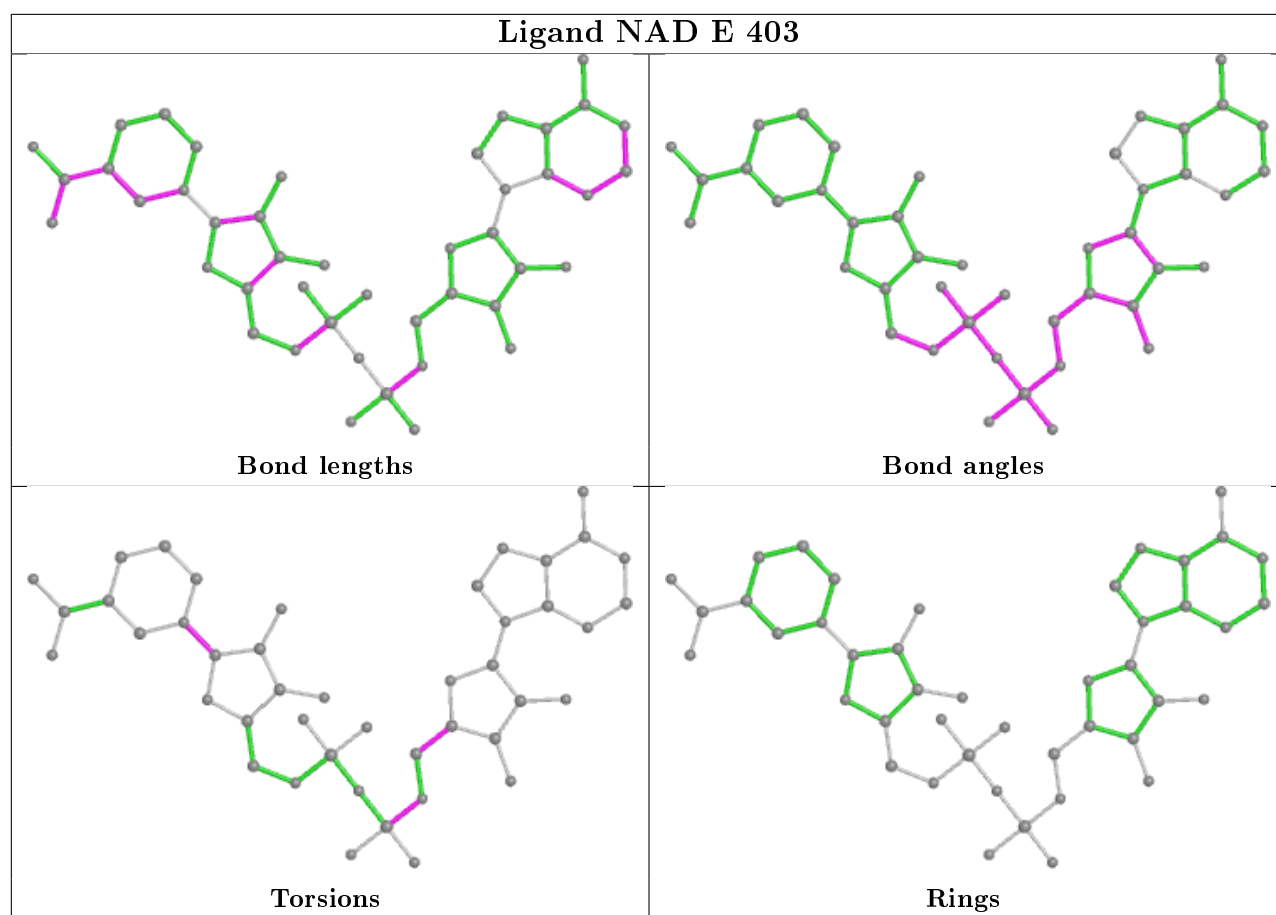












## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 Fit of model and data

### 6.1 Protein, DNA and RNA chains

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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	376/378 (99%)	-0.48	1 (0%) 94 94	14, 25, 50, 81	0
1	B	376/378 (99%)	-0.42	0 100 100	12, 25, 49, 76	0
1	C	376/378 (99%)	-0.43	1 (0%) 94 94	14, 31, 61, 80	0
1	D	376/378 (99%)	-0.46	2 (0%) 91 91	16, 31, 56, 79	0
1	E	373/378 (98%)	0.28	29 (7%) 13 10	29, 57, 85, 105	0
1	F	376/378 (99%)	-0.24	3 (0%) 86 86	18, 37, 68, 87	0
All	All	2253/2268 (99%)	-0.29	36 (1%) 72 71	12, 32, 70, 105	0

All (36) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	E	147	THR	4.8
1	E	143	HIS	4.3
1	E	32	PRO	3.9
1	E	154	THR	3.9
1	E	134	PHE	3.9
1	F	3	GLU	3.5
1	E	150	PHE	2.8
1	E	33	PRO	2.7
1	A	370	GLU	2.6
1	E	60	PRO	2.6
1	E	129	ASP	2.5
1	E	40	VAL	2.5
1	E	155	VAL	2.5
1	E	153	TYR	2.5
1	E	133	ARG	2.4
1	E	14	ALA	2.4
1	F	61	GLU	2.4
1	F	234	PRO	2.3
1	E	156	VAL	2.3

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Mol	Chain	Res	Type	RSRZ
1	E	30	VAL	2.3
1	E	9	ILE	2.2
1	E	136	VAL	2.2
1	E	62	GLY	2.2
1	E	45	THR	2.2
1	D	2	SER	2.2
1	E	361	GLU	2.1
1	C	10	GLU	2.1
1	E	373	ARG	2.1
1	E	28	VAL	2.1
1	E	29	THR	2.1
1	E	39	ARG	2.1
1	E	37	GLU	2.1
1	E	151	SER	2.1
1	E	132	PRO	2.0
1	E	95	CYS	2.0
1	D	228	ILE	2.0

## 6.2 Non-standard residues in protein, DNA, RNA chains [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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	SNC	E	244	8/9	0.88	0.16	54,59,69,77	0
1	SNC	D	244	8/9	0.88	0.20	43,48,57,61	0
1	SNC	F	244	8/9	0.94	0.24	38,49,51,52	0
1	SNC	A	244	8/9	0.95	0.17	27,31,35,78	0
1	SNC	B	244	8/9	0.97	0.10	24,30,36,39	0
1	SNC	C	244	8/9	0.98	0.14	24,29,41,45	0

## 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

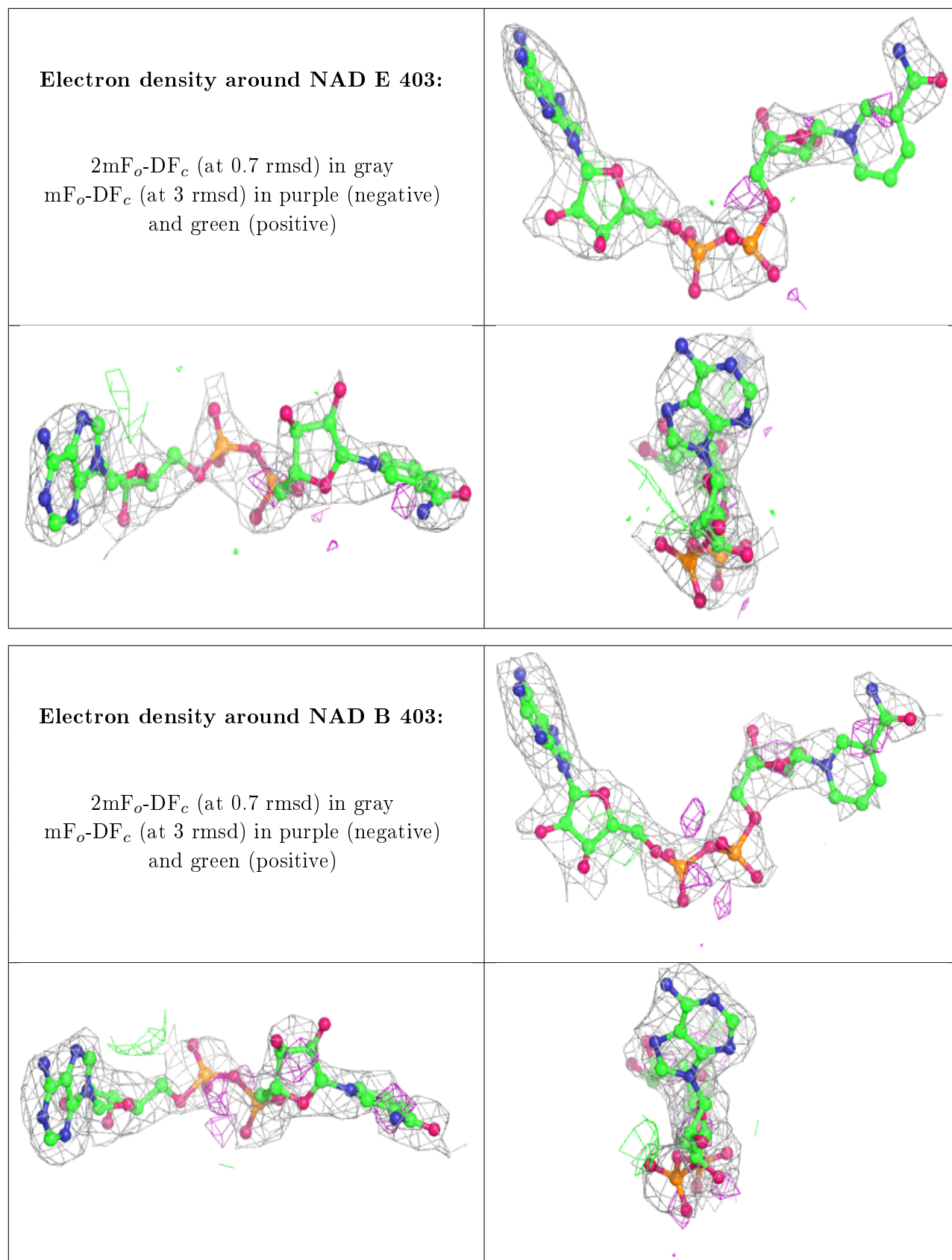
## 6.4 Ligands [i](#)

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, 95<sup>th</sup> 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.

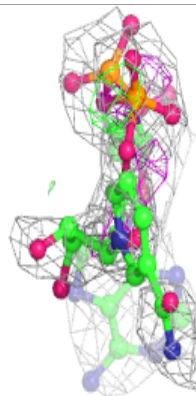
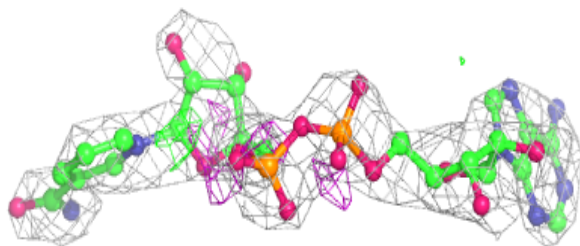
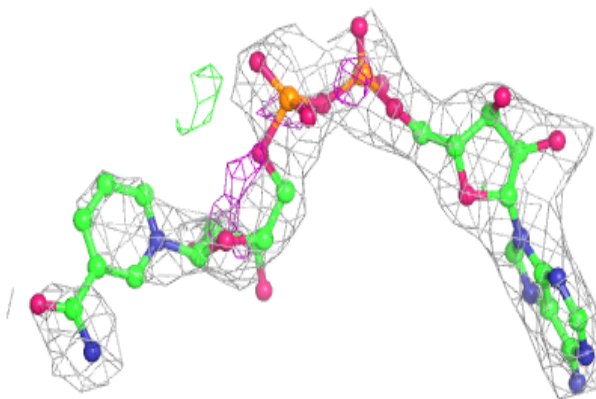
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
3	NAD	E	403	44/44	0.86	0.26	32,66,88,108	0
3	NAD	B	403	44/44	0.91	0.24	28,50,73,88	0
3	NAD	D	403	44/44	0.91	0.26	27,58,75,87	0
3	NAD	A	403	44/44	0.92	0.28	29,48,73,82	0
4	CL	D	404	1/1	0.92	0.13	61,61,61,61	0
2	ZN	F	401	1/1	0.94	0.09	63,63,63,63	0
2	ZN	A	401	1/1	0.95	0.06	54,54,54,54	0
2	ZN	C	401	1/1	0.95	0.08	52,52,52,52	0
3	NAD	F	403	44/44	0.95	0.16	29,45,60,72	0
3	NAD	C	403	44/44	0.96	0.16	21,33,43,50	0
2	ZN	B	401	1/1	0.98	0.08	39,39,39,39	0
2	ZN	D	401	1/1	0.98	0.09	45,45,45,45	0
2	ZN	D	402	1/1	0.98	0.11	30,30,30,30	0
2	ZN	E	401	1/1	0.99	0.06	79,79,79,79	0
2	ZN	A	402	1/1	0.99	0.09	22,22,22,22	0
2	ZN	B	402	1/1	0.99	0.11	17,17,17,17	0
2	ZN	E	402	1/1	0.99	0.09	43,43,43,43	0
2	ZN	F	402	1/1	0.99	0.08	39,39,39,39	0
2	ZN	C	402	1/1	1.00	0.11	28,28,28,28	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.

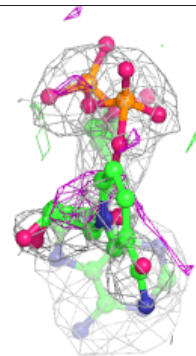
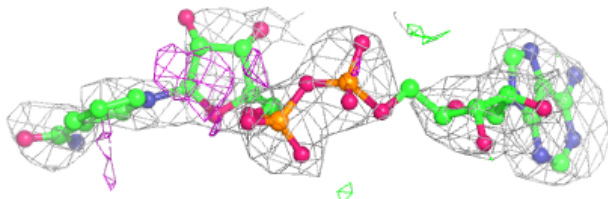
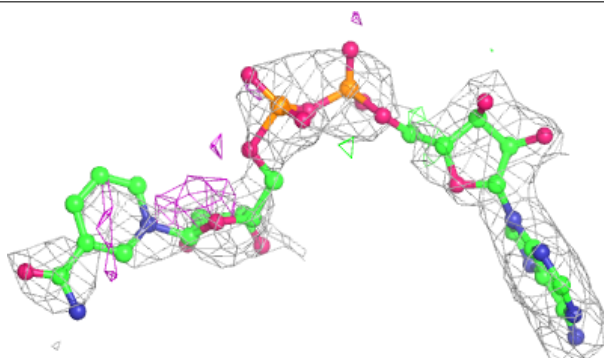


**Electron density around NAD D 403:**

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

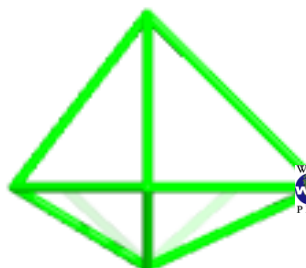
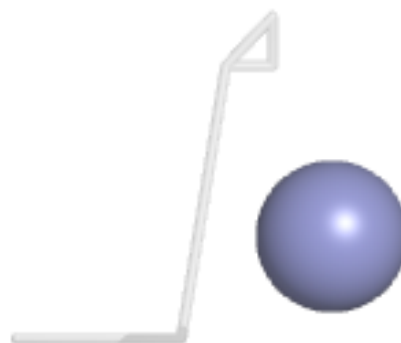
**Electron density around NAD A 403:**

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

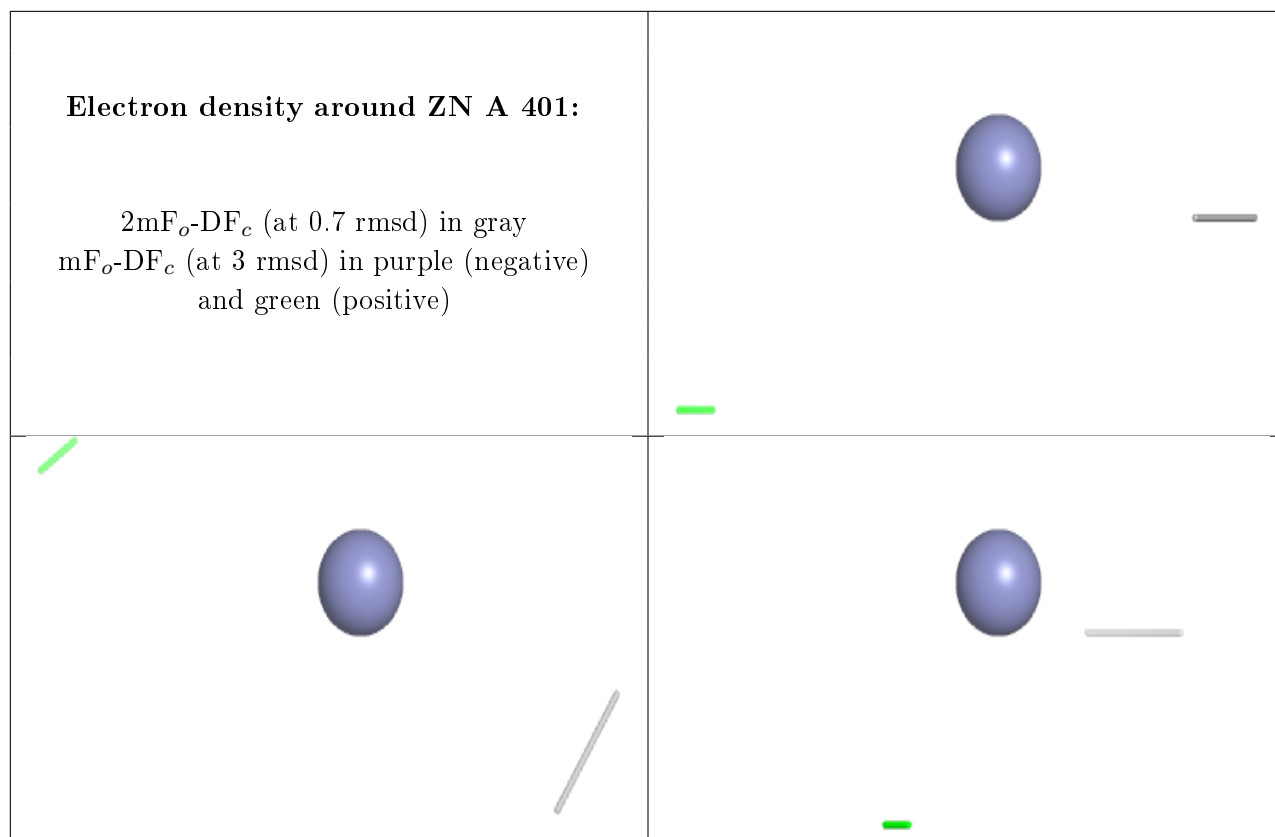


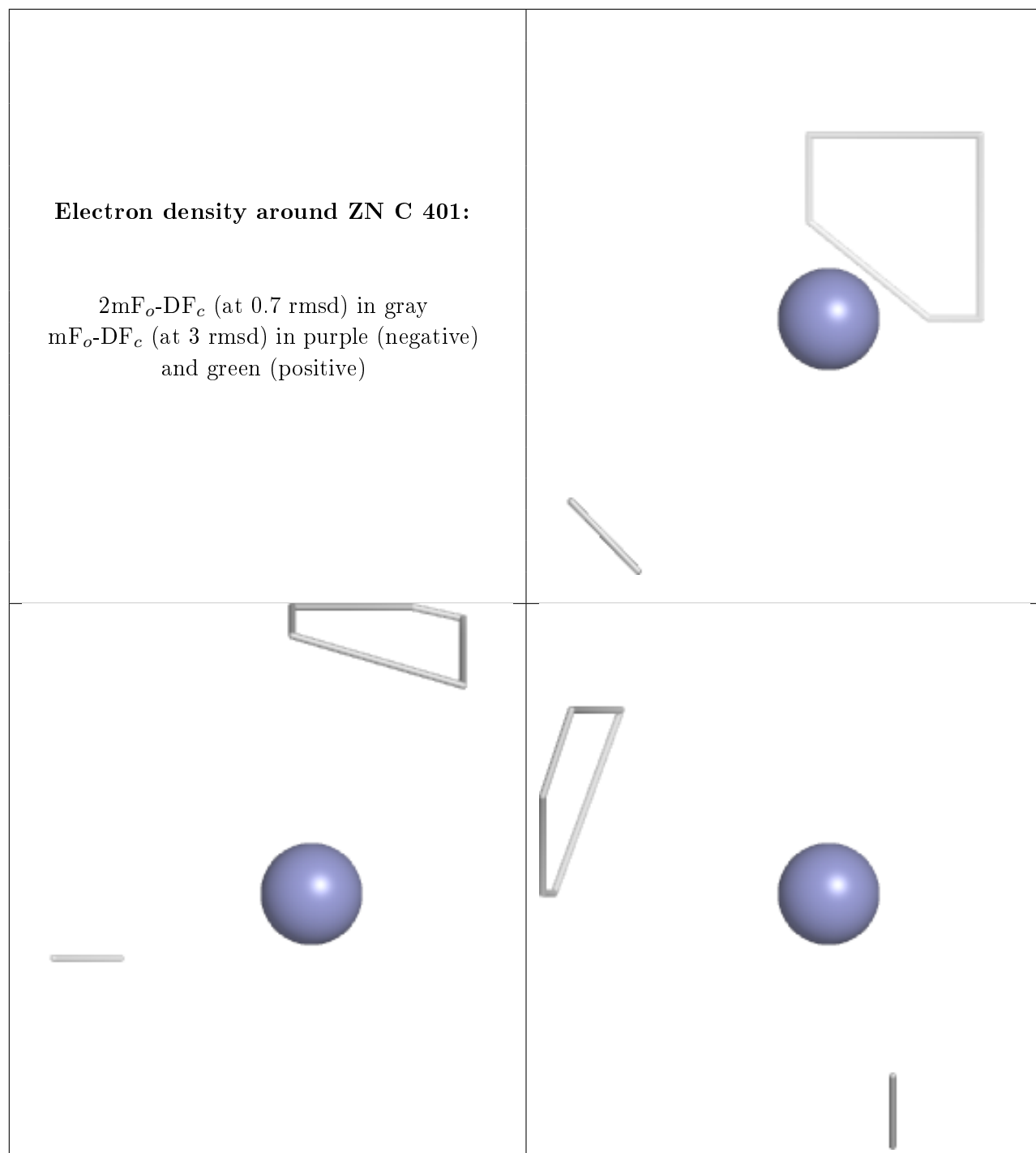
**Electron density around ZN F 401:**

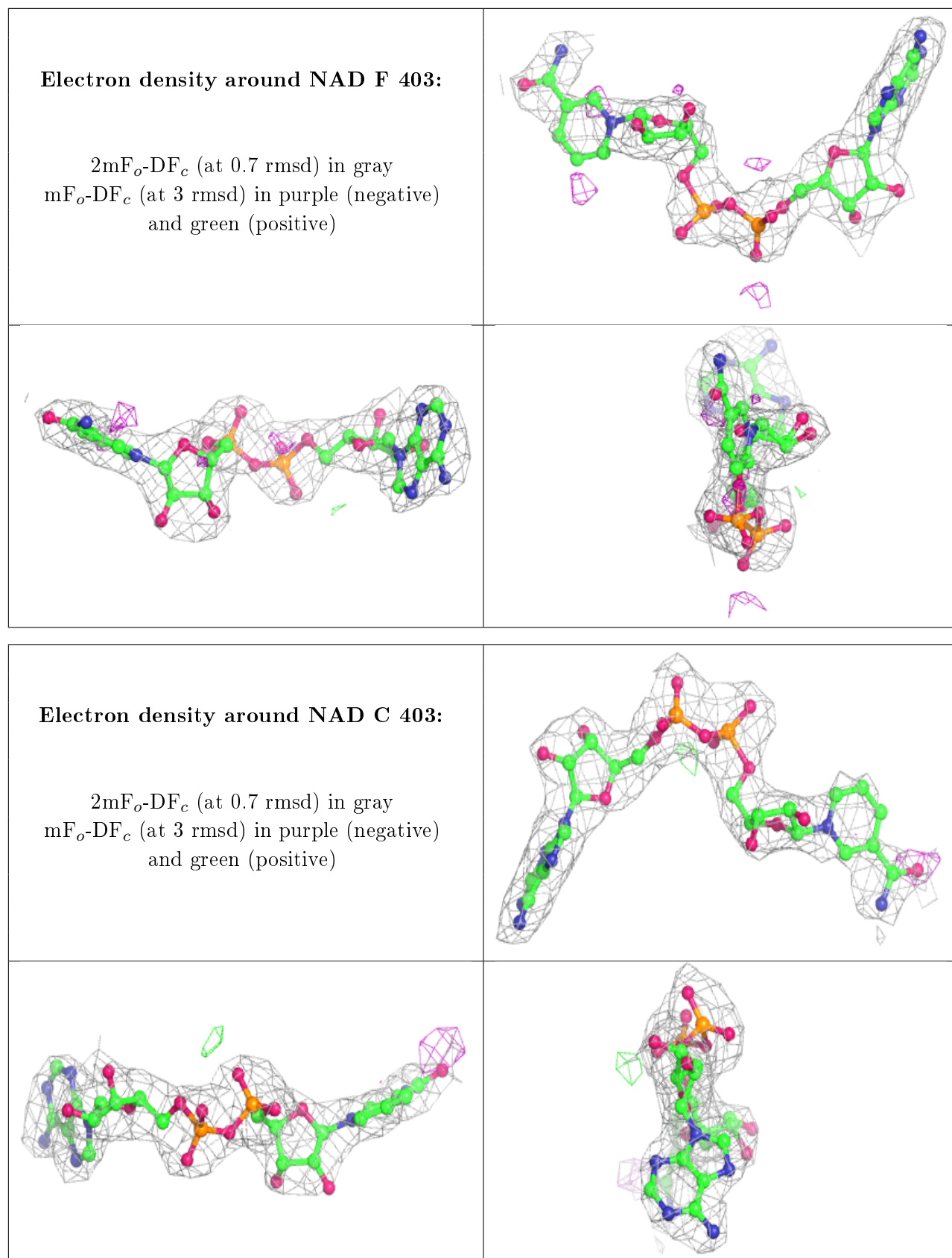
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)

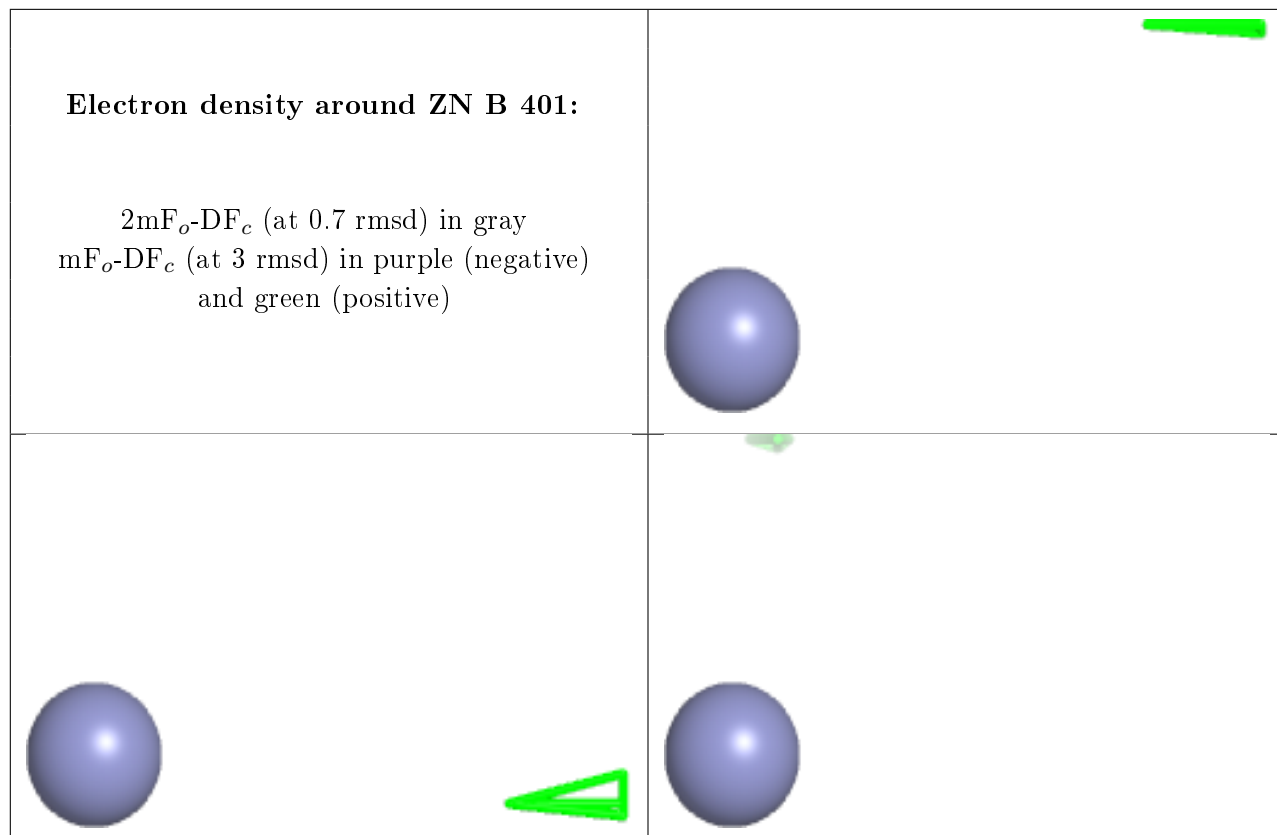






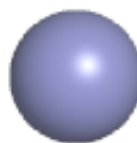


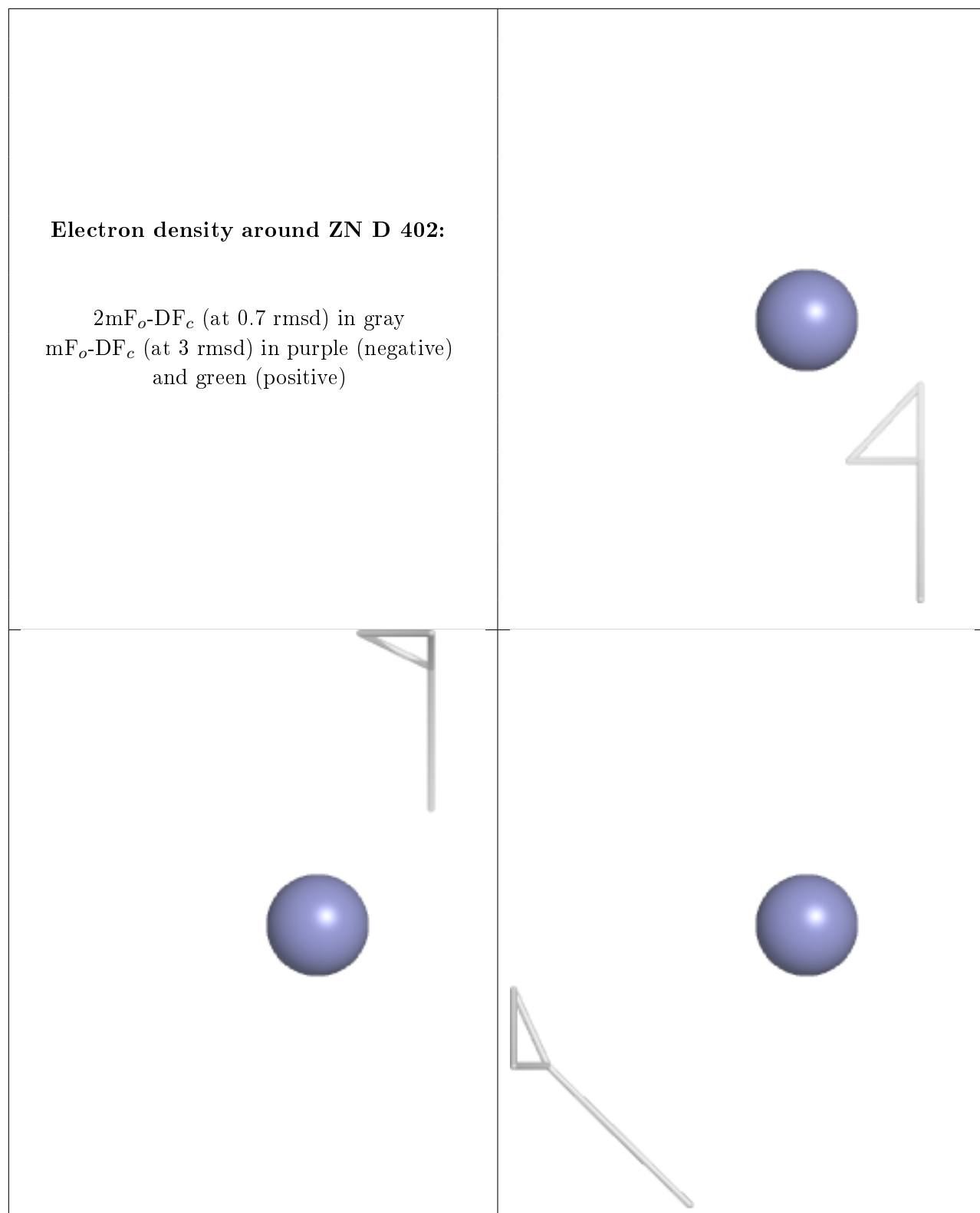


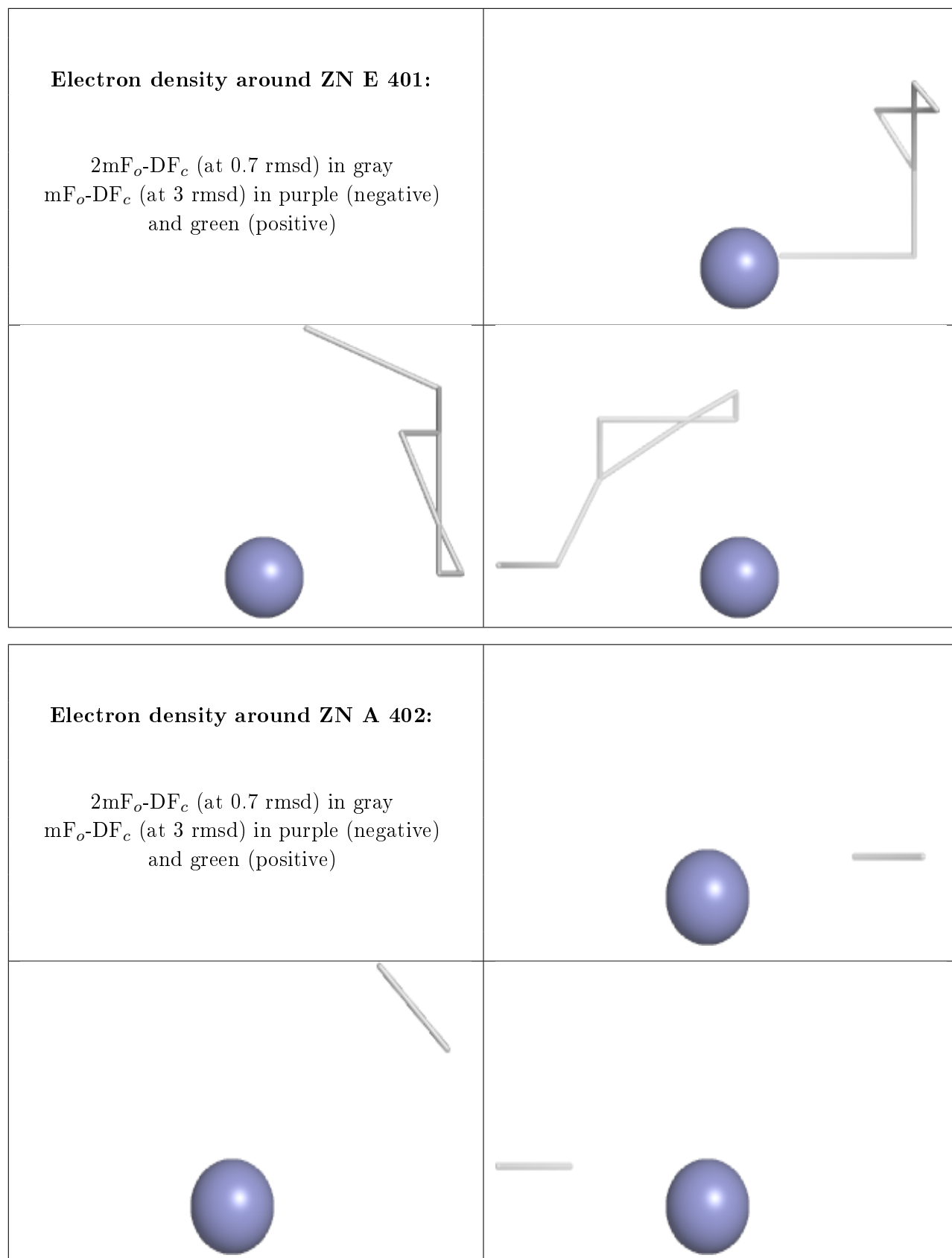


**Electron density around ZN D 401:**

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

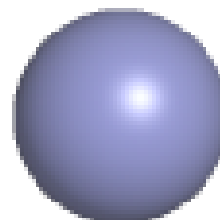
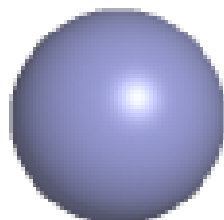
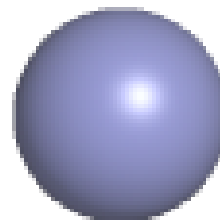






**Electron density around ZN B 402:**

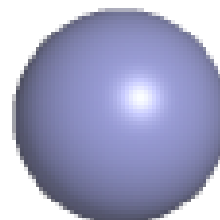
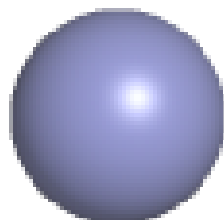
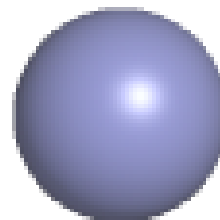
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)

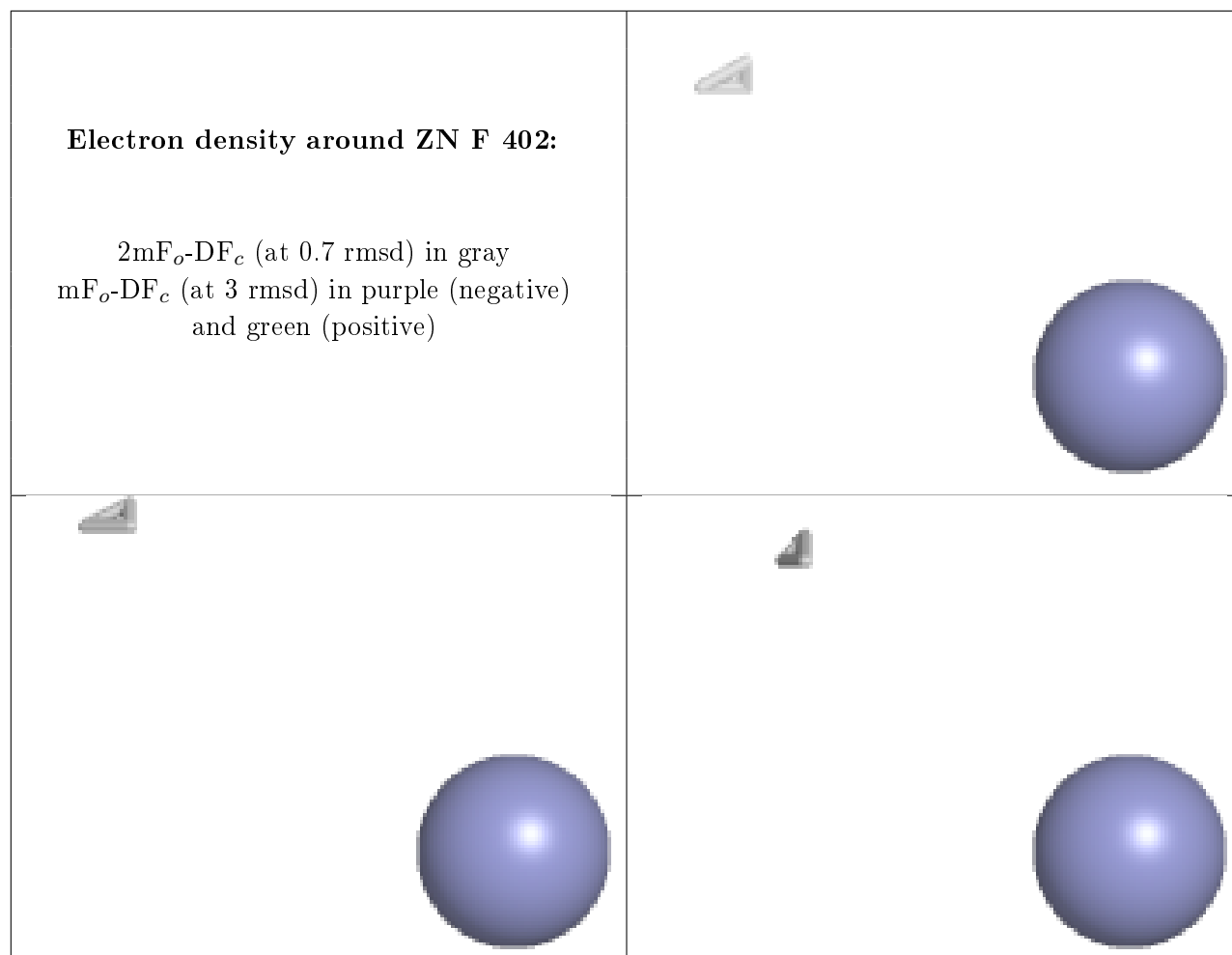


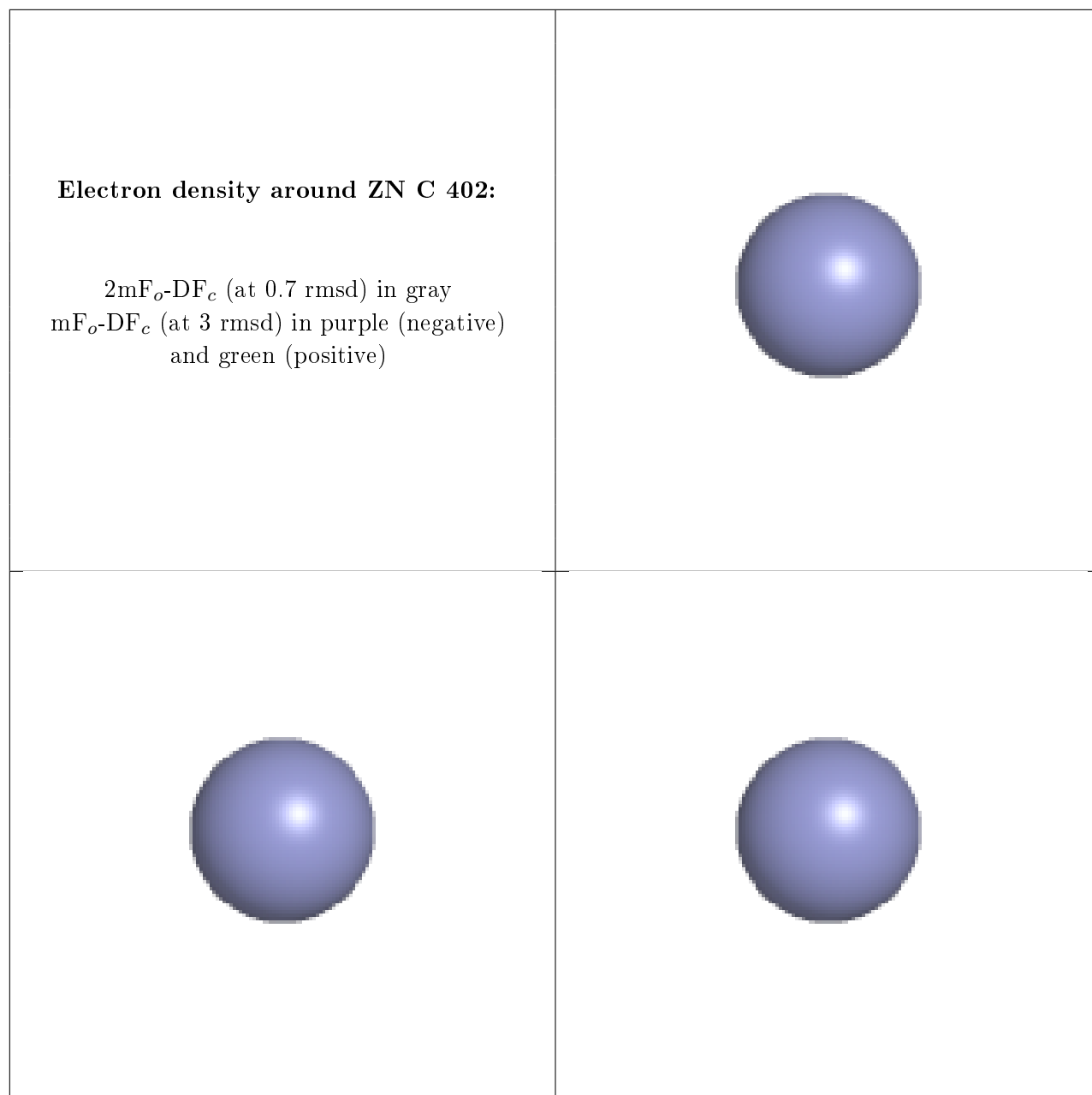


**Electron density around ZN E 402:**

$2mF_o-DF_c$  (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.