Full wwPDB X-ray Structure Validation Report (i)

Sep 14, 2023 – 11:21 AM EDT

PDB ID	:	1RHJ
Title	:	CRYSTAL STRUCTURE OF THE COMPLEX OF CASPASE-3 WITH A PRYAZINONE INHIBITOR
Authors	:	Becker, J.W.; Rotonda, J.; Soisson, S.M.
Deposited on	:	2003-11-14
Resolution	:	2.20 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:

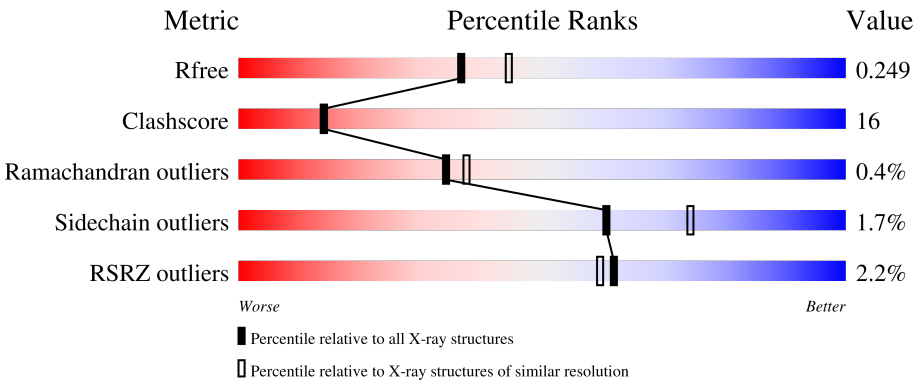
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.35.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.35.1

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 2.20 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	4898 (2.20-2.20)
Clashscore	141614	5594 (2.20-2.20)
Ramachandran outliers	138981	5503 (2.20-2.20)
Sidechain outliers	138945	5504 (2.20-2.20)
RSRZ outliers	127900	4800 (2.20-2.20)

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	147	4% 69% 26% • 5%
1	C	147	3% 65% 29% • 5%
2	B	110	54% 27% • 17%
2	D	110	59% 23% • 17%

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 4055 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 Caspase-3.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	140	1113	688	201	215	9	0	0	0
1	C	140	1113	688	201	215	9	0	0	0

- Molecule 2 is a protein called Caspase-3.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	91	757	499	119	134	5	0	0	0
2	D	91	757	499	119	134	5	0	0	0

There are 18 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	324	GLU	ASP	variant	UNP P42574
B	403	LEU	-	expression tag	UNP P42574
B	404	GLU	-	expression tag	UNP P42574
B	405	HIS	-	expression tag	UNP P42574
B	406	HIS	-	expression tag	UNP P42574
B	407	HIS	-	expression tag	UNP P42574
B	408	HIS	-	expression tag	UNP P42574
B	409	HIS	-	expression tag	UNP P42574
B	410	HIS	-	expression tag	UNP P42574
D	824	GLU	ASP	variant	UNP P42574
D	903	LEU	-	expression tag	UNP P42574
D	904	GLU	-	expression tag	UNP P42574
D	905	HIS	-	expression tag	UNP P42574
D	906	HIS	-	expression tag	UNP P42574
D	907	HIS	-	expression tag	UNP P42574
D	908	HIS	-	expression tag	UNP P42574

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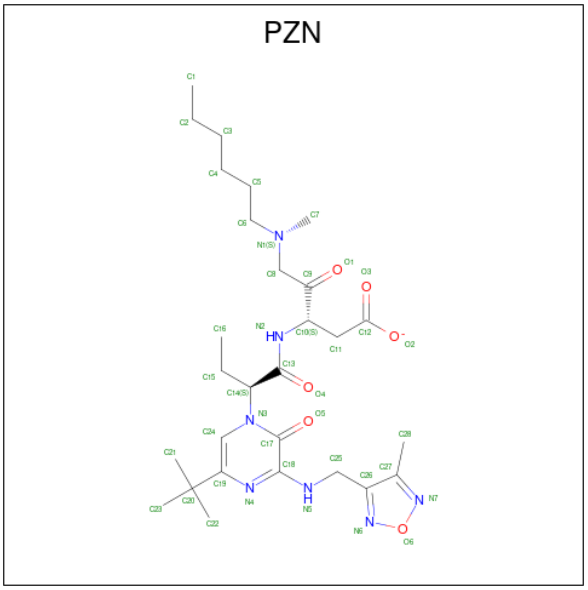
Chain	Residue	Modelled	Actual	Comment	Reference
D	909	HIS	-	expression tag	UNP P42574
D	910	HIS	-	expression tag	UNP P42574

- Molecule 3 is 3-(2-{5-TERT-BUTYL-3-[(4-METHYL-FURAZAN-3-YLMETHYL)-AMINO]-2-OXO-2H-PYRAZIN-1-YL}-BUTYRYLAMINO)-5-(HEXYL-METHYL-AMINO)-4-OXO-PENTANOIC ACID ANION (three-letter code: PZN) (formula: $C_{28}H_{44}N_7O_6$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
3	A	1	41	28	7	6	0	0
			Total	C	N	O		
3	C	1	41	28	7	6	0	0

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
4	A	63	63	63	0	0
			Total	O		
4	B	36	36	36	0	0
			Total	O		
4	C	86	86	86	0	0
			Total	O		
4	D	48	48	48	0	0

3 Residue-property plots (i)

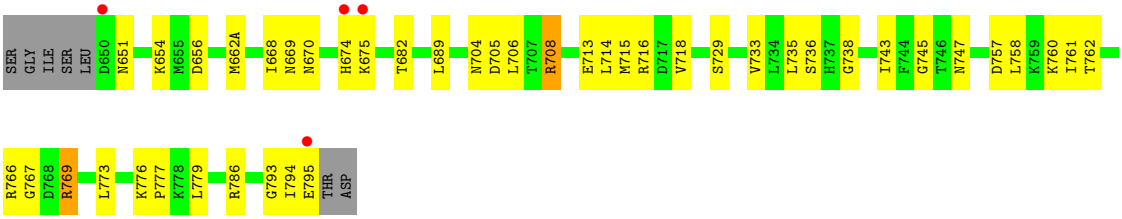
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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: Caspase-3

Chain A:

• Molecule 1: Caspase-3

Chain C:

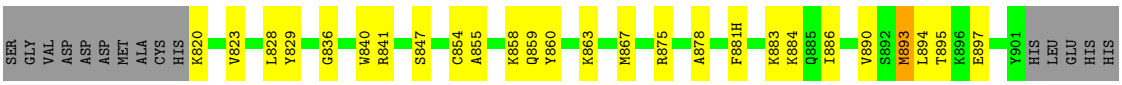


• Molecule 2: Caspase-3

Chain B:

• Molecule 2: Caspase-3

Chain D:



HIS
HIS
HIS
HIS

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	50.19Å 68.76Å 93.01Å 90.00° 101.46° 90.00°	Depositor
Resolution (Å)	19.90 – 2.20 19.90 – 2.20	Depositor EDS
% Data completeness (in resolution range)	94.1 (19.90-2.20) 93.9 (19.90-2.20)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	3.91 (at 2.19Å)	Xtriage
Refinement program	CNX 2002	Depositor
R, R_{free}	0.204 , 0.252 0.202 , 0.249	Depositor DCC
R_{free} test set	3034 reflections (10.02%)	wwPDB-VP
Wilson B-factor (Å^2)	19.2	Xtriage
Anisotropy	0.486	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.36 , 48.1	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	4055	wwPDB-VP
Average B, all atoms (Å^2)	23.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 8.08% of the height of the origin peak. No significant pseudotranslation is detected.*

[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: PZN

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\#\|Z\|>5$	RMSZ	$\#\|Z\|>5$
1	A	0.32	0/1128	0.60	1/1510 (0.1%)
1	C	0.34	0/1128	0.62	1/1510 (0.1%)
2	B	0.39	0/780	0.62	0/1053
2	D	0.40	0/780	0.63	0/1053
All	All	0.36	0/3816	0.62	2/5126 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	245	GLY	N-CA-C	-5.46	99.46	113.10
1	C	745	GLY	N-CA-C	-5.33	99.78	113.10

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	1113	0	1106	31	0
1	C	1113	0	1106	43	0
2	B	757	0	740	29	0
2	D	757	0	740	33	0
3	A	41	0	44	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	C	41	0	44	1	0
4	A	63	0	0	4	0
4	B	36	0	0	3	0
4	C	86	0	0	7	0
4	D	48	0	0	9	0
All	All	4055	0	3780	119	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 16.

All (119) 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:662(A):MET:HA	1:C:662(A):MET:HE2	1.48	0.94
1:C:713:GLU:HA	1:C:716:ARG:HH12	1.37	0.89
1:C:670:ASN:HD21	1:C:706:LEU:H	1.19	0.89
2:B:368:HIS:HB3	4:D:49:HOH:O	1.77	0.82
2:B:390:VAL:HG12	2:B:393:MET:HE1	1.67	0.77
1:C:766:ARG:HB2	4:D:215:HOH:O	1.88	0.74
2:D:854:CYS:O	2:D:858:LYS:HG3	1.89	0.71
1:A:169:ASN:HD22	1:A:186:ALA:HB2	1.53	0.71
1:C:669:ASN:HB3	1:C:704:ASN:HD22	1.56	0.70
1:C:670:ASN:ND2	1:C:706:LEU:H	1.89	0.69
1:C:713:GLU:HA	1:C:716:ARG:NH1	2.08	0.69
1:A:169:ASN:ND2	1:A:186:ALA:HB2	2.07	0.69
2:B:341:ARG:HA	2:B:347:SER:HA	1.75	0.68
1:C:708:ARG:HG2	1:C:747:ASN:OD1	1.92	0.68
1:C:689:LEU:HD13	1:C:733:VAL:HG11	1.78	0.65
1:C:738:GLY:H	3:C:502:PZN:H71	1.61	0.65
2:D:860:TYR:HD1	2:D:863:LYS:HE3	1.62	0.65
2:D:881(H):PHE:HA	4:D:186:HOH:O	1.95	0.65
2:D:823:VAL:HG23	4:D:215:HOH:O	1.96	0.64
1:C:674:HIS:HB3	4:C:19:HOH:O	1.98	0.64
2:D:863:LYS:HE2	4:D:80:HOH:O	1.98	0.63
2:B:355:ALA:HA	2:B:358:LYS:HD2	1.79	0.63
2:D:890:VAL:HG12	2:D:893:MET:HE1	1.81	0.63
2:B:340:TRP:HH2	2:B:381(H):PHE:HB3	1.65	0.61
2:D:828:LEU:HD22	2:D:894:LEU:HD11	1.82	0.61
2:D:883:LYS:HG3	4:D:186:HOH:O	2.00	0.61
1:A:196:LEU:O	1:A:197:LYS:HB2	2.01	0.60
1:A:151:ASN:HB3	2:D:875:ARG:NH2	2.16	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:841:ARG:HA	2:D:847:SER:HA	1.85	0.59
1:C:675:LYS:HE2	4:C:180:HOH:O	2.03	0.59
1:A:189:LEU:HD13	1:A:233:VAL:HG11	1.85	0.58
1:A:243:ILE:HD12	1:A:243:ILE:O	2.04	0.58
1:C:766:ARG:NH1	2:D:823:VAL:HG21	2.18	0.58
1:A:226:LYS:N	1:A:226:LYS:HD2	2.19	0.57
1:A:170:ASN:HD21	1:A:206:LEU:H	1.52	0.57
1:A:266:ARG:NH1	1:A:268:ASP:OD1	2.38	0.57
1:C:779:LEU:HD22	2:D:828:LEU:HD23	1.87	0.56
1:C:743:ILE:CG2	1:C:758:LEU:HD21	2.37	0.55
1:C:716:ARG:HD3	4:C:29:HOH:O	2.05	0.55
2:B:354:CYS:O	2:B:358:LYS:HG3	2.07	0.55
2:B:379:THR:HB	4:B:179:HOH:O	2.08	0.54
2:D:893:MET:N	2:D:893:MET:HE3	2.23	0.54
1:A:229:SER:HB3	1:A:277:PRO:HG2	1.91	0.53
1:A:266:ARG:O	1:A:269:ARG:HB2	2.09	0.52
2:D:855:ALA:O	2:D:859:GLN:HG3	2.10	0.52
2:D:840:TRP:HZ2	4:D:186:HOH:O	1.92	0.52
2:D:860:TYR:CD1	2:D:863:LYS:HE3	2.45	0.52
2:D:890:VAL:HG12	2:D:893:MET:CE	2.40	0.51
1:A:151:ASN:HB3	2:D:875:ARG:HH22	1.75	0.51
1:A:216:ARG:HD3	4:A:537:HOH:O	2.10	0.51
1:C:668:ILE:HG13	4:C:116:HOH:O	2.10	0.51
1:A:237:HIS:HB3	4:A:524:HOH:O	2.11	0.50
1:C:669:ASN:HB3	1:C:704:ASN:ND2	2.26	0.50
1:A:156(A):TYR:HB2	1:A:228:SER:OG	2.11	0.50
2:D:828:LEU:HD21	2:D:867:MET:HE1	1.94	0.50
2:D:854:CYS:HB3	2:D:858:LYS:NZ	2.27	0.50
2:B:328:LEU:HD13	2:B:367:MET:HE3	1.94	0.49
1:A:207:THR:OG1	1:A:210:GLU:HG3	2.12	0.49
2:B:362:ASP:OD2	2:B:363:LYS:NZ	2.45	0.49
2:B:328:LEU:HD12	2:B:392:SER:HB2	1.94	0.49
1:C:743:ILE:HG23	1:C:758:LEU:HD21	1.94	0.49
1:C:786:ARG:O	2:D:836:GLY:HA2	2.12	0.49
1:A:282:ILE:HD12	2:B:331:TYR:CE1	2.48	0.49
1:A:185:ASP:HB3	2:B:350:ILE:HG21	1.95	0.49
2:B:354:CYS:HB3	2:B:358:LYS:HE3	1.95	0.48
1:C:794:ILE:HD12	1:C:795:GLU:H	1.78	0.48
1:A:243:ILE:CG2	1:A:258:LEU:HD21	2.44	0.48
1:C:766:ARG:HD2	4:D:215:HOH:O	2.13	0.47
2:B:328:LEU:HD22	2:B:366:PHE:HE2	1.80	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:322:PRO:CD	2:D:878:ALA:HB1	2.44	0.47
1:A:262:THR:HG22	4:B:71:HOH:O	2.14	0.47
1:C:716:ARG:NH1	1:C:716:ARG:HB3	2.29	0.47
2:D:859:GLN:NE2	4:D:200:HOH:O	2.44	0.47
1:C:762:THR:HG22	4:C:187:HOH:O	2.14	0.47
1:C:714:LEU:O	1:C:718:VAL:HG23	2.16	0.46
2:B:360:TYR:CZ	2:B:372:ARG:NH1	2.83	0.46
1:C:713:GLU:HG3	1:C:716:ARG:HH22	1.81	0.46
1:A:170:ASN:ND2	1:A:206:LEU:H	2.14	0.45
1:C:766:ARG:NH2	1:C:769:ARG:NH1	2.64	0.45
1:A:271:ARG:HG3	1:A:271:ARG:HH11	1.81	0.45
1:A:294:ILE:HG13	1:A:295:GLU:N	2.31	0.45
2:B:322:PRO:HD2	2:D:878:ALA:HB1	1.97	0.45
2:B:320:LYS:O	2:D:884:LYS:HE2	2.15	0.45
1:A:263:ASN:O	1:A:269:ARG:HG2	2.16	0.45
1:C:757:ASP:O	1:C:760:LYS:HB3	2.16	0.45
2:D:829:TYR:HB2	2:D:890:VAL:HB	1.97	0.45
2:B:374:ASN:OD1	2:B:387:PRO:HB2	2.17	0.44
1:C:766:ARG:HH21	1:C:769:ARG:NH1	2.16	0.44
2:B:395:THR:HG23	2:D:875:ARG:HB2	1.99	0.44
2:B:358:LYS:NZ	4:B:82:HOH:O	2.51	0.44
2:B:375:ARG:CB	2:D:895:THR:HG23	2.48	0.44
1:C:715:MET:HG3	1:C:761:ILE:HB	2.00	0.43
2:D:886:ILE:HG23	2:D:886:ILE:O	2.19	0.43
1:C:743:ILE:HD12	1:C:743:ILE:O	2.18	0.43
1:A:266:ARG:NH1	2:B:323:VAL:HG21	2.33	0.43
1:A:184:VAL:O	1:A:188:ASN:HB2	2.18	0.43
1:A:203:LYS:HB3	1:A:206:LEU:HD11	2.01	0.42
1:C:735:LEU:O	1:C:736:SER:HB2	2.18	0.42
1:A:271:ARG:HG3	1:A:271:ARG:NH1	2.35	0.42
1:C:662(A):MET:HE3	4:C:59:HOH:O	2.18	0.42
1:C:773:LEU:HA	1:C:776:LYS:HD2	2.01	0.42
1:A:150:ASP:HA	4:A:553:HOH:O	2.19	0.42
1:C:729:SER:HB3	1:C:777:PRO:HG2	2.00	0.42
2:B:321:ILE:O	1:C:793:GLY:HA2	2.20	0.42
3:A:501:PZN:H52	4:A:524:HOH:O	2.20	0.41
2:B:372:ARG:HH21	1:C:651:ASN:ND2	2.18	0.41
2:D:895:THR:O	2:D:895:THR:HG22	2.20	0.41
1:C:662(A):MET:CE	4:C:59:HOH:O	2.68	0.41
1:C:669:ASN:ND2	1:C:682:THR:OG1	2.53	0.41
2:B:369:ILE:O	2:B:373:VAL:HG23	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:208:ARG:NH2	1:A:255:PRO:HD2	2.36	0.41
1:A:243:ILE:HG23	1:A:258:LEU:HD21	2.03	0.41
2:B:328:LEU:HD13	2:B:367:MET:CE	2.51	0.41
2:B:395:THR:HG23	2:D:875:ARG:CB	2.51	0.41
1:C:654:LYS:NZ	1:C:656:ASP:OD1	2.40	0.41
2:B:384:LYS:HE2	2:D:820:LYS:O	2.21	0.40
1:C:689:LEU:CD1	1:C:733:VAL:HG11	2.48	0.40
1:C:651:ASN:ND2	2:D:897:GLU:OE2	2.54	0.40
1:C:670:ASN:ND2	1:C:705:ASP:HA	2.36	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	138/147 (94%)	132 (96%)	5 (4%)	1 (1%)	22 22
1	C	138/147 (94%)	132 (96%)	5 (4%)	1 (1%)	22 22
2	B	89/110 (81%)	87 (98%)	2 (2%)	0	100 100
2	D	89/110 (81%)	86 (97%)	3 (3%)	0	100 100
All	All	454/514 (88%)	437 (96%)	15 (3%)	2 (0%)	34 37

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	267	GLY
1	C	767	GLY

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	126/132 (96%)	124 (98%)	2 (2%)	62	76
1	C	126/132 (96%)	124 (98%)	2 (2%)	62	76
2	B	81/98 (83%)	79 (98%)	2 (2%)	47	60
2	D	81/98 (83%)	80 (99%)	1 (1%)	71	83
All	All	414/460 (90%)	407 (98%)	7 (2%)	60	74

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

Mol	Chain	Res	Type
1	A	174	HIS
1	A	271	ARG
2	B	328	LEU
2	B	393	MET
1	C	708	ARG
1	C	769	ARG
2	D	893	MET

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	169	ASN
1	A	170	ASN
1	A	195	ASN
2	B	359	GLN
1	C	669	ASN
1	C	670	ASN
1	C	704	ASN
2	D	859	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)

2 ligands 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	$\#\|Z\| > 2$
3	PZN	A	501	1	36,42,42	1.65	3 (8%)	38,58,58	1.57	8 (21%)
3	PZN	C	502	1	36,42,42	1.82	4 (11%)	38,58,58	1.44	6 (15%)

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	PZN	A	501	1	-	14/38/43/43	0/2/2/2
3	PZN	C	502	1	-	9/38/43/43	0/2/2/2

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	502	PZN	C19-N4	6.86	1.42	1.34
3	A	501	PZN	C19-N4	6.49	1.42	1.34
3	C	502	PZN	C18-N4	4.43	1.42	1.34
3	C	502	PZN	C26-C27	4.29	1.50	1.43
3	A	501	PZN	C26-C27	3.87	1.49	1.43
3	A	501	PZN	C18-N4	3.84	1.41	1.34

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	502	PZN	C24-C19	-2.68	1.36	1.39

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	A	501	PZN	C13-C14-N3	5.09	119.00	110.86
3	C	502	PZN	C13-C14-N3	4.35	117.82	110.86
3	A	501	PZN	C15-C14-C13	-3.79	107.48	111.90
3	C	502	PZN	C25-N5-C18	2.92	126.98	123.14
3	C	502	PZN	C15-C14-C13	-2.80	108.63	111.90
3	A	501	PZN	C24-C19-C20	2.73	125.83	122.68
3	C	502	PZN	C5-C6-N1	2.51	121.20	113.79
3	A	501	PZN	C18-N4-C19	2.49	123.06	118.24
3	A	501	PZN	C5-C6-N1	2.40	120.88	113.79
3	C	502	PZN	C18-N4-C19	2.37	122.83	118.24
3	A	501	PZN	N5-C18-N4	-2.33	115.52	118.50
3	C	502	PZN	C24-C19-N4	-2.28	118.18	120.46
3	A	501	PZN	C25-N5-C18	2.21	126.04	123.14
3	A	501	PZN	C24-C19-N4	-2.05	118.41	120.46

There are no chirality outliers.

All (23) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	501	PZN	C9-C8-N1-C6
3	A	501	PZN	C9-C10-C11-C12
3	A	501	PZN	C13-C14-C15-C16
3	C	502	PZN	N1-C8-C9-O1
3	C	502	PZN	C4-C5-C6-N1
3	A	501	PZN	C2-C3-C4-C5
3	A	501	PZN	C3-C4-C5-C6
3	A	501	PZN	C9-C8-N1-C7
3	C	502	PZN	C2-C3-C4-C5
3	A	501	PZN	O4-C13-C14-C15
3	A	501	PZN	N2-C10-C11-C12
3	C	502	PZN	C9-C8-N1-C7
3	C	502	PZN	C9-C8-N1-C6
3	A	501	PZN	N1-C8-C9-O1
3	C	502	PZN	N1-C8-C9-C10
3	A	501	PZN	N2-C13-C14-C15
3	A	501	PZN	O4-C13-N2-C10
3	A	501	PZN	O4-C13-C14-N3

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Mol	Chain	Res	Type	Atoms
3	A	501	PZN	N2-C13-C14-N3
3	A	501	PZN	N3-C14-C15-C16
3	C	502	PZN	O4-C13-C14-C15
3	C	502	PZN	C3-C4-C5-C6
3	C	502	PZN	O4-C13-C14-N3

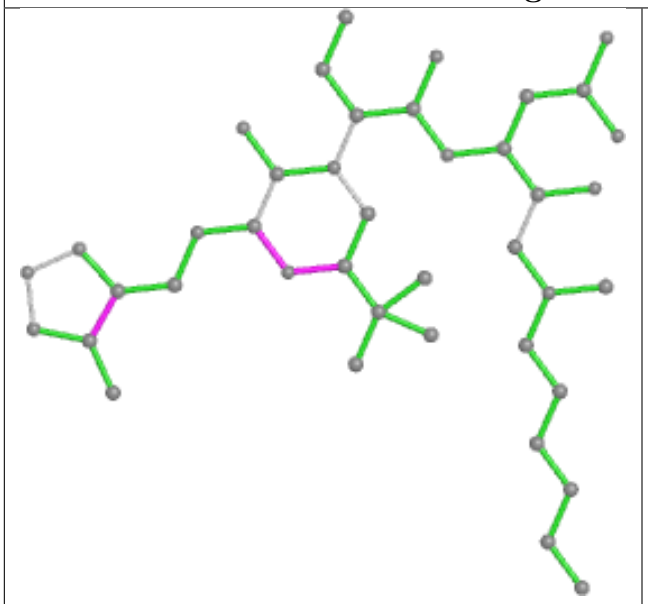
There are no ring outliers.

2 monomers are involved in 2 short contacts:

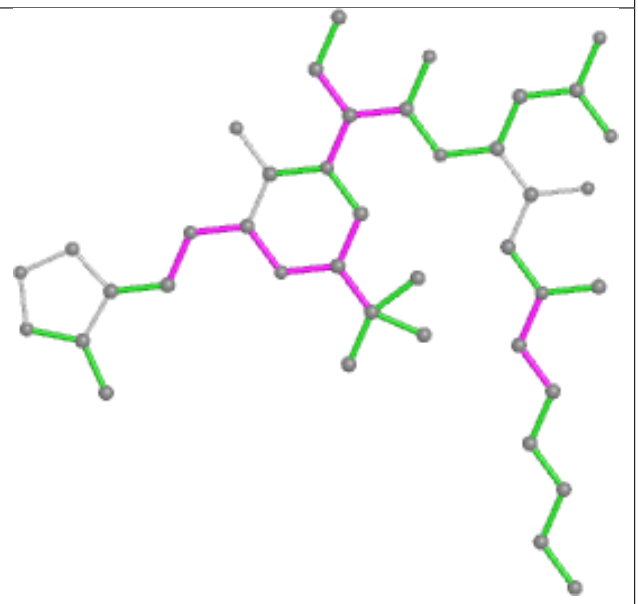
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	501	PZN	1	0
3	C	502	PZN	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

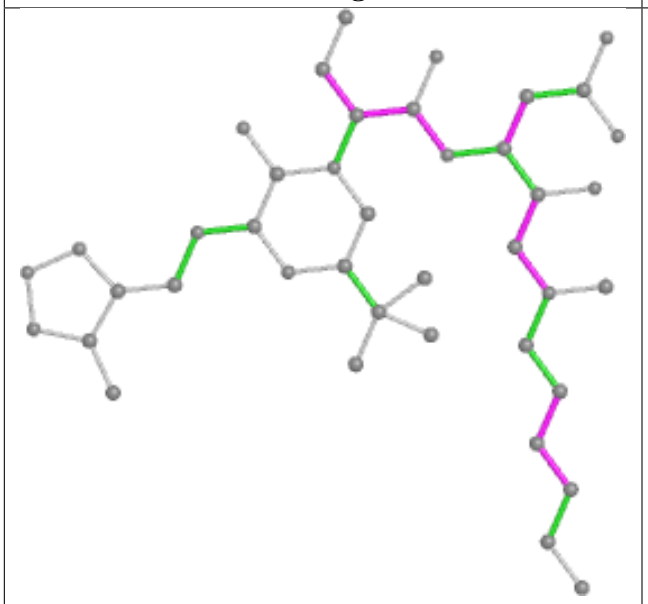
Ligand PZN A 501



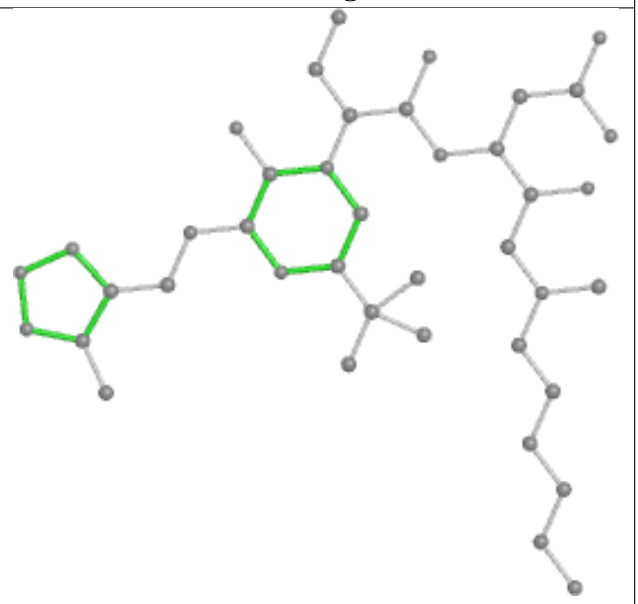
Bond lengths



Bond angles

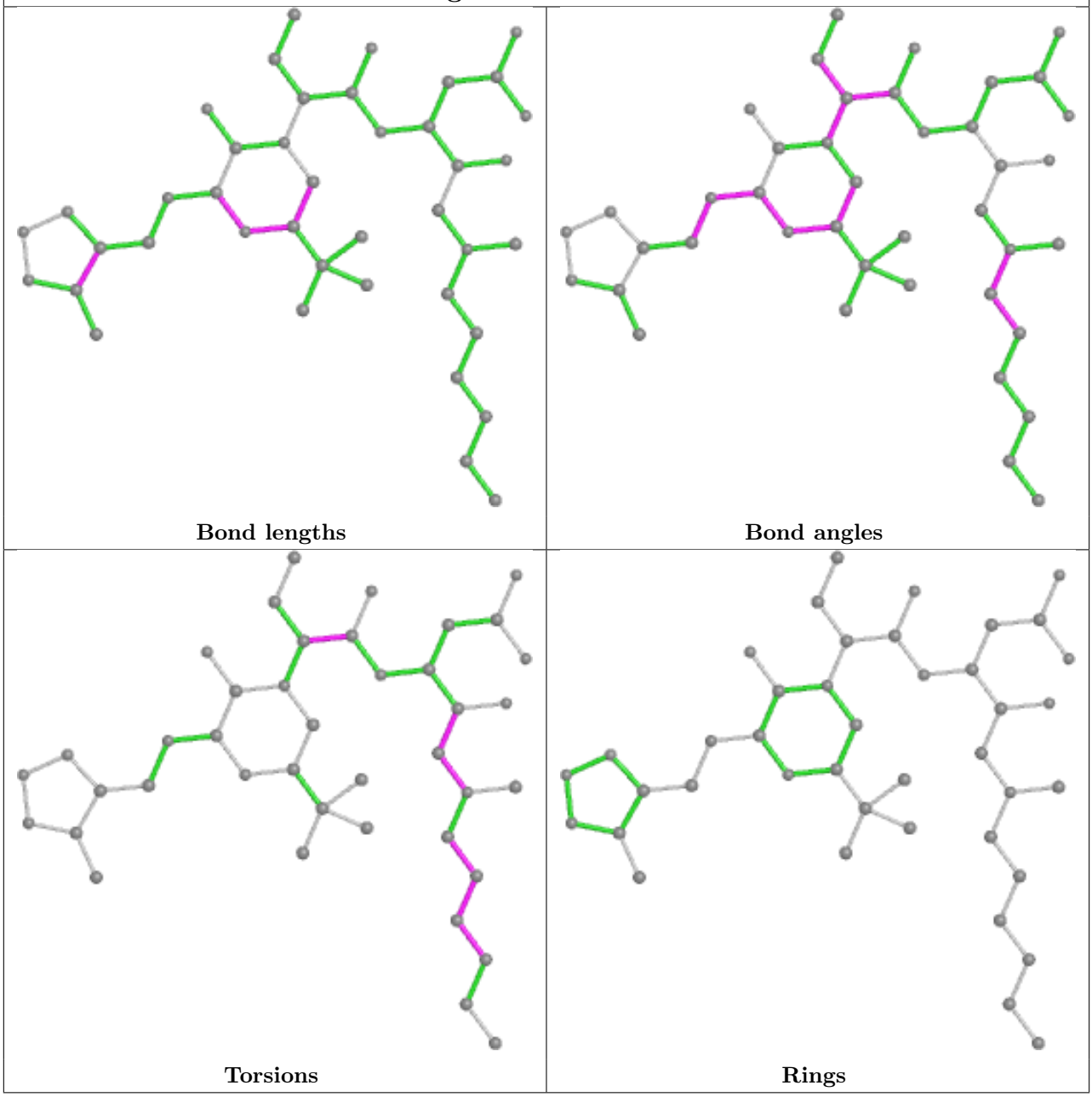


Torsions



Rings

Ligand PZN C 502



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	140/147 (95%)	0.06	6 (4%)	35	33	15, 28, 45, 57	0
1	C	140/147 (95%)	-0.20	4 (2%)	51	49	12, 21, 39, 54	0
2	B	91/110 (82%)	-0.26	0	100	100	9, 20, 32, 40	0
2	D	91/110 (82%)	-0.47	0	100	100	9, 16, 25, 35	0
All	All	462/514 (89%)	-0.19	10 (2%)	62	59	9, 21, 40, 57	0

All (10) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	175	LYS	4.0
1	C	674	HIS	3.5
1	A	175(A)	SER	3.5
1	A	295	GLU	2.5
1	A	151	ASN	2.4
1	A	150	ASP	2.4
1	C	650	ASP	2.2
1	C	795	GLU	2.1
1	C	675	LYS	2.0
1	A	257	ASP	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)

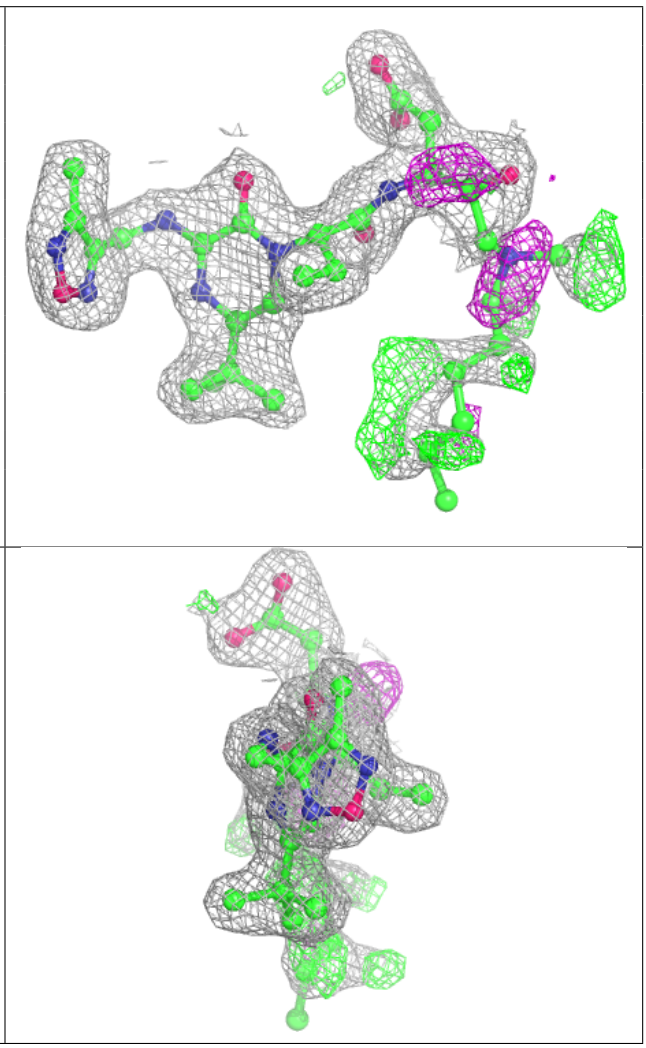
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	PZN	C	502	41/41	0.85	0.20	15,17,50,56	0
3	PZN	A	501	41/41	0.86	0.19	21,25,50,52	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.

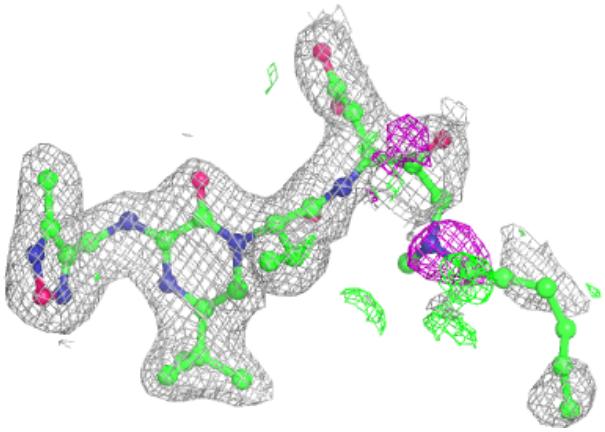
Electron density around PZN C 502:

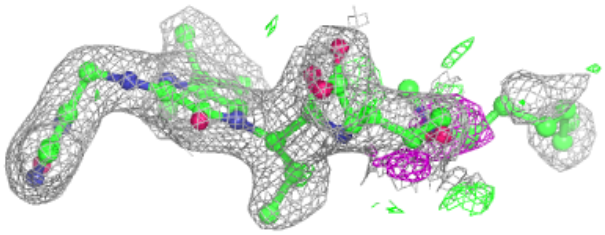
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

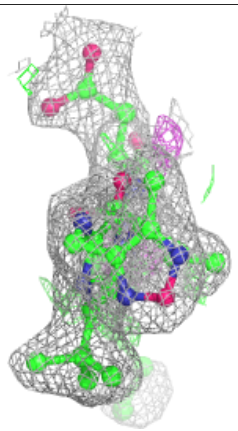


Electron density around PZN A 501:

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







6.5 Other polymers (i)

There are no such residues in this entry.