



# Full wwPDB X-ray Structure Validation Report ⓘ

May 17, 2020 – 01:03 am BST

PDB ID : 3R0I  
Title : IspC in complex with an N-methyl-substituted hydroxamic acid  
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Deposited on : 2011-03-08  
Resolution : 2.10 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 : 2.11  
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) : 2.11

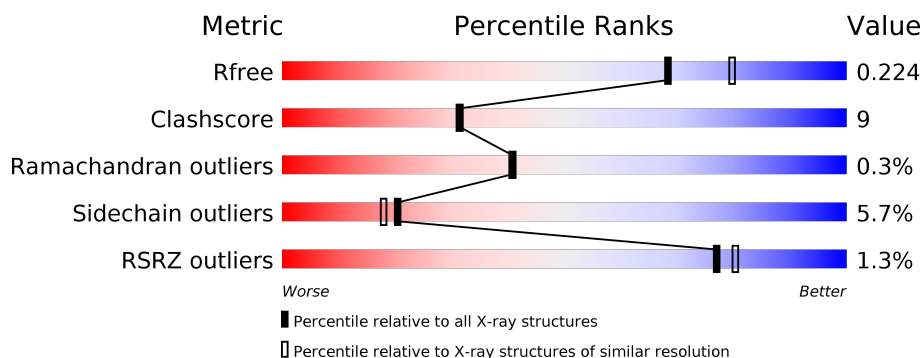
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.10 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	5197 (2.10-2.10)
Clashscore	141614	5710 (2.10-2.10)
Ramachandran outliers	138981	5647 (2.10-2.10)
Sidechain outliers	138945	5648 (2.10-2.10)
RSRZ outliers	127900	5083 (2.10-2.10)

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 on 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	410	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 1%, orange 1%, yellow 16%, green 77%, grey 8%);"></div> <div style="display: flex; justify-content: space-between; width: 100%;"> <span>%</span> <span>77%</span> <span>16%</span> <span>• •</span> </div> </div>
1	B	410	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 1%, orange 1%, yellow 17%, green 76%, grey 8%);"></div> <div style="display: flex; justify-content: space-between; width: 100%;"> <span>%</span> <span>76%</span> <span>17%</span> <span>• •</span> </div> </div>

## 2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 6778 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 1-deoxy-D-xylulose 5-phosphate reductoisomerase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	393	Total	C	N	O	S	0	0	0
			2979	1860	522	570	27			
1	B	393	Total	C	N	O	S	0	0	0
			2984	1863	525	569	27			

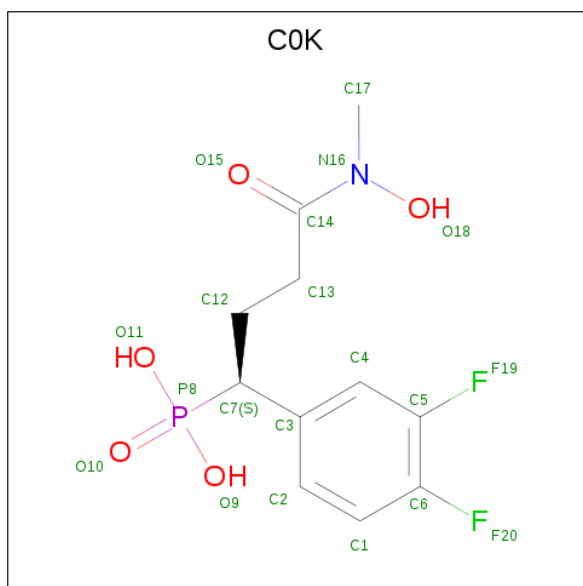
There are 24 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-11	MET	-	EXPRESSION TAG	UNP P45568
A	-10	ARG	-	EXPRESSION TAG	UNP P45568
A	-9	GLY	-	EXPRESSION TAG	UNP P45568
A	-8	SER	-	EXPRESSION TAG	UNP P45568
A	-7	HIS	-	EXPRESSION TAG	UNP P45568
A	-6	HIS	-	EXPRESSION TAG	UNP P45568
A	-5	HIS	-	EXPRESSION TAG	UNP P45568
A	-4	HIS	-	EXPRESSION TAG	UNP P45568
A	-3	HIS	-	EXPRESSION TAG	UNP P45568
A	-2	HIS	-	EXPRESSION TAG	UNP P45568
A	-1	GLY	-	EXPRESSION TAG	UNP P45568
A	0	SER	-	EXPRESSION TAG	UNP P45568
B	-11	MET	-	EXPRESSION TAG	UNP P45568
B	-10	ARG	-	EXPRESSION TAG	UNP P45568
B	-9	GLY	-	EXPRESSION TAG	UNP P45568
B	-8	SER	-	EXPRESSION TAG	UNP P45568
B	-7	HIS	-	EXPRESSION TAG	UNP P45568
B	-6	HIS	-	EXPRESSION TAG	UNP P45568
B	-5	HIS	-	EXPRESSION TAG	UNP P45568
B	-4	HIS	-	EXPRESSION TAG	UNP P45568
B	-3	HIS	-	EXPRESSION TAG	UNP P45568
B	-2	HIS	-	EXPRESSION TAG	UNP P45568
B	-1	GLY	-	EXPRESSION TAG	UNP P45568
B	0	SER	-	EXPRESSION TAG	UNP P45568

- Molecule 2 is MANGANESE (II) ION (three-letter code: MN) (formula: Mn).

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

- Molecule 3 is {(1S)-1-(3,4-difluorophenyl)-4-[hydroxy(methyl)amino]-4-oxobutyl}phosphonic acid (three-letter code: C0K) (formula: C<sub>11</sub>H<sub>14</sub>F<sub>2</sub>NO<sub>5</sub>P).



Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
3	A	1	Total	C	F	N	O	P	0	0
			20	11	2	1	5	1		
3	B	1	Total	C	F	N	O	P	0	0
			20	11	2	1	5	1		

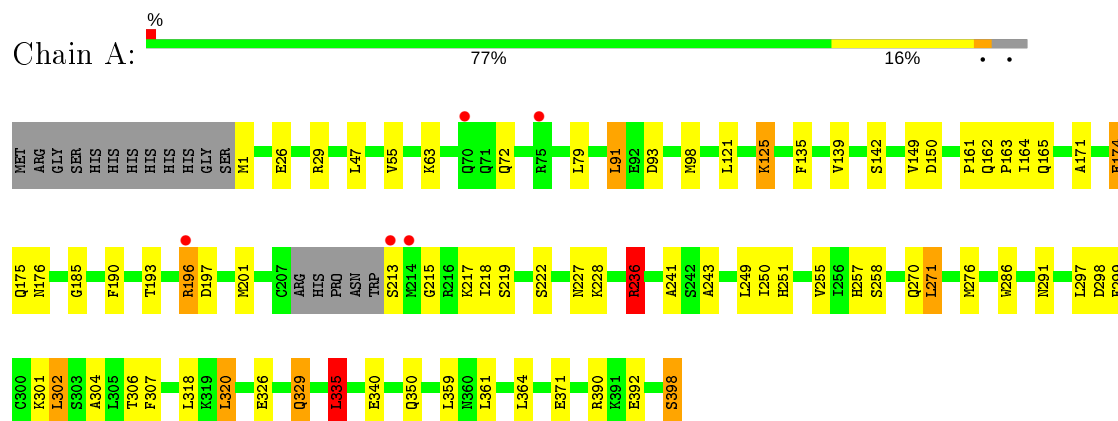
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	385	Total	O	0	0
			385	385		
4	B	388	Total	O	0	0
			388	388		

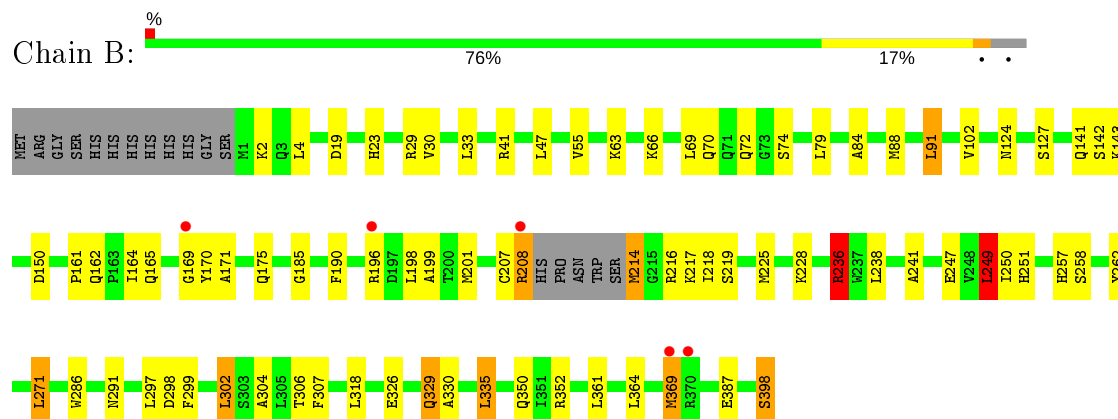
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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: 1-deoxy-D-xylulose 5-phosphate reductoisomerase



- Molecule 1: 1-deoxy-D-xylulose 5-phosphate reductoisomerase



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	91.25Å 54.58Å 107.80Å 90.00° 93.17° 90.00°	Depositor
Resolution (Å)	10.00 – 2.10 53.82 – 2.10	Depositor EDS
% Data completeness (in resolution range)	99.9 (10.00-2.10) 99.9 (53.82-2.10)	Depositor EDS
$R_{merge}$	0.07	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.13 (at 2.10Å)	Xtriage
Refinement program	REFMAC 5.5.0109, CNS	Depositor
R, $R_{free}$	0.163 , 0.217 0.172 , 0.224	Depositor DCC
$R_{free}$ test set	3154 reflections (5.06%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	18.5	Xtriage
Anisotropy	0.098	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.37 , 43.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.51$ , $\langle L^2 \rangle = 0.35$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	6778	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	20.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.92% 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: C0K, MN

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	1.14	6/3022 (0.2%)	1.03	12/4093 (0.3%)
1	B	1.13	4/3027 (0.1%)	1.02	12/4099 (0.3%)
All	All	1.13	10/6049 (0.2%)	1.03	24/8192 (0.3%)

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	B	0	1

All (10) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	142	SER	CB-OG	7.26	1.51	1.42
1	A	236	ARG	CD-NE	-6.18	1.35	1.46
1	B	329	GLN	CG-CD	5.93	1.64	1.51
1	B	247	GLU	CB-CG	5.74	1.63	1.52
1	A	329	GLN	CG-CD	5.65	1.64	1.51
1	A	243	ALA	CA-CB	5.61	1.64	1.52
1	A	149	VAL	CB-CG1	5.45	1.64	1.52
1	A	26	GLU	CG-CD	5.28	1.59	1.51
1	B	102	VAL	CB-CG2	5.10	1.63	1.52
1	B	236	ARG	CD-NE	-5.05	1.37	1.46

All (24) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	236	ARG	NE-CZ-NH2	-14.71	112.94	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	236	ARG	NE-CZ-NH2	-12.65	113.98	120.30
1	A	236	ARG	NE-CZ-NH1	12.59	126.60	120.30
1	B	236	ARG	NE-CZ-NH1	11.81	126.20	120.30
1	B	4	LEU	CB-CG-CD1	-7.14	98.86	111.00
1	A	125	LYS	CD-CE-NZ	-6.97	95.67	111.70
1	B	335	LEU	CB-CG-CD2	6.61	122.24	111.00
1	A	276	MET	CG-SD-CE	6.43	110.48	100.20
1	A	91	LEU	CA-CB-CG	6.14	129.42	115.30
1	B	29	ARG	NE-CZ-NH1	6.04	123.32	120.30
1	B	91	LEU	CA-CB-CG	5.73	128.48	115.30
1	A	335	LEU	CB-CG-CD2	5.65	120.61	111.00
1	A	271	LEU	CA-CB-CG	5.63	128.24	115.30
1	B	271	LEU	CA-CB-CG	5.62	128.22	115.30
1	B	238	LEU	CB-CG-CD2	-5.55	101.56	111.00
1	A	29	ARG	NE-CZ-NH1	5.54	123.07	120.30
1	A	271	LEU	CB-CG-CD2	5.42	120.21	111.00
1	A	390	ARG	NE-CZ-NH2	-5.37	117.62	120.30
1	A	236	ARG	CB-CG-CD	-5.34	97.71	111.60
1	B	298	ASP	CB-CG-OD1	5.34	123.11	118.30
1	B	271	LEU	CB-CG-CD2	5.25	119.93	111.00
1	B	249	LEU	CA-CB-CG	5.25	127.38	115.30
1	B	29	ARG	NE-CZ-NH2	-5.23	117.69	120.30
1	A	150	ASP	CB-CG-OD1	-5.21	113.61	118.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	207	CYS	Peptide

## 5.2 Too-close contacts ⓘ

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2979	0	3011	46	0
1	B	2984	0	3019	63	0
2	A	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	1	0	0	0	0
3	A	20	0	11	0	0
3	B	20	0	11	0	0
4	A	385	0	0	17	0
4	B	388	0	0	28	0
All	All	6778	0	6052	108	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 9.

All (108) 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:A:213:SER:HA	4:A:741:HOH:O	1.33	1.26
1:B:169:GLY:HA2	4:B:713:HOH:O	1.43	1.12
1:B:175:GLN:HG2	4:B:698:HOH:O	1.49	1.10
1:B:164:ILE:HD13	1:B:171:ALA:HB1	1.42	1.02
1:B:141:GLN:CD	4:B:598:HOH:O	2.03	0.96
1:B:23:HIS:HB2	4:B:778:HOH:O	1.67	0.94
1:A:63:LYS:HD2	4:A:671:HOH:O	1.67	0.94
1:B:291:ASN:HB2	4:B:479:HOH:O	1.65	0.94
1:B:218:ILE:HB	4:B:515:HOH:O	1.71	0.90
1:B:171:ALA:HB3	4:B:722:HOH:O	1.73	0.88
1:B:236:ARG:HD3	1:B:241:ALA:O	1.74	0.87
1:B:236:ARG:CD	1:B:241:ALA:O	2.27	0.82
1:A:236:ARG:HD3	1:A:241:ALA:O	1.80	0.81
1:B:66:LYS:HD2	4:B:544:HOH:O	1.83	0.78
1:B:164:ILE:CD1	1:B:171:ALA:HB1	2.13	0.77
1:B:208:ARG:NH1	1:B:208:ARG:HB2	2.00	0.76
1:A:236:ARG:CD	1:A:241:ALA:O	2.36	0.73
1:B:150:ASP:HB3	4:B:410:HOH:O	1.89	0.73
1:A:125:LYS:HE2	4:A:509:HOH:O	1.89	0.73
1:B:141:GLN:NE2	4:B:598:HOH:O	2.19	0.72
1:B:196:ARG:HG3	4:B:624:HOH:O	1.88	0.72
1:B:196:ARG:HG2	4:B:670:HOH:O	1.91	0.70
1:A:340:GLU:CG	4:A:691:HOH:O	2.39	0.69
1:B:208:ARG:HG3	1:B:214:MET:CE	2.24	0.66
1:A:174:GLU:HG2	4:A:705:HOH:O	1.97	0.65
1:A:340:GLU:CD	4:A:691:HOH:O	2.37	0.63
1:B:257:HIS:HE1	4:B:536:HOH:O	1.82	0.62
1:B:369:MET:HA	4:B:498:HOH:O	2.00	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:291:ASN:HB3	4:A:531:HOH:O	2.01	0.61
1:A:257:HIS:HE1	4:A:587:HOH:O	1.85	0.60
1:B:69:LEU:HB3	1:B:74:SER:HB3	1.84	0.60
1:A:125:LYS:NZ	1:A:227:ASN:OD1	2.36	0.59
1:B:236:ARG:HD2	1:B:241:ALA:O	2.01	0.59
1:B:208:ARG:CZ	1:B:208:ARG:HB2	2.33	0.58
1:B:329:GLN:HG3	4:B:430:HOH:O	2.05	0.56
1:A:340:GLU:HG3	4:A:691:HOH:O	2.02	0.56
1:A:320:LEU:HD13	1:A:335:LEU:HD21	1.86	0.56
1:B:165:GLN:HE21	1:B:286:TRP:HE1	1.52	0.56
1:B:165:GLN:NE2	1:B:286:TRP:HE1	2.04	0.56
1:B:199:ALA:HB1	1:B:352:ARG:NH1	2.22	0.55
1:B:350:GLN:NE2	4:B:407:HOH:O	2.38	0.55
1:A:329:GLN:HG3	4:A:428:HOH:O	2.05	0.55
1:A:164:ILE:HG12	1:A:171:ALA:HB1	1.89	0.55
1:B:307:PHE:HD2	4:B:787:HOH:O	1.90	0.55
1:B:208:ARG:HG3	1:B:214:MET:HE3	1.88	0.55
1:B:251:HIS:HD2	1:B:306:THR:O	1.90	0.54
1:A:165:GLN:HE21	1:A:286:TRP:HE1	1.53	0.54
1:A:304:ALA:HB1	1:B:304:ALA:HB1	1.90	0.54
1:A:236:ARG:NH2	1:A:326:GLU:OE2	2.36	0.54
1:A:398:SER:HA	4:A:609:HOH:O	2.08	0.53
1:A:55:VAL:HG22	1:A:79:LEU:HB2	1.88	0.53
1:A:236:ARG:HD2	1:A:241:ALA:O	2.09	0.53
1:A:251:HIS:HD2	1:A:306:THR:O	1.91	0.53
1:B:208:ARG:HG3	1:B:214:MET:HE1	1.89	0.53
1:B:216:ARG:HD3	4:B:695:HOH:O	2.08	0.53
1:A:218:ILE:HD11	4:A:692:HOH:O	2.08	0.53
1:B:291:ASN:ND2	4:B:479:HOH:O	2.36	0.52
1:B:369:MET:HG3	4:B:675:HOH:O	2.09	0.52
1:B:185:GLY:HA3	1:B:228:LYS:HE3	1.91	0.52
1:B:299:PHE:HA	1:B:302:LEU:HD22	1.91	0.52
1:B:330:ALA:CB	1:B:369:MET:HB2	2.40	0.52
1:A:190:PHE:CE2	1:A:201:MET:HE2	2.45	0.51
1:B:369:MET:SD	4:B:675:HOH:O	2.60	0.50
1:A:165:GLN:NE2	1:A:286:TRP:HE1	2.10	0.49
1:B:30:VAL:HG11	1:B:33:LEU:HD21	1.94	0.49
1:A:93:ASP:HB3	4:A:477:HOH:O	2.13	0.49
1:A:135:PHE:O	1:A:139:VAL:HG23	2.13	0.48
1:B:236:ARG:NH2	1:B:326:GLU:OE2	2.38	0.48
1:B:161:PRO:HD3	1:B:262:TYR:OH	2.13	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:359:LEU:HD22	1:A:392:GLU:HB3	1.96	0.48
1:A:196:ARG:HB2	4:A:565:HOH:O	2.13	0.47
1:B:2:LYS:CE	4:B:766:HOH:O	2.62	0.47
1:A:164:ILE:HD11	1:A:176:ASN:HB2	1.96	0.47
1:B:398:SER:HA	4:B:752:HOH:O	2.14	0.47
1:B:387:GLU:HG3	4:B:688:HOH:O	2.14	0.47
1:B:55:VAL:HG22	1:B:79:LEU:HB2	1.97	0.46
1:B:218:ILE:HG12	4:B:575:HOH:O	2.16	0.46
1:B:84:ALA:O	1:B:88:MET:HG2	2.15	0.46
1:A:175:GLN:HG2	4:A:454:HOH:O	2.16	0.46
1:B:249:LEU:HD13	4:B:787:HOH:O	2.16	0.46
1:B:141:GLN:CG	4:B:598:HOH:O	2.59	0.45
1:A:350:GLN:NE2	4:A:626:HOH:O	2.43	0.45
1:A:98:MET:HA	1:A:121:LEU:HB2	1.99	0.44
1:A:47:LEU:HD11	1:A:72:GLN:HG3	1.99	0.44
1:A:185:GLY:HA3	1:A:228:LYS:HE3	2.00	0.43
1:A:298:ASP:OD2	1:A:301:LYS:HD2	2.18	0.43
1:A:161:PRO:HB2	1:A:163:PRO:HD2	2.01	0.43
1:B:190:PHE:CE2	1:B:201:MET:HE2	2.54	0.43
1:B:164:ILE:HD13	1:B:171:ALA:CB	2.30	0.43
1:A:250:ILE:O	1:A:307:PHE:HA	2.19	0.42
1:A:215:GLY:O	1:A:219:SER:HB2	2.19	0.42
1:B:19:ASP:HB2	4:B:779:HOH:O	2.19	0.42
1:B:124:ASN:ND2	1:B:127:SER:H	2.18	0.42
1:B:142:SER:O	1:B:143:LYS:HB2	2.19	0.42
1:B:225:MET:SD	1:B:250:ILE:HD11	2.60	0.42
1:B:330:ALA:HB3	1:B:369:MET:HB2	2.01	0.42
1:A:251:HIS:CE1	1:A:255:VAL:H	2.37	0.42
1:A:257:HIS:HD2	1:A:270:GLN:OE1	2.02	0.42
1:A:299:PHE:HA	1:A:302:LEU:HD22	2.02	0.42
1:A:1:MET:N	4:A:739:HOH:O	1.99	0.41
1:A:193:THR:HG22	1:A:197:ASP:HB2	2.01	0.41
1:B:208:ARG:CZ	1:B:208:ARG:CB	2.97	0.41
1:A:196:ARG:HA	1:A:196:ARG:NE	2.36	0.41
1:A:371:GLU:OE2	1:A:371:GLU:HA	2.21	0.41
1:B:47:LEU:HD11	1:B:72:GLN:HG3	2.03	0.41
1:B:198:LEU:HD23	1:B:198:LEU:HA	1.86	0.40
1:B:175:GLN:HE21	1:B:175:GLN:HB2	1.67	0.40
1:B:169:GLY:O	1:B:170:TYR:C	2.57	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles

### 5.3.1 Protein backbone

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	389/410 (95%)	379 (97%)	9 (2%)	1 (0%)	41	41
1	B	389/410 (95%)	380 (98%)	8 (2%)	1 (0%)	41	41
All	All	778/820 (95%)	759 (98%)	17 (2%)	2 (0%)	41	41

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	258	SER
1	A	258	SER

### 5.3.2 Protein sidechains

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	323/338 (96%)	306 (95%)	17 (5%)	22	20
1	B	323/338 (96%)	303 (94%)	20 (6%)	18	15
All	All	646/676 (96%)	609 (94%)	37 (6%)	20	18

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

Mol	Chain	Res	Type
1	A	91	LEU
1	A	162	GLN
1	A	174	GLU
1	A	196	ARG

*Continued on next page...*

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Mol	Chain	Res	Type
1	A	217	LYS
1	A	222	SER
1	A	236	ARG
1	A	249	LEU
1	A	271	LEU
1	A	297	LEU
1	A	302	LEU
1	A	318	LEU
1	A	320	LEU
1	A	335	LEU
1	A	361	LEU
1	A	364	LEU
1	A	398	SER
1	B	41	ARG
1	B	63	LYS
1	B	70	GLN
1	B	91	LEU
1	B	162	GLN
1	B	208	ARG
1	B	214	MET
1	B	217	LYS
1	B	219	SER
1	B	236	ARG
1	B	249	LEU
1	B	271	LEU
1	B	297	LEU
1	B	302	LEU
1	B	318	LEU
1	B	335	LEU
1	B	361	LEU
1	B	364	LEU
1	B	369	MET
1	B	398	SER

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (19) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	70	GLN
1	A	71	GLN
1	A	124	ASN
1	A	162	GLN
1	A	165	GLN

*Continued on next page...*

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Mol	Chain	Res	Type
1	A	175	GLN
1	A	251	HIS
1	A	257	HIS
1	A	270	GLN
1	A	327	GLN
1	A	350	GLN
1	B	124	ASN
1	B	162	GLN
1	B	165	GLN
1	B	175	GLN
1	B	251	HIS
1	B	257	HIS
1	B	350	GLN
1	B	373	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 carbohydrates in this entry.

## 5.6 Ligand geometry [i](#)

Of 4 ligands modelled in this entry, 2 are monoatomic - leaving 2 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	C0K	B	991	2	17,20,20	1.91	5 (29%)	19,29,29	1.43	4 (21%)
3	C0K	A	991	2	17,20,20	1.79	7 (41%)	19,29,29	1.82	5 (26%)

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	C0K	B	991	2	-	4/19/19/19	0/1/1/1
3	C0K	A	991	2	-	4/19/19/19	0/1/1/1

All (12) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	991	C0K	C14-N16	3.51	1.39	1.35
3	B	991	C0K	P8-C7	3.25	1.86	1.82
3	B	991	C0K	P8-O11	-3.00	1.50	1.54
3	A	991	C0K	P8-O11	-2.98	1.50	1.54
3	B	991	C0K	C4-C5	2.93	1.42	1.37
3	A	991	C0K	P8-C7	2.84	1.85	1.82
3	A	991	C0K	C14-N16	2.81	1.38	1.35
3	B	991	C0K	C4-C3	2.60	1.43	1.39
3	A	991	C0K	C13-C14	2.55	1.56	1.51
3	A	991	C0K	C2-C3	2.22	1.42	1.39
3	A	991	C0K	C4-C5	2.12	1.41	1.37
3	A	991	C0K	C1-C6	2.11	1.42	1.37

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	991	C0K	C4-C3-C7	-4.64	114.29	120.78
3	A	991	C0K	C2-C3-C7	3.02	125.69	120.82
3	B	991	C0K	C12-C7-C3	-2.96	108.55	113.42
3	B	991	C0K	O11-P8-O9	2.74	115.01	107.64
3	B	991	C0K	F19-C5-C4	2.57	123.72	118.61
3	A	991	C0K	F20-C6-C1	2.53	124.23	118.59
3	A	991	C0K	O10-P8-C7	-2.23	107.11	113.35
3	A	991	C0K	C12-C7-C3	-2.15	109.88	113.42
3	B	991	C0K	P8-C7-C3	2.06	115.32	110.26

There are no chirality outliers.

All (8) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	B	991	C0K	C2-C3-C7-C12
3	B	991	C0K	C4-C3-C7-C12
3	A	991	C0K	C4-C3-C7-C12
3	A	991	C0K	C2-C3-C7-C12
3	B	991	C0K	C12-C7-P8-O10
3	A	991	C0K	C12-C7-P8-O10
3	B	991	C0K	O15-C14-N16-O18
3	A	991	C0K	O15-C14-N16-O18

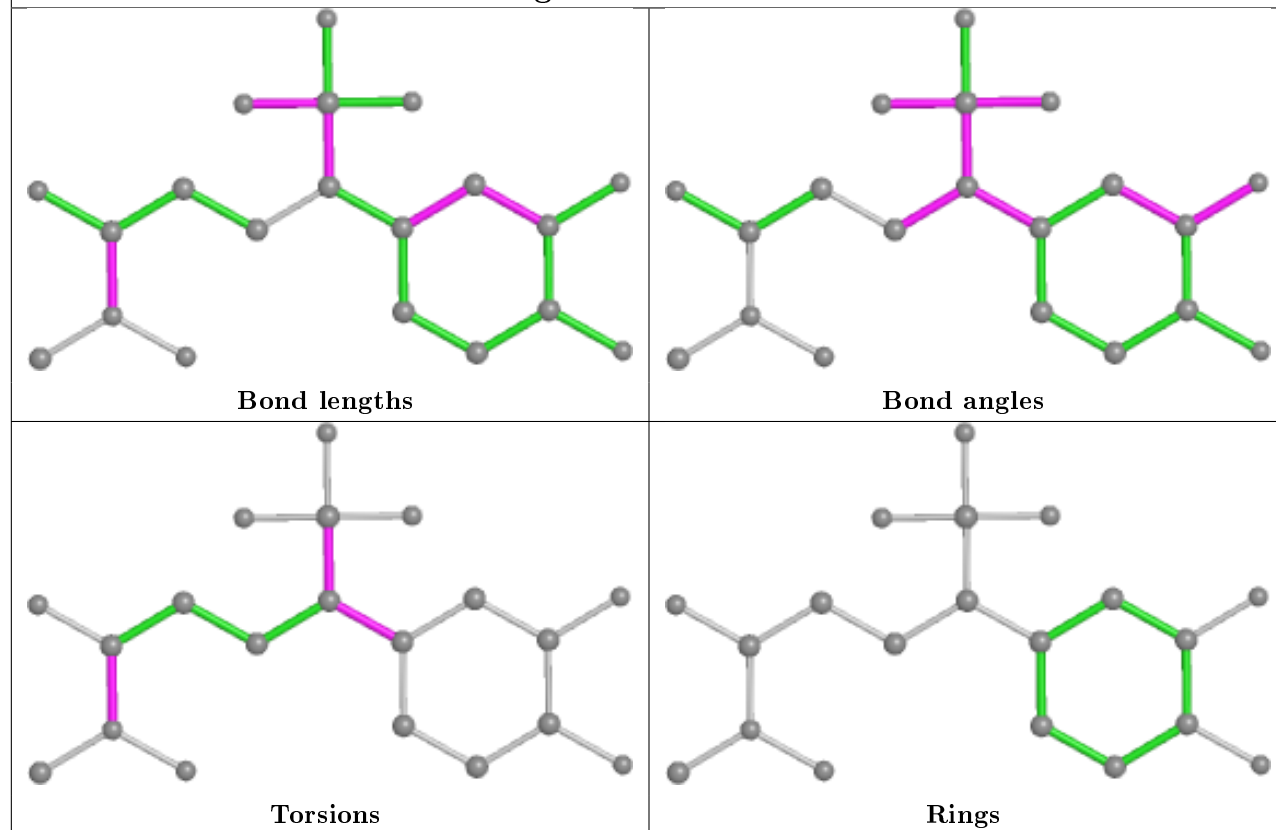
There are no ring outliers.

No monomer is involved in short contacts.

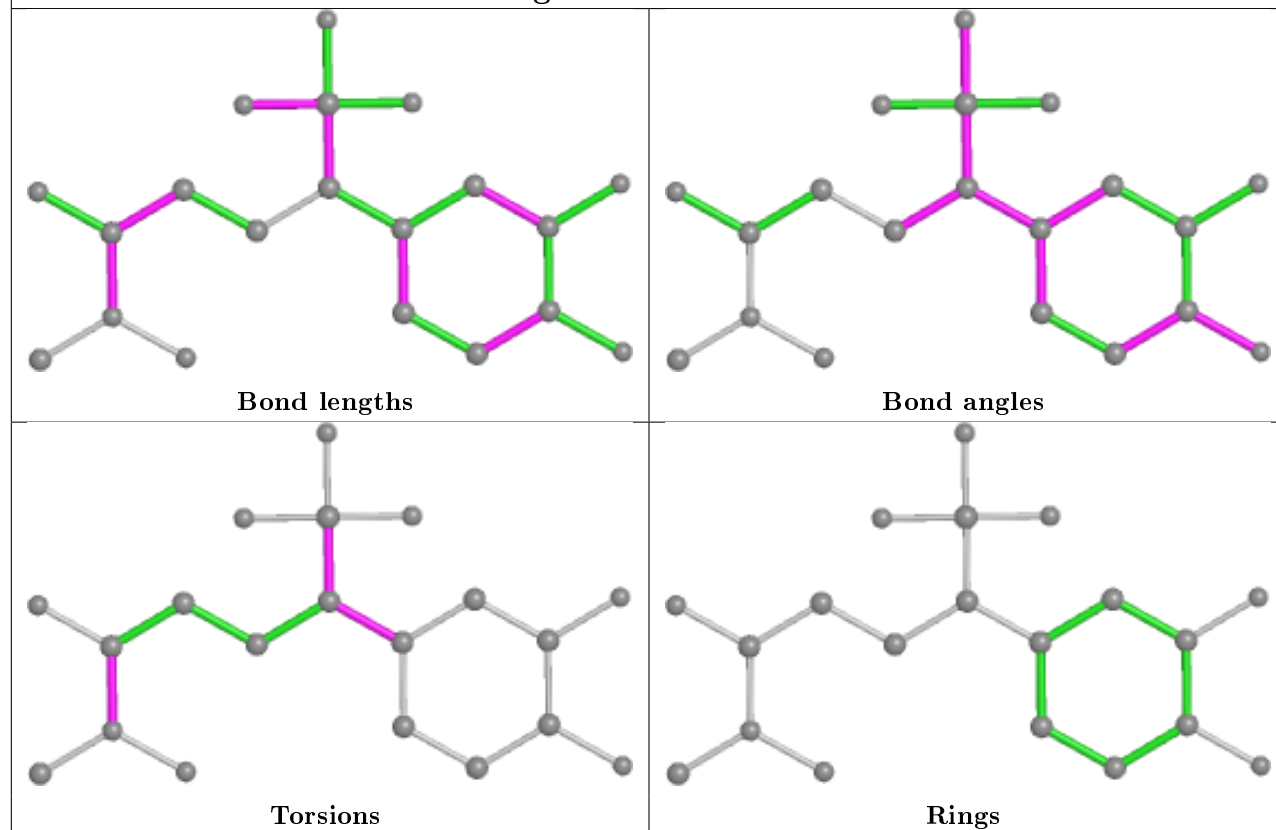
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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



## Ligand C0K B 991



## Ligand C0K A 991



## 5.7 Other polymers

There are no such residues in this entry.

## 5.8 Polymer linkage issues

There are no chain breaks in this entry.

## 6 Fit of model and data [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, 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	393/410 (95%)	-0.38	5 (1%) 77 80	7, 17, 36, 65	0
1	B	393/410 (95%)	-0.38	5 (1%) 77 80	8, 17, 36, 60	0
All	All	786/820 (95%)	-0.38	10 (1%) 77 80	7, 17, 36, 65	0

All (10) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	213	SER	4.9
1	A	214	MET	3.1
1	B	196	ARG	3.1
1	A	196	ARG	3.0
1	B	208	ARG	2.8
1	B	369	MET	2.6
1	A	70	GLN	2.6
1	A	75	ARG	2.5
1	B	169	GLY	2.3
1	B	370	ARG	2.1

### 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 carbohydrates in this entry.

## 6.4 Ligands [i](#)

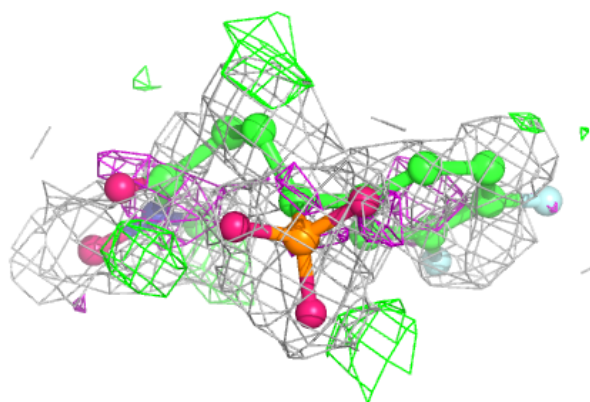
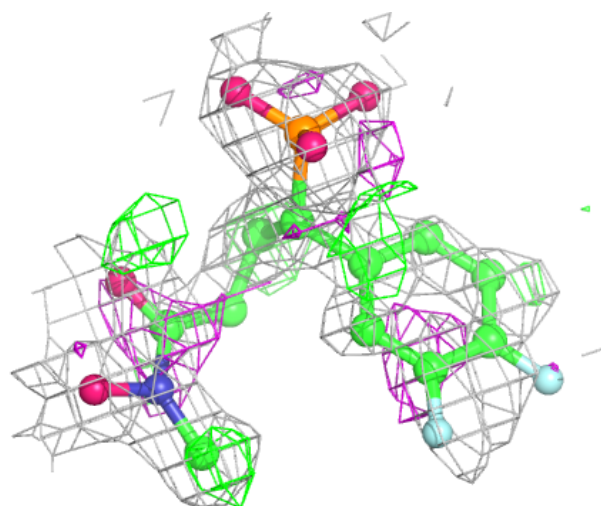
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 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	C0K	B	991	20/20	0.87	0.28	26,42,55,61	0
3	C0K	A	991	20/20	0.91	0.23	30,40,55,60	0
2	MN	A	990	1/1	1.00	0.06	19,19,19,19	0
2	MN	B	990	1/1	1.00	0.05	19,19,19,19	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.

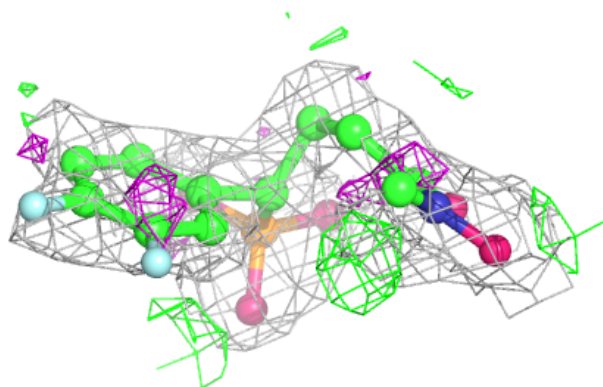
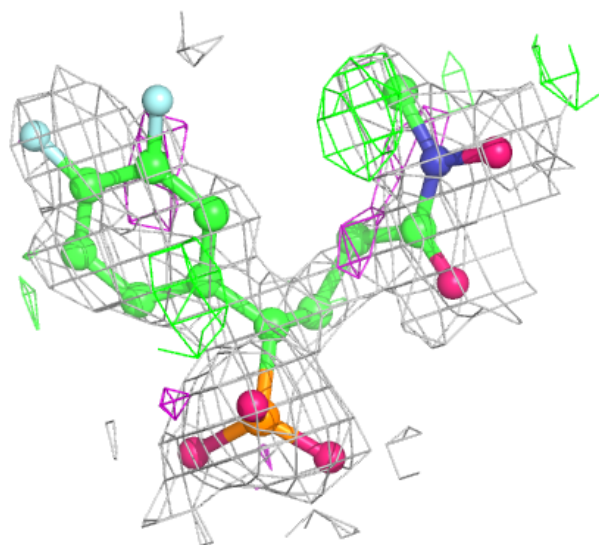
### Electron density around C0K B 991:

2mF<sub>o</sub>-DF<sub>c</sub> (at 0.7 rmsd) in gray  
mF<sub>o</sub>-DF<sub>c</sub> (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around C0K A 991:**

$2mF_o-DF_c$  (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.