



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 12:26 PM GMT

PDB ID : 3RAS  
Title : Crystal structure of 1-deoxy-D-xylulose 5-phosphate reductoisomerase (DXR) complexed with a lipophilic phosphonate inhibitor  
Authors : Diao, J.; Deng, L.; Prasad, B.V.V.; Song, Y.  
Deposited on : 2011-03-28  
Resolution : 2.55 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  
<http://wwpdb.org/validation/2016/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 : 1.7 (RC4), CSD as536be (2015)  
Xtriage (Phenix) : 1.9-1692  
EDS : rb-20026688  
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)  
Refmac : 5.8.0135  
CCP4 : 6.5.0  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : trunk26865

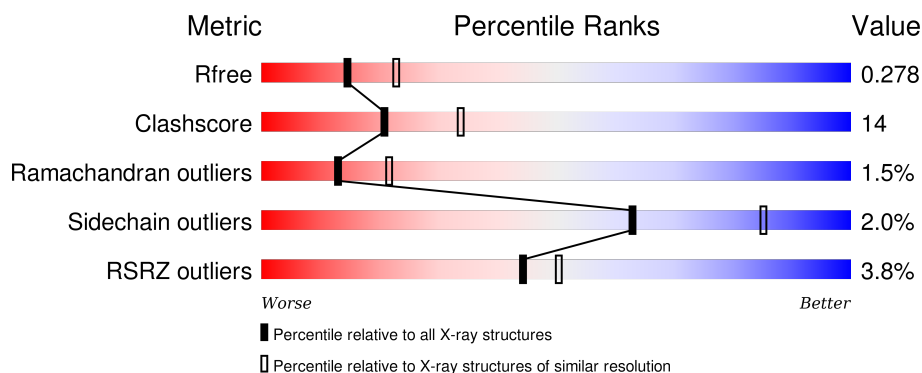
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.55 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))
$R_{free}$	91344	4549 (2.58-2.50)
Clashscore	102246	5292 (2.58-2.50)
Ramachandran outliers	100387	5194 (2.58-2.50)
Sidechain outliers	100360	5196 (2.58-2.50)
RSRZ outliers	91569	4561 (2.58-2.50)

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. 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	398	<div> <div>4%</div> <div>68%</div> <div>26%</div> <div>5%</div> </div>
1	B	398	<div> <div>3%</div> <div>65%</div> <div>30%</div> <div>5%</div> </div>

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
6	SO4	B	393	-	-	-	X

## 2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 5864 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	379	Total	C	N	O	S	0	0	0
			2781	1742	502	528	9			
1	B	379	Total	C	N	O	S	0	0	0
			2781	1742	502	528	9			

There are 20 discrepancies between the modelled and reference sequences:

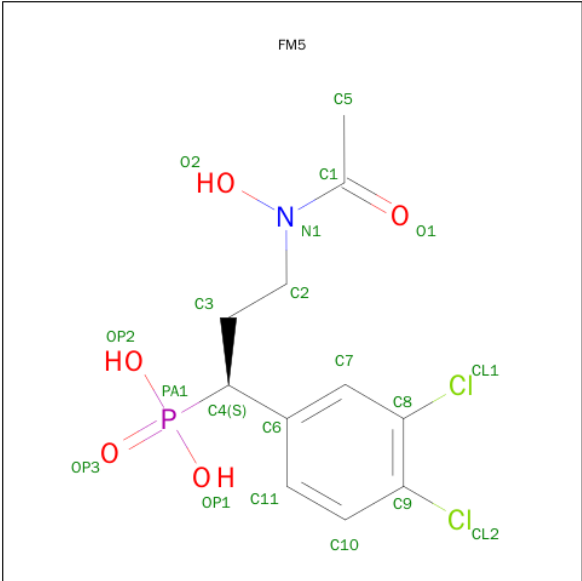
Chain	Residue	Modelled	Actual	Comment	Reference
A	-8	THR	-	EXPRESSION TAG	UNP P64012
A	-7	MET	-	EXPRESSION TAG	UNP P64012
A	-6	ALA	-	EXPRESSION TAG	UNP P64012
A	-5	HIS	-	EXPRESSION TAG	UNP P64012
A	-4	HIS	-	EXPRESSION TAG	UNP P64012
A	-3	HIS	-	EXPRESSION TAG	UNP P64012
A	-2	HIS	-	EXPRESSION TAG	UNP P64012
A	-1	HIS	-	EXPRESSION TAG	UNP P64012
A	0	HIS	-	EXPRESSION TAG	UNP P64012
A	1	VAL	-	EXPRESSION TAG	UNP P64012
B	-8	THR	-	EXPRESSION TAG	UNP P64012
B	-7	MET	-	EXPRESSION TAG	UNP P64012
B	-6	ALA	-	EXPRESSION TAG	UNP P64012
B	-5	HIS	-	EXPRESSION TAG	UNP P64012
B	-4	HIS	-	EXPRESSION TAG	UNP P64012
B	-3	HIS	-	EXPRESSION TAG	UNP P64012
B	-2	HIS	-	EXPRESSION TAG	UNP P64012
B	-1	HIS	-	EXPRESSION TAG	UNP P64012
B	0	HIS	-	EXPRESSION TAG	UNP P64012
B	1	VAL	-	EXPRESSION TAG	UNP P64012

- Molecule 2 is NADPH DIHYDRO-NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (three-letter code: NDP) (formula: C<sub>21</sub>H<sub>30</sub>N<sub>7</sub>O<sub>17</sub>P<sub>3</sub>).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			48	21	7	17	3		
2	B	1	Total	C	N	O	P	0	0
			48	21	7	17	3		

- Molecule 3 is 3-(N-HYDROXYACETAMIDO)-1-(3,4-DICHLOROPHENYL)PROPYLPHOSPHONIC ACID (three-letter code: FM5) (formula: C<sub>11</sub>H<sub>14</sub>Cl<sub>2</sub>NO<sub>5</sub>P).



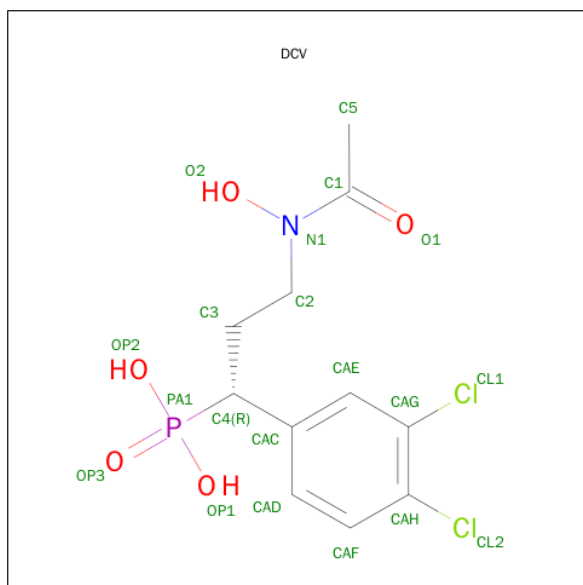
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
3	A	1	Total	C	Cl	N	O	P	0	0
			20	11	2	1	5	1		

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

- Molecule 4 is [(1R)-3-[ACETYL(HYDROXY)AMINO]-1-(3,4-DICHLOROPHENYL)PROPYL]PHOSPHONIC ACID (three-letter code: DCV) (formula: C<sub>11</sub>H<sub>14</sub>Cl<sub>2</sub>NO<sub>5</sub>P).

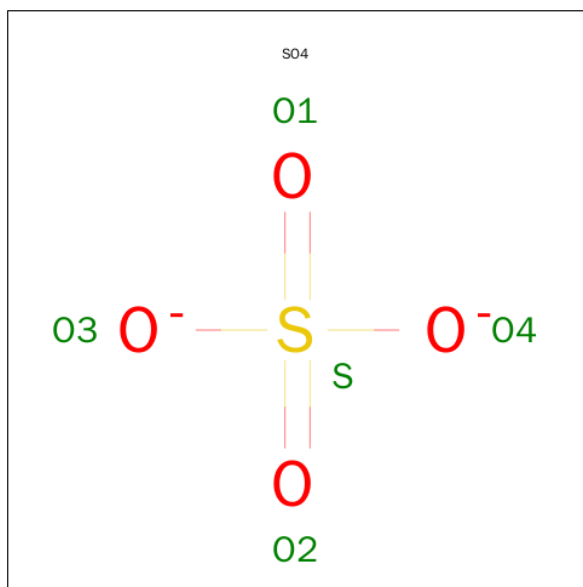


Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
4	A	1	Total	C	Cl	N	O	P	0	0
			20	11	2	1	5	1		
4	B	1	Total	C	Cl	N	O	P	0	0
			20	11	2	1	5	1		

- Molecule 5 is MANGANESE (II) ION (three-letter code: MN) (formula: Mn).

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

- Molecule 6 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	B	1	Total	O	S	0	0
			5	4	1		

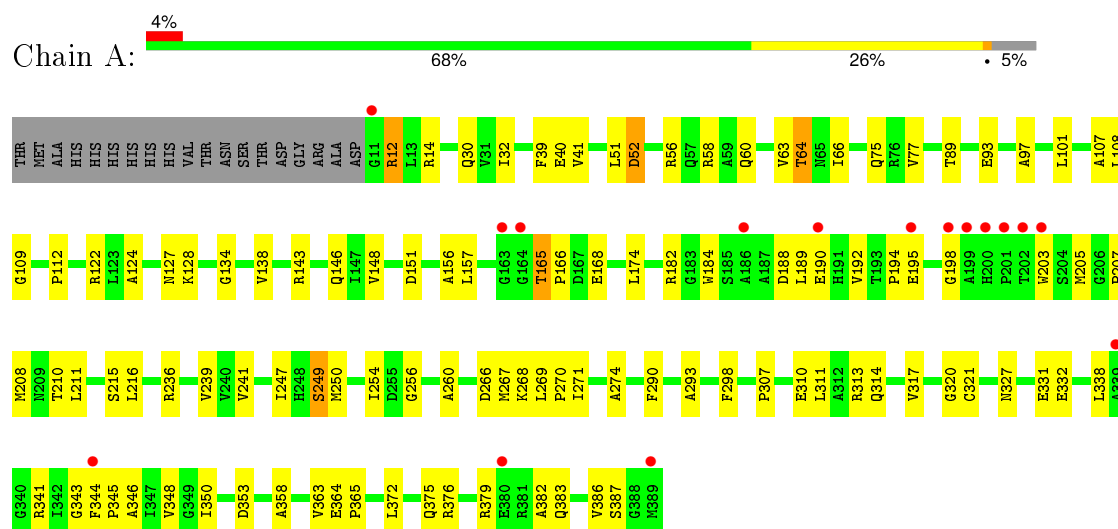
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	51	Total	O	0	0
			51	51		
7	B	68	Total	O	0	0
			68	68		

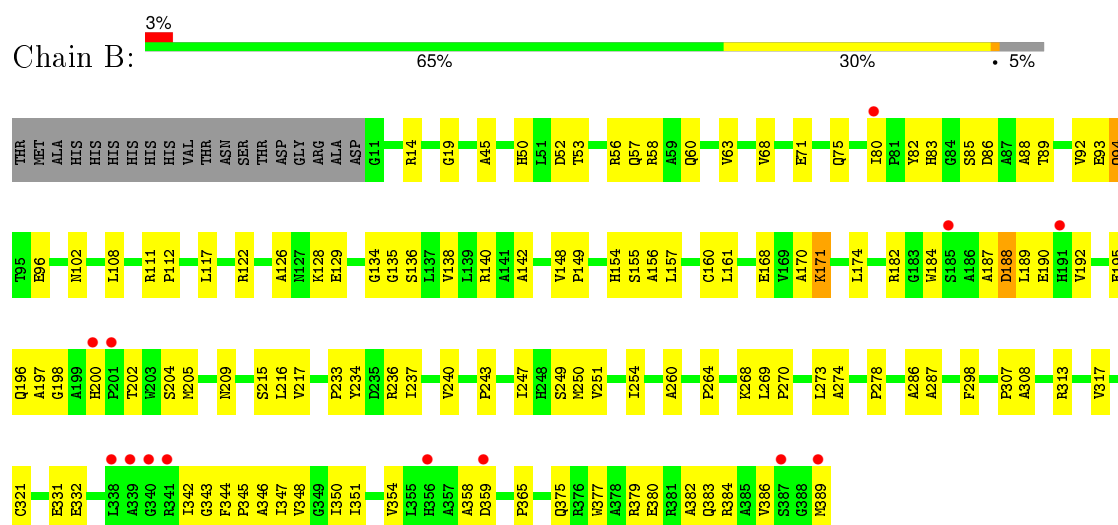
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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, $\alpha$ , $\beta$ , $\gamma$	67.25Å 65.18Å 85.41Å 90.00° 101.28° 90.00°	Depositor
Resolution (Å)	33.45 – 2.55 33.45 – 2.55	Depositor EDS
% Data completeness (in resolution range)	93.5 (33.45-2.55) 93.2 (33.45-2.55)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.14	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.80 (at 2.54Å)	Xtriage
Refinement program	CNS 1.3	Depositor
R, $R_{free}$	0.208 , 0.278 0.208 , 0.278	Depositor DCC
$R_{free}$ test set	1111 reflections (4.97%)	DCC
Wilson B-factor (Å <sup>2</sup> )	46.8	Xtriage
Anisotropy	0.573	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 37.1	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.51$ , $\langle L^2 \rangle = 0.34$	Xtriage
Outliers	0 of 22347 reflections	Xtriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	5864	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	52.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.77% 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, 0.375 respectively for untwinned datasets, and 0.333, 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: DCV, FM5, MN, SO4, NDP

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	0.38	0/2835	0.64	0/3873
1	B	0.38	0/2835	0.62	0/3873
All	All	0.38	0/5670	0.63	0/7746

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts

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	2781	0	2768	75	0
1	B	2781	0	2768	89	0
2	A	48	0	26	0	0
2	B	48	0	26	1	0
3	A	20	0	7	2	0
3	B	20	0	6	1	0
4	A	20	0	5	1	0
4	B	20	0	7	0	0
5	A	1	0	0	0	0
5	B	1	0	0	0	0
6	B	5	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
7	A	51	0	0	3	0
7	B	68	0	0	7	0
All	All	5864	0	5613	163	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 14.

All (163) 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:307:PRO:HG2	1:A:348:VAL:HG11	1.50	0.92
1:A:75:GLN:HE21	1:A:75:GLN:HA	1.46	0.80
1:B:273:LEU:HB2	7:B:399:HOH:O	1.84	0.78
1:B:379:ARG:O	1:B:383:GLN:HG3	1.84	0.77
1:A:58:ARG:HG3	1:A:63:VAL:O	1.88	0.74
1:A:313:ARG:O	1:A:317:VAL:HG23	1.88	0.73
1:A:56:ARG:O	1:A:60:GLN:HG3	1.88	0.73
1:A:310:GLU:O	1:A:314:GLN:HG3	1.89	0.72
1:A:75:GLN:NE2	1:A:75:GLN:HA	2.05	0.71
1:B:234:TYR:HB3	1:B:313:ARG:HG2	1.73	0.69
1:B:148:VAL:HG11	1:B:274:ALA:HA	1.74	0.69
1:B:53:THR:O	1:B:57:GLN:HG3	1.95	0.67
1:A:190:GLU:HG3	1:A:345:PRO:HG2	1.76	0.66
1:A:108:LEU:HD12	1:A:109:GLY:N	2.12	0.65
1:B:14:ARG:HH12	1:B:96:GLU:HG2	1.62	0.65
1:A:379:ARG:O	1:A:383:GLN:HG2	1.97	0.65
1:A:211:LEU:HD22	1:A:338:LEU:HD21	1.80	0.64
1:B:313:ARG:O	1:B:317:VAL:HG23	1.98	0.64
1:B:195:GLU:HG3	1:B:200:HIS:NE2	2.13	0.63
1:B:71:GLU:O	1:B:75:GLN:HG2	1.98	0.63
1:B:85:SER:O	1:B:86:ASP:HB2	1.97	0.63
1:A:189:LEU:O	1:A:192:VAL:HG23	1.99	0.62
1:B:168:GLU:O	1:B:254:ILE:HG23	1.99	0.62
1:A:89:THR:O	1:A:93:GLU:HG3	1.99	0.62
1:B:344:PHE:HB3	1:B:345:PRO:HD3	1.82	0.62
1:B:184:TRP:CE3	1:B:188:ASP:HB3	2.35	0.62
1:B:307:PRO:HG2	1:B:348:VAL:HG11	1.81	0.61
1:B:202:THR:HG22	1:B:204:SER:H	1.66	0.61
1:B:56:ARG:O	1:B:60:GLN:HG3	2.01	0.60
1:A:344:PHE:HB3	1:A:345:PRO:HD3	1.83	0.60
1:A:332:GLU:HG3	1:A:379:ARG:HA	1.84	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:341:ARG:NH2	1:A:387:SER:HA	2.17	0.60
1:B:148:VAL:CG1	1:B:274:ALA:HA	2.32	0.60
3:A:390:FM5:C7	4:A:391:DCV:H5A	2.31	0.60
1:B:247:ILE:HD12	1:B:298:PHE:HZ	1.66	0.60
1:B:189:LEU:HA	1:B:192:VAL:CG2	2.32	0.60
1:B:14:ARG:HH12	1:B:96:GLU:CG	2.16	0.59
1:B:52:ASP:HB3	1:B:56:ARG:HH12	1.68	0.58
1:B:82:TYR:OH	1:B:94:GLN:HG2	2.03	0.58
1:A:266:ASP:OD1	1:A:268:LYS:HG3	2.03	0.58
1:B:182:ARG:NE	1:B:243:PRO:HG3	2.19	0.58
1:A:327:ASN:O	1:A:331:GLU:HG3	2.04	0.57
1:B:343:GLY:O	1:B:346:ALA:HB3	2.05	0.57
1:A:327:ASN:HB3	7:A:437:HOH:O	2.04	0.57
1:A:382:ALA:O	1:A:386:VAL:HG23	2.06	0.56
1:A:108:LEU:HD12	1:A:108:LEU:C	2.25	0.55
1:A:311:LEU:HD12	1:A:348:VAL:HG13	1.87	0.55
1:A:269:LEU:HB3	1:A:270:PRO:CD	2.36	0.55
1:B:128:LYS:HD2	7:B:434:HOH:O	2.07	0.55
1:B:157:LEU:CD2	1:B:249:SER:HB3	2.37	0.55
1:B:205:MET:CE	1:B:209:ASN:HB2	2.36	0.55
1:A:12:ARG:HH21	1:A:40:GLU:CG	2.20	0.54
1:B:155:SER:OG	1:B:273:LEU:HD12	2.07	0.54
1:A:58:ARG:HD3	1:A:66:ILE:HD12	1.90	0.54
1:B:380:GLU:HG3	7:B:398:HOH:O	2.07	0.54
1:A:168:GLU:HA	1:A:254:ILE:HD13	1.89	0.53
1:B:321:CYS:SG	1:B:365:PRO:HB3	2.48	0.53
1:B:187:ALA:O	1:B:190:GLU:HG2	2.08	0.53
1:B:182:ARG:HE	1:B:243:PRO:HG3	1.73	0.53
1:B:205:MET:HE1	1:B:209:ASN:HB2	1.91	0.53
1:B:196:GLN:C	1:B:198:GLY:H	2.11	0.53
1:B:189:LEU:HA	1:B:192:VAL:HG23	1.92	0.52
1:B:250:MET:HG2	1:B:260:ALA:HB2	1.91	0.52
1:B:269:LEU:HB3	1:B:270:PRO:CD	2.40	0.52
1:A:143:ARG:NH1	1:A:146:GLN:HG3	2.24	0.52
1:B:171:LYS:HB3	1:B:171:LYS:NZ	2.24	0.52
1:B:89:THR:O	1:B:93:GLU:HG3	2.10	0.51
1:B:215:SER:O	1:B:216:LEU:HB2	2.11	0.51
1:A:156:ALA:HB3	1:A:249:SER:HB2	1.93	0.51
1:B:170:ALA:O	1:B:171:LYS:HB3	2.12	0.50
1:A:311:LEU:CD1	1:A:348:VAL:HG13	2.40	0.50
1:B:382:ALA:O	1:B:386:VAL:HG23	2.11	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:75:GLN:HE21	1:A:75:GLN:CA	2.11	0.49
1:A:290:PHE:HB3	1:B:240:VAL:HG21	1.94	0.49
1:B:88:ALA:HB3	7:B:416:HOH:O	2.12	0.49
1:A:247:ILE:HD12	1:A:298:PHE:HZ	1.76	0.49
1:A:250:MET:HG2	1:A:260:ALA:HB2	1.94	0.49
1:A:128:LYS:HE2	1:A:151:ASP:OD2	2.13	0.49
1:B:117:LEU:HD13	1:B:142:ALA:HB2	1.94	0.49
1:A:350:ILE:HD13	1:A:386:VAL:HG22	1.95	0.49
1:A:332:GLU:OE2	1:A:383:GLN:NE2	2.45	0.49
1:B:75:GLN:HA	1:B:75:GLN:HE21	1.78	0.49
1:A:109:GLY:C	1:A:112:PRO:HD2	2.33	0.48
1:A:143:ARG:HG2	1:A:146:GLN:HB2	1.95	0.48
1:B:268:LYS:HE3	7:B:433:HOH:O	2.12	0.48
1:B:129:GLU:OE1	1:B:129:GLU:N	2.47	0.48
1:B:75:GLN:HA	1:B:75:GLN:NE2	2.29	0.48
1:B:160:CYS:HB2	1:B:251:VAL:HG23	1.96	0.48
1:A:122:ARG:HD2	1:A:148:VAL:HG21	1.94	0.48
1:B:134:GLY:O	1:B:138:VAL:HG23	2.14	0.48
1:A:148:VAL:HG11	1:A:274:ALA:HA	1.96	0.48
1:B:58:ARG:HG3	1:B:63:VAL:O	2.14	0.48
1:B:250:MET:HG2	1:B:260:ALA:CB	2.43	0.48
1:B:50:HIS:HD2	3:B:390:FM5:OP1	1.97	0.47
1:B:136:SER:O	1:B:140:ARG:HG3	2.13	0.47
1:B:52:ASP:HB3	1:B:56:ARG:NH1	2.28	0.47
1:A:12:ARG:HH21	1:A:40:GLU:HG3	1.80	0.47
1:B:190:GLU:OE2	1:B:345:PRO:HG2	2.14	0.47
1:A:51:LEU:HD22	1:A:77:VAL:HG21	1.96	0.47
1:A:184:TRP:CD1	1:A:184:TRP:N	2.83	0.47
1:B:384:ARG:HD2	1:B:389:MET:O	2.15	0.46
1:A:75:GLN:NE2	1:A:75:GLN:CA	2.74	0.46
1:A:107:ALA:HB1	1:A:375:GLN:HE22	1.80	0.46
1:A:32:ILE:HG21	1:A:41:VAL:HG23	1.96	0.46
1:A:250:MET:HG2	1:A:260:ALA:CB	2.46	0.46
1:A:372:LEU:O	1:A:376:ARG:HB2	2.16	0.46
1:A:269:LEU:HG	7:A:409:HOH:O	2.16	0.46
1:A:14:ARG:NH1	1:A:97:ALA:HA	2.31	0.46
1:B:157:LEU:HD21	1:B:249:SER:HB3	1.96	0.45
1:A:174:LEU:O	1:A:239:VAL:HA	2.16	0.45
1:A:165:THR:HG22	1:A:166:PRO:HD2	1.97	0.45
1:B:160:CYS:CB	1:B:251:VAL:HG23	2.46	0.45
1:A:343:GLY:O	1:A:346:ALA:HB3	2.17	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:68:VAL:CG2	1:B:80:ILE:HD13	2.47	0.45
1:A:363:VAL:HG12	1:A:364:GLU:O	2.17	0.45
1:B:111:ARG:HB2	1:B:112:PRO:HD3	1.99	0.45
1:B:68:VAL:HG21	1:B:80:ILE:HD13	1.97	0.45
1:B:215:SER:OG	1:B:217:VAL:HG23	2.17	0.45
1:A:101:LEU:HA	1:A:124:ALA:HB3	1.99	0.44
1:A:134:GLY:HA3	1:A:138:VAL:HG23	1.99	0.44
1:A:182:ARG:HD2	1:A:241:VAL:HG11	1.99	0.44
1:B:237:ILE:O	1:B:313:ARG:NH1	2.51	0.44
1:A:32:ILE:HG23	1:A:39:PHE:HB2	2.00	0.44
1:B:233:PRO:HG2	1:B:236:ARG:HE	1.83	0.44
1:A:207:PRO:HG2	1:A:208:MET:H	1.83	0.44
1:A:58:ARG:HD3	1:A:66:ILE:CD1	2.47	0.43
1:B:156:ALA:HB3	1:B:249:SER:HB2	2.00	0.43
1:B:157:LEU:HD11	1:B:174:LEU:HD11	2.01	0.43
1:A:269:LEU:HB3	1:A:270:PRO:HD3	2.01	0.43
1:A:52:ASP:N	1:A:52:ASP:OD2	2.50	0.43
1:A:30:GLN:OE1	1:A:268:LYS:NZ	2.47	0.43
1:A:157:LEU:CD2	1:A:249:SER:HB3	2.49	0.42
1:A:236:ARG:HD3	7:A:401:HOH:O	2.18	0.42
1:B:19:GLY:N	1:B:45:ALA:O	2.42	0.42
1:A:320:GLY:HA2	1:A:364:GLU:HA	2.02	0.42
1:B:149:PRO:HB2	1:B:154:HIS:HB2	2.01	0.42
1:B:88:ALA:O	1:B:92:VAL:HG23	2.19	0.42
1:B:157:LEU:O	1:B:161:LEU:HG	2.20	0.42
1:B:269:LEU:O	1:B:273:LEU:HG	2.20	0.42
1:A:58:ARG:HD2	1:A:64:THR:HG22	2.01	0.42
1:A:321:CYS:SG	1:A:365:PRO:HB3	2.59	0.42
1:B:182:ARG:HD3	7:B:440:HOH:O	2.20	0.42
1:B:347:ILE:O	1:B:351:ILE:HG13	2.20	0.42
1:B:375:GLN:O	1:B:379:ARG:HG3	2.20	0.42
1:A:215:SER:O	1:A:216:LEU:HB2	2.20	0.42
1:A:375:GLN:O	1:A:379:ARG:HG3	2.19	0.41
1:A:267:MET:O	1:A:271:ILE:HG13	2.20	0.41
1:A:109:GLY:O	1:A:112:PRO:HD2	2.19	0.41
1:A:205:MET:SD	3:A:390:FM5:H22C	2.60	0.41
1:B:379:ARG:HG2	1:B:379:ARG:HH11	1.85	0.41
1:A:205:MET:HE3	1:A:210:THR:HA	2.02	0.41
1:B:264:PRO:HD2	1:B:286:ALA:O	2.20	0.41
1:B:308:ALA:HB2	7:B:427:HOH:O	2.21	0.41
1:B:354:VAL:HG21	1:B:382:ALA:HB2	2.03	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:358:ALA:HB2	1:B:377:TRP:CZ3	2.55	0.41
1:B:189:LEU:HA	1:B:192:VAL:HG21	2.03	0.41
1:B:71:GLU:OE2	1:B:83:HIS:ND1	2.53	0.41
1:B:332:GLU:HG2	1:B:383:GLN:HG2	2.02	0.41
1:B:342:ILE:HD13	1:B:350:ILE:HD12	2.03	0.40
1:B:331:GLU:HA	1:B:331:GLU:OE1	2.20	0.40
1:B:102:ASN:O	1:B:126:ALA:HB3	2.22	0.40
1:B:108:LEU:HD22	2:B:1392:NDP:H61A	1.86	0.40
1:A:256:GLY:HA2	1:B:287:ALA:HB2	2.04	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	377/398 (95%)	353 (94%)	17 (4%)	7 (2%)	10	15
1	B	377/398 (95%)	358 (95%)	15 (4%)	4 (1%)	17	30
All	All	754/796 (95%)	711 (94%)	32 (4%)	11 (2%)	13	22

All (11) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	249	SER
1	B	135	GLY
1	B	188	ASP
1	A	12	ARG
1	B	197	ALA
1	A	127	ASN
1	A	293	ALA
1	A	358	ALA
1	B	359	ASP

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Mol	Chain	Res	Type
1	A	194	PRO
1	A	198	GLY

### 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	282/298 (95%)	275 (98%)	7 (2%)	55	80
1	B	282/298 (95%)	278 (99%)	4 (1%)	74	90
All	All	564/596 (95%)	553 (98%)	11 (2%)	63	85

All (11) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	52	ASP
1	A	64	THR
1	A	165	THR
1	A	188	ASP
1	A	195	GLU
1	A	203	TRP
1	A	353	ASP
1	B	94	GLN
1	B	122	ARG
1	B	171	LYS
1	B	278	PRO

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	57	GLN
1	A	75	GLN
1	A	375	GLN
1	A	383	GLN
1	B	50	HIS

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Mol	Chain	Res	Type
1	B	75	GLN

### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

## 5.5 Carbohydrates ⓘ

There are no carbohydrates in this entry.

## 5.6 Ligand geometry ⓘ

Of 9 ligands modelled in this entry, 2 are monoatomic - leaving 7 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
2	NDP	A	1391	-	42,52,52	1.41	6 (14%)	55,80,80	1.92	6 (10%)
3	FM5	A	390	5	18,20,20	3.60	9 (50%)	17,29,29	1.01	0
4	DCV	A	391	5	18,20,20	4.41	10 (55%)	17,29,29	1.03	1 (5%)
2	NDP	B	1392	-	42,52,52	1.32	3 (7%)	55,80,80	1.99	7 (12%)
3	FM5	B	390	-	18,20,20	3.45	9 (50%)	17,29,29	0.85	0
4	DCV	B	391	-	18,20,20	3.33	8 (44%)	17,29,29	0.90	1 (5%)
6	SO4	B	393	-	4,4,4	0.37	0	6,6,6	0.26	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the chemical component dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means

no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NDP	A	1391	-	-	0/30/77/77	0/5/5/5
3	FM5	A	390	5	-	0/19/19/19	0/1/1/1
4	DCV	A	391	5	-	0/19/19/19	0/1/1/1
2	NDP	B	1392	-	-	0/30/77/77	0/5/5/5
3	FM5	B	390	-	-	1/19/19/19	0/1/1/1
4	DCV	B	391	-	-	0/19/19/19	0/1/1/1
6	SO4	B	393	-	-	0/0/0/0	0/0/0/0

All (45) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	391	DCV	PA1-C4	-15.68	1.61	1.82
3	A	390	FM5	PA1-C4	-12.59	1.65	1.82
3	B	390	FM5	PA1-C4	-11.61	1.67	1.82
4	B	391	DCV	PA1-C4	-11.15	1.67	1.82
3	A	390	FM5	O1-C1	-2.45	1.13	1.23
4	A	391	DCV	O1-C1	-2.33	1.13	1.23
2	A	1391	NDP	C8A-N7A	-2.16	1.30	1.34
3	B	390	FM5	O1-C1	-2.14	1.14	1.23
4	B	391	DCV	O1-C1	-2.12	1.14	1.23
4	A	391	DCV	C2-N1	-2.11	1.44	1.46
3	B	390	FM5	C10-C9	2.04	1.43	1.39
2	A	1391	NDP	C2N-C3N	2.06	1.39	1.34
2	A	1391	NDP	C5B-C4B	2.07	1.58	1.51
3	A	390	FM5	C8-C9	2.09	1.44	1.39
4	A	391	DCV	CAG-CAH	2.09	1.44	1.39
3	B	390	FM5	C8-C9	2.18	1.44	1.39
2	A	1391	NDP	C2A-N3A	2.20	1.36	1.32
4	B	391	DCV	CAG-CAH	2.23	1.44	1.39
4	A	391	DCV	CAD-CAF	2.25	1.42	1.38
4	B	391	DCV	CAD-CAF	2.27	1.42	1.38
2	B	1392	NDP	C2A-N3A	2.34	1.36	1.32
3	A	390	FM5	C3-C2	2.44	1.57	1.52
3	B	390	FM5	C11-C10	2.50	1.43	1.38
3	A	390	FM5	C7-C6	2.54	1.43	1.39
4	B	391	DCV	CAD-CAC	2.59	1.43	1.39
2	A	1391	NDP	O4D-C1D	2.59	1.48	1.42
3	B	390	FM5	C7-C6	2.64	1.43	1.39
4	A	391	DCV	CAF-CAH	2.68	1.44	1.39
3	A	390	FM5	C10-C9	2.79	1.45	1.39
2	B	1392	NDP	O4D-C1D	2.79	1.49	1.42
3	A	390	FM5	C11-C10	2.83	1.43	1.38

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	390	FM5	C11-C6	3.10	1.44	1.39
4	A	391	DCV	CAE-CAG	3.10	1.43	1.38
3	B	390	FM5	C7-C8	3.11	1.43	1.38
3	A	390	FM5	O2-N1	3.30	1.42	1.40
4	B	391	DCV	CAE-CAC	3.36	1.44	1.39
4	B	391	DCV	CAE-CAG	3.57	1.44	1.38
2	B	1392	NDP	O4B-C1B	3.89	1.46	1.41
4	A	391	DCV	O2-N1	3.91	1.43	1.40
3	A	390	FM5	C11-C6	4.04	1.45	1.39
4	A	391	DCV	CAD-CAC	4.28	1.46	1.39
4	B	391	DCV	O2-N1	4.29	1.43	1.40
3	B	390	FM5	O2-N1	4.60	1.44	1.40
4	A	391	DCV	CAE-CAC	5.19	1.47	1.39
2	A	1391	NDP	O4B-C1B	5.34	1.48	1.41

All (15) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	1392	NDP	N3A-C2A-N1A	-10.31	121.00	128.89
2	A	1391	NDP	N3A-C2A-N1A	-10.02	121.22	128.89
2	B	1392	NDP	PN-O3-PA	-5.01	118.67	132.73
2	A	1391	NDP	PN-O3-PA	-4.82	119.18	132.73
2	B	1392	NDP	C1B-N9A-C4A	-4.48	120.18	126.94
2	A	1391	NDP	C1B-N9A-C4A	-3.90	121.06	126.94
2	B	1392	NDP	P2B-O2B-C2B	-2.93	114.55	121.56
2	A	1391	NDP	P2B-O2B-C2B	-2.77	114.91	121.56
2	B	1392	NDP	C1D-N1N-C6N	-2.42	115.40	120.81
2	A	1391	NDP	C1D-N1N-C6N	-2.37	115.50	120.81
4	A	391	DCV	OP2-PA1-OP3	-2.23	107.57	113.49
4	B	391	DCV	OP2-PA1-OP3	-2.01	108.14	113.49
2	B	1392	NDP	O3-PN-O5D	2.01	108.27	102.94
2	A	1391	NDP	O3-PA-O5B	2.96	110.78	102.94
2	B	1392	NDP	O3-PA-O5B	3.09	111.13	102.94

There are no chirality outliers.

All (1) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	B	390	FM5	C3-C2-N1-O2

There are no ring outliers.

4 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	390	FM5	2	0
4	A	391	DCV	1	0
2	B	1392	NDP	1	0
3	B	390	FM5	1	0

## 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	379/398 (95%)	0.37	16 (4%) 40 46	36, 50, 72, 123	0
1	B	379/398 (95%)	0.22	13 (3%) 49 55	33, 48, 77, 98	0
All	All	758/796 (95%)	0.30	29 (3%) 44 50	33, 49, 77, 123	0

All (29) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	201	PRO	9.9
1	A	200	HIS	7.2
1	B	389	MET	7.1
1	A	199	ALA	5.4
1	A	186	ALA	4.9
1	A	203	TRP	4.8
1	A	202	THR	4.5
1	A	198	GLY	4.1
1	A	389	MET	3.6
1	B	80	ILE	3.5
1	A	11	GLY	3.3
1	B	339	ALA	3.1
1	B	359	ASP	3.0
1	B	387	SER	3.0
1	B	200	HIS	3.0
1	A	190	GLU	2.9
1	B	340	GLY	2.8
1	A	163	GLY	2.6
1	B	341	ARG	2.6
1	A	339	ALA	2.6
1	B	338	LEU	2.4
1	A	344	PHE	2.3
1	B	201	PRO	2.2
1	A	195	GLU	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	380	GLU	2.1
1	A	164	GLY	2.1
1	B	185	SER	2.1
1	B	356	HIS	2.1
1	B	191	HIS	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 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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	LLDF	B-factors(Å <sup>2</sup> )	Q<0.9
6	SO4	B	393	5/5	0.94	0.23	2.55	54,56,57,57	0
3	FM5	B	390	20/20	0.87	0.17	0.62	60,69,75,76	20
4	DCV	B	391	20/20	0.86	0.17	0.58	61,69,75,76	20
2	NDP	B	1392	48/48	0.96	0.16	0.01	49,56,63,65	0
4	DCV	A	391	20/20	0.87	0.21	-0.02	44,48,52,52	20
3	FM5	A	390	20/20	0.86	0.21	-0.06	45,48,51,51	20
2	NDP	A	1391	48/48	0.97	0.13	-0.75	39,45,51,54	0
5	MN	B	392	1/1	0.99	0.14	-2.43	66,66,66,66	0
5	MN	A	392	1/1	0.92	0.12	-4.57	51,51,51,51	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.