



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 06:00 PM GMT

PDB ID : 4K4Y  
Title : Coxsackievirus B3 polymerase elongation complex (r2+1\_form)  
Authors : Gong, P.; Peersen, O.B.  
Deposited on : 2013-04-12  
Resolution : 2.72 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

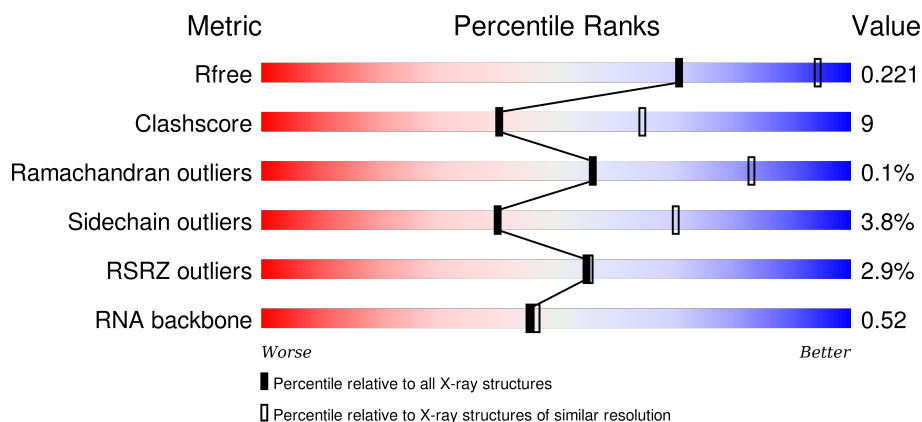
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.72 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	2439 (2.74-2.70)
Clashscore	102246	2771 (2.74-2.70)
Ramachandran outliers	100387	2726 (2.74-2.70)
Sidechain outliers	100360	2727 (2.74-2.70)
RSRZ outliers	91569	2443 (2.74-2.70)
RNA backbone	2183	1004 (3.10-2.34)

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	472	<div> <div>2%</div> <div>75%</div> <div>21%</div> <div>..</div> </div>
1	E	472	<div> <div>3%</div> <div>75%</div> <div>22%</div> <div>..</div> </div>
1	I	472	<div> <div>3%</div> <div>74%</div> <div>23%</div> <div>..</div> </div>
1	M	472	<div> <div>2%</div> <div>78%</div> <div>19%</div> <div>..</div> </div>

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Mol	Chain	Length	Quality of chain
2	B	24	
2	F	24	
2	J	24	
2	N	24	
3	C	15	
3	G	15	
3	K	15	
3	O	15	
4	D	9	
4	H	9	
4	L	9	
4	P	9	

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	ACT	A	502	-	-	X	-
6	ACT	E	503	-	-	X	-
6	ACT	I	503	-	-	X	-
7	GOL	A	503	-	-	-	X
7	GOL	E	504	-	-	-	X
7	GOL	I	504	-	-	X	X
7	GOL	M	503	-	-	X	X

## 2 Entry composition

There are 8 unique types of molecules in this entry. The entry contains 18284 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 RNA-dependent RNA polymerase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	463	Total	C	N	O	S	0	0	0
			3693	2372	614	685	22			
1	E	463	Total	C	N	O	S	0	0	0
			3693	2372	614	685	22			
1	I	463	Total	C	N	O	S	0	0	0
			3693	2372	614	685	22			
1	M	463	Total	C	N	O	S	0	0	0
			3693	2372	614	685	22			

There are 44 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	252	ILE	LEU	VARIANT	UNP Q66338
A	463	GLY	-	EXPRESSION TAG	UNP Q66338
A	464	SER	-	EXPRESSION TAG	UNP Q66338
A	465	SER	-	EXPRESSION TAG	UNP Q66338
A	466	SER	-	EXPRESSION TAG	UNP Q66338
A	467	HIS	-	EXPRESSION TAG	UNP Q66338
A	468	HIS	-	EXPRESSION TAG	UNP Q66338
A	469	HIS	-	EXPRESSION TAG	UNP Q66338
A	470	HIS	-	EXPRESSION TAG	UNP Q66338
A	471	HIS	-	EXPRESSION TAG	UNP Q66338
A	472	HIS	-	EXPRESSION TAG	UNP Q66338
E	252	ILE	LEU	VARIANT	UNP Q66338
E	463	GLY	-	EXPRESSION TAG	UNP Q66338
E	464	SER	-	EXPRESSION TAG	UNP Q66338
E	465	SER	-	EXPRESSION TAG	UNP Q66338
E	466	SER	-	EXPRESSION TAG	UNP Q66338
E	467	HIS	-	EXPRESSION TAG	UNP Q66338
E	468	HIS	-	EXPRESSION TAG	UNP Q66338
E	469	HIS	-	EXPRESSION TAG	UNP Q66338
E	470	HIS	-	EXPRESSION TAG	UNP Q66338
E	471	HIS	-	EXPRESSION TAG	UNP Q66338

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Chain	Residue	Modelled	Actual	Comment	Reference
E	472	HIS	-	EXPRESSION TAG	UNP Q66338
I	252	ILE	LEU	VARIANT	UNP Q66338
I	463	GLY	-	EXPRESSION TAG	UNP Q66338
I	464	SER	-	EXPRESSION TAG	UNP Q66338
I	465	SER	-	EXPRESSION TAG	UNP Q66338
I	466	SER	-	EXPRESSION TAG	UNP Q66338
I	467	HIS	-	EXPRESSION TAG	UNP Q66338
I	468	HIS	-	EXPRESSION TAG	UNP Q66338
I	469	HIS	-	EXPRESSION TAG	UNP Q66338
I	470	HIS	-	EXPRESSION TAG	UNP Q66338
I	471	HIS	-	EXPRESSION TAG	UNP Q66338
I	472	HIS	-	EXPRESSION TAG	UNP Q66338
M	252	ILE	LEU	VARIANT	UNP Q66338
M	463	GLY	-	EXPRESSION TAG	UNP Q66338
M	464	SER	-	EXPRESSION TAG	UNP Q66338
M	465	SER	-	EXPRESSION TAG	UNP Q66338
M	466	SER	-	EXPRESSION TAG	UNP Q66338
M	467	HIS	-	EXPRESSION TAG	UNP Q66338
M	468	HIS	-	EXPRESSION TAG	UNP Q66338
M	469	HIS	-	EXPRESSION TAG	UNP Q66338
M	470	HIS	-	EXPRESSION TAG	UNP Q66338
M	471	HIS	-	EXPRESSION TAG	UNP Q66338
M	472	HIS	-	EXPRESSION TAG	UNP Q66338

- Molecule 2 is a RNA chain called RNA (5'-R(\*AP\*AP\*GP\*UP\*CP\*UP\*CP\*CP\*AP\*GP\*GP\*UP\*CP\*UP\*CP\*UP\*CP\*GP\*UP\*CP\*GP\*AP\*AP\*A)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	18	Total	C	N	O	P	0	0	0
			376	168	61	129	18			
2	F	17	Total	C	N	O	P	0	0	0
			356	159	58	122	17			
2	J	18	Total	C	N	O	P	0	0	0
			376	168	61	129	18			
2	N	17	Total	C	N	O	P	0	0	0
			356	159	58	122	17			

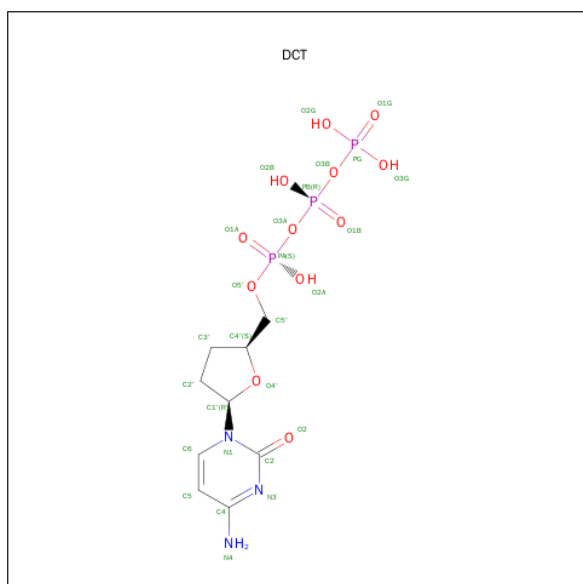
- Molecule 3 is DNA/RNA hybrid called DNA/RNA (5'-R(\*UP\*GP\*UP\*UP\*CP\*GP\*AP\*C P\*GP\*AP\*GP\*AP\*GP\*AP\*(DOC))-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	C	12	Total	C	N	O	P	0	0	0
			258	116	51	79	12			
3	G	12	Total	C	N	O	P	0	0	0
			258	116	51	79	12			
3	K	12	Total	C	N	O	P	0	0	0
			258	116	51	79	12			
3	O	12	Total	C	N	O	P	0	0	0
			258	116	51	79	12			

- Molecule 4 is a RNA chain called RNA (5'-R(\*GP\*GP\*GP\*AP\*GP\*AP\*UP\*GP\*A)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	D	5	Total	C	N	O	P	0	0	0
			113	50	25	33	5			
4	H	5	Total	C	N	O	P	0	0	0
			113	50	25	33	5			
4	L	5	Total	C	N	O	P	0	0	0
			113	50	25	33	5			
4	P	5	Total	C	N	O	P	0	0	0
			113	50	25	33	5			

- Molecule 5 is 2',3'-DIDEOXYCYTIDINE 5'-TRIPHOSPHATE (three-letter code: DCT) (formula: C<sub>9</sub>H<sub>16</sub>N<sub>3</sub>O<sub>12</sub>P<sub>3</sub>).



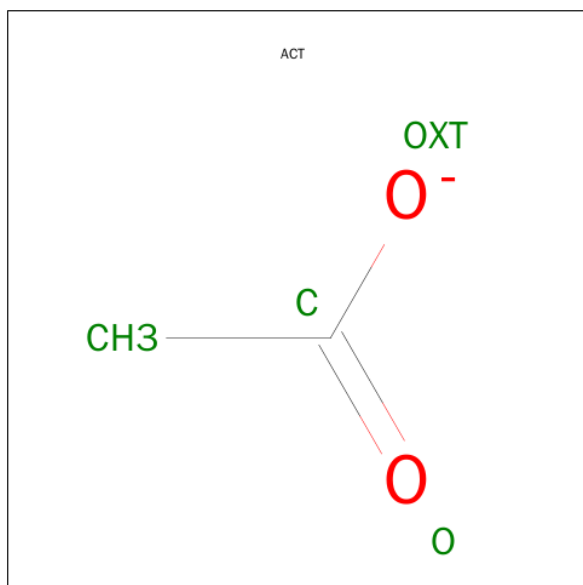
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	A	1	Total	C	N	O	P	0	0
			27	9	3	12	3		

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	E	1	Total	C	N	O	P	0	0
			27	9	3	12	3		
5	I	1	Total	C	N	O	P	0	0
			27	9	3	12	3		
5	M	1	Total	C	N	O	P	0	0
			27	9	3	12	3		

- Molecule 6 is ACETATE ION (three-letter code: ACT) (formula:  $C_2H_3O_2$ ).



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

- Molecule 7 is GLYCEROL (three-letter code: GOL) (formula:  $C_3H_8O_3$ ).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	A	1	Total	C	O	0	0
			6	3	3		
7	A	1	Total	C	O	0	0
			6	3	3		
7	A	1	Total	C	O	0	0
			6	3	3		
7	E	1	Total	C	O	0	0
			6	3	3		
7	E	1	Total	C	O	0	0
			6	3	3		
7	E	1	Total	C	O	0	0
			6	3	3		
7	I	1	Total	C	O	0	0
			6	3	3		
7	I	1	Total	C	O	0	0
			6	3	3		
7	I	1	Total	C	O	0	0
			6	3	3		
7	M	1	Total	C	O	0	0
			6	3	3		
7	M	1	Total	C	O	0	0
			6	3	3		
7	M	1	Total	C	O	0	0
			6	3	3		

- Molecule 8 is water.

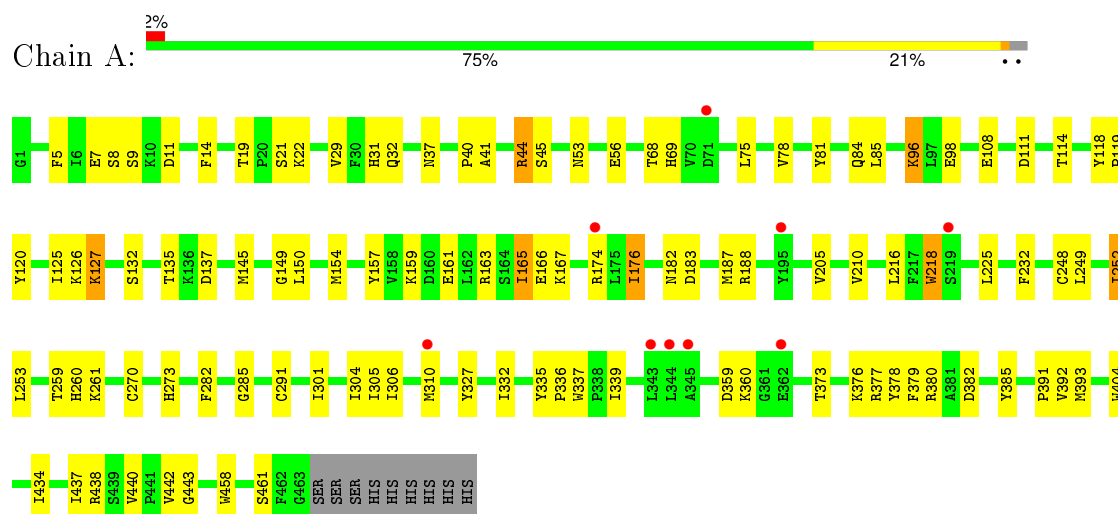


Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	C	6	Total O 6 6	0	0
8	A	80	Total O 80 80	0	0
8	B	9	Total O 9 9	0	0
8	E	71	Total O 71 71	0	0
8	F	13	Total O 13 13	0	0
8	G	7	Total O 7 7	0	0
8	I	73	Total O 73 73	0	0
8	J	16	Total O 16 16	0	0
8	K	5	Total O 5 5	0	0
8	L	2	Total O 2 2	0	0
8	M	69	Total O 69 69	0	0
8	N	12	Total O 12 12	0	0
8	O	9	Total O 9 9	0	0

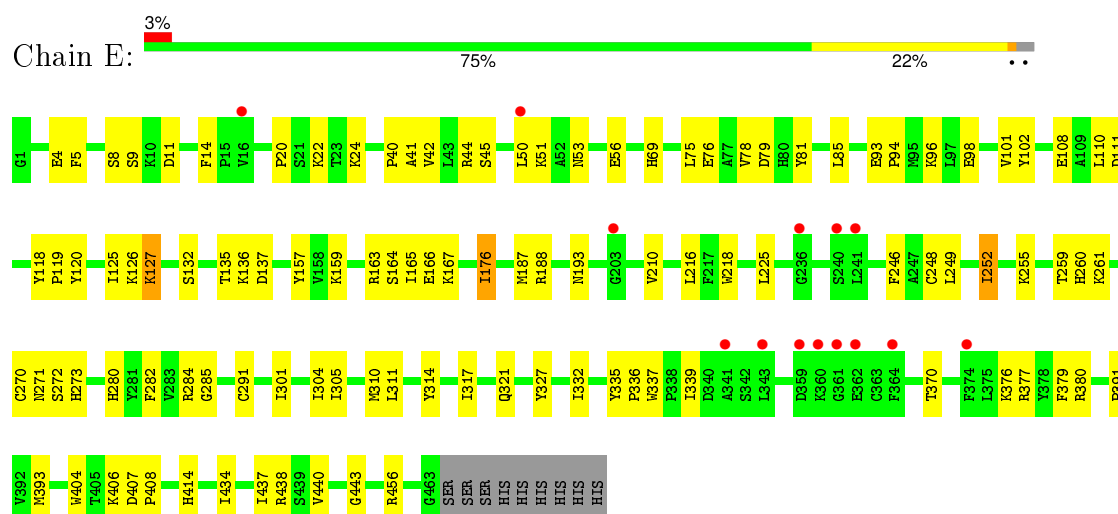
### 3 Residue-property plots

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: RNA-dependent RNA polymerase

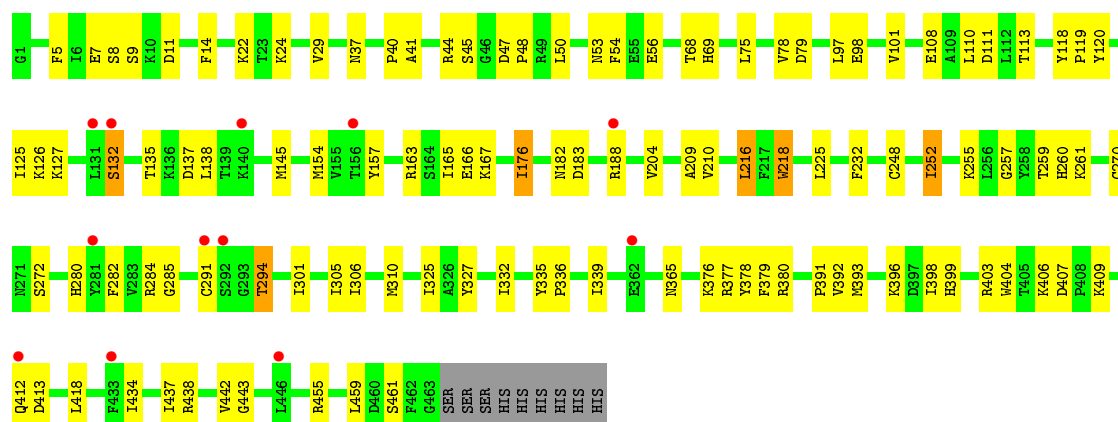


#### • Molecule 1: RNA-dependent RNA polymerase

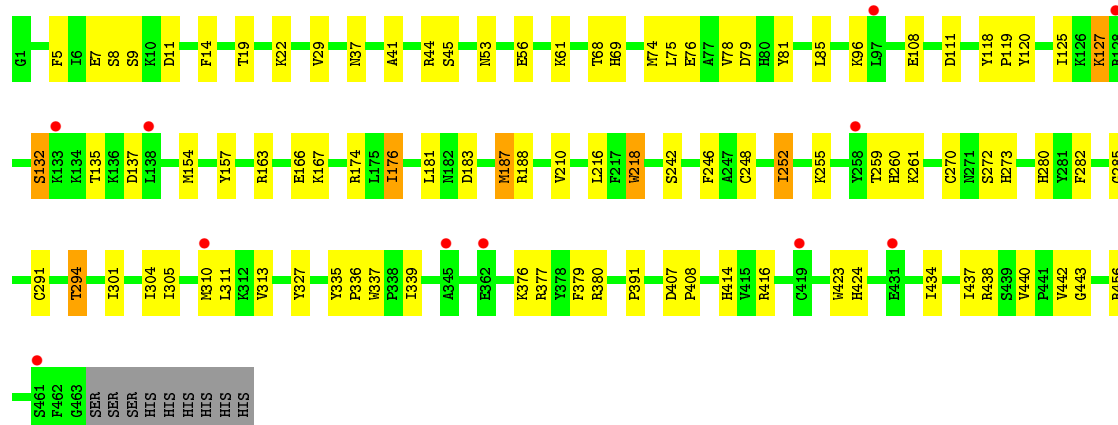
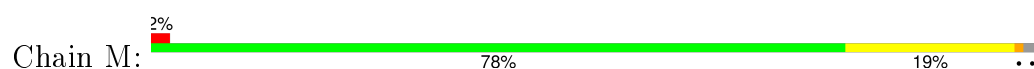


#### • Molecule 1: RNA-dependent RNA polymerase

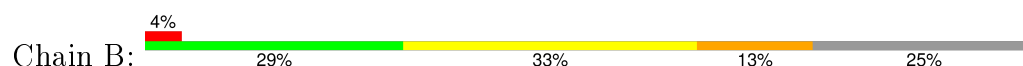




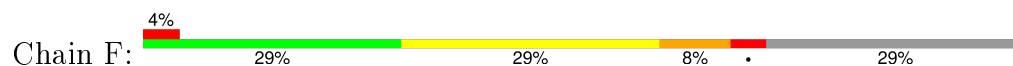
- Molecule 1: RNA-dependent RNA polymerase



- Molecule 2: RNA (5'-R(\*AP\*AP\*GP\*UP\*CP\*UP\*CP\*CP\*AP\*GP\*GP\*UP\*CP\*UP\*CP\*UP\*CP\*GP\*UP\*CP\*GP\*AP\*AP\*A)-3')



- Molecule 2: RNA (5'-R(\*AP\*AP\*GP\*UP\*CP\*UP\*CP\*CP\*AP\*GP\*GP\*UP\*CP\*UP\*CP\*UP\*CP\*GP\*UP\*CP\*GP\*AP\*AP\*A)-3')




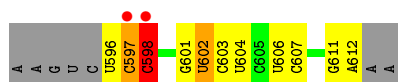
- Molecule 2: RNA (5'-R(\*AP\*AP\*GP\*UP\*CP\*UP\*CP\*CP\*AP\*GP\*GP\*UP\*CP\*UP\*CP\*UP\*CP\*GP\*UP\*CP\*GP\*AP\*AP\*A)-3')

Chain J: 



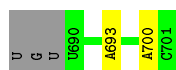
- Molecule 2: RNA (5'-R(\*AP\*AP\*GP\*UP\*CP\*UP\*CP\*CP\*AP\*GP\*GP\*UP\*CP\*UP\*CP\*UP\*CP\*GP\*UP\*CP\*GP\*AP\*AP\*A)-3')

Chain N: 



- Molecule 3: DNA/RNA (5'-R(\*UP\*GP\*UP\*UP\*CP\*GP\*AP\*CP\*GP\*AP\*GP\*AP\*GP\*AP\*(DOC))-3')

Chain C: 



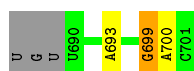
- Molecule 3: DNA/RNA (5'-R(\*UP\*GP\*UP\*UP\*CP\*GP\*AP\*CP\*GP\*AP\*GP\*AP\*GP\*AP\*(DOC))-3')

Chain G: 



- Molecule 3: DNA/RNA (5'-R(\*UP\*GP\*UP\*UP\*CP\*GP\*AP\*CP\*GP\*AP\*GP\*AP\*GP\*AP\*(DOC))-3')

Chain K: 




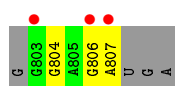
- Molecule 3: DNA/RNA (5'-R(\*UP\*GP\*UP\*UP\*CP\*GP\*AP\*CP\*GP\*AP\*GP\*AP\*GP\*AP\*(DOC))-3')

Chain O: 

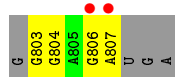


- Molecule 4: RNA (5'-R(\*GP\*GP\*GP\*AP\*GP\*AP\*UP\*GP\*A)-3')

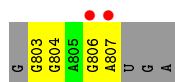
Chain D: 



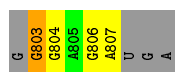
- Molecule 4: RNA (5'-R(\*GP\*GP\*GP\*AP\*GP\*AP\*UP\*GP\*A)-3')



- Molecule 4: RNA (5'-R(\*GP\*GP\*GP\*AP\*GP\*AP\*UP\*GP\*A)-3')



- Molecule 4: RNA (5'-R(\*GP\*GP\*GP\*AP\*GP\*AP\*UP\*GP\*A)-3')



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	60.37Å 60.40Å 194.03Å 89.92° 89.96° 79.75°	Depositor
Resolution (Å)	43.76 – 2.72 43.76 – 2.72	Depositor EDS
% Data completeness (in resolution range)	97.6 (43.76-2.72) 97.5 (43.76-2.72)	Depositor EDS
$R_{merge}$	0.10	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.91 (at 2.73Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.8.2_1309)	Depositor
R, $R_{free}$	0.199 , 0.247 0.217 , 0.221	Depositor DCC
$R_{free}$ test set	3563 reflections (5.30%)	DCC
Wilson B-factor (Å <sup>2</sup> )	43.2	Xtriage
Anisotropy	0.809	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 26.6	EDS
Estimated twinning fraction	0.387 for -h,-k,l 0.387 for k,h,-l 0.397 for -k,-h,-l	Xtriage
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.53$ , $\langle L^2 \rangle = 0.37$	Xtriage
Outliers	0 of 70785 reflections	Xtriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	18284	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	50.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.54% 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: GOL, DCT, DOC, ACT

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	0.45	0/3786	0.59	0/5125
1	E	0.44	0/3786	0.58	0/5125
1	I	0.45	0/3786	0.59	0/5125
1	M	0.46	0/3786	0.59	0/5125
2	B	0.52	0/417	1.05	0/646
2	F	0.56	0/395	1.13	1/612 (0.2%)
2	J	0.56	0/417	1.02	0/646
2	N	0.55	0/395	1.05	1/612 (0.2%)
3	C	0.54	0/269	1.10	0/418
3	G	0.59	0/269	1.16	0/418
3	K	0.58	0/269	1.23	1/418 (0.2%)
3	O	0.58	0/269	1.15	0/418
4	D	0.54	0/127	1.05	0/197
4	H	0.50	0/127	1.09	0/197
4	L	0.40	0/127	1.07	0/197
4	P	0.48	0/127	0.95	0/197
All	All	0.47	0/18352	0.71	3/25476 (0.0%)

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	E	0	1
1	I	0	1
1	M	0	1
All	All	0	3

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	F	598	C	N1-C2-O2	6.22	122.63	118.90
2	N	598	C	N1-C2-O2	5.41	122.15	118.90
3	K	699	G	N7-C8-N9	-5.24	110.48	113.10

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	E	272	SER	Peptide
1	I	272	SER	Peptide
1	M	272	SER	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	3693	0	3661	68	0
1	E	3693	0	3661	72	0
1	I	3693	0	3661	78	0
1	M	3693	0	3661	58	1
2	B	376	0	194	7	0
2	F	356	0	183	6	0
2	J	376	0	194	5	0
2	N	356	0	183	6	0
3	C	258	0	132	1	0
3	G	258	0	132	3	0
3	K	258	0	132	2	0
3	O	258	0	132	3	0
4	D	113	0	56	2	0
4	H	113	0	56	1	0
4	L	113	0	56	2	0
4	P	113	0	56	2	0
5	A	27	0	12	5	0
5	E	27	0	12	0	0
5	I	27	0	12	0	0
5	M	27	0	12	3	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	A	4	0	3	3	0
6	E	4	0	3	2	0
6	I	4	0	3	2	0
7	A	18	0	24	3	0
7	E	18	0	24	4	0
7	I	18	0	24	6	0
7	M	18	0	24	5	0
8	A	80	0	0	1	0
8	B	9	0	0	0	0
8	C	6	0	0	0	0
8	E	71	0	0	3	0
8	F	13	0	0	1	0
8	G	7	0	0	1	0
8	I	73	0	0	6	0
8	J	16	0	0	0	0
8	K	5	0	0	0	0
8	L	2	0	0	0	0
8	M	69	0	0	4	0
8	N	12	0	0	0	0
8	O	9	0	0	0	0
All	All	18284	0	16303	296	1

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 (296) 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:259:THR:HG22	1:E:261:LYS:H	1.33	0.94
1:A:259:THR:HG22	1:A:261:LYS:H	1.35	0.92
1:I:259:THR:HG22	1:I:261:LYS:H	1.36	0.90
1:M:259:THR:HG22	1:M:261:LYS:H	1.38	0.88
1:A:161:GLU:OE2	1:A:174:ARG:NH2	2.08	0.87
1:M:291:CYS:HB2	7:M:503:GOL:H12	1.58	0.82
1:M:108:GLU:O	1:M:188:ARG:NH2	2.14	0.81
1:I:108:GLU:O	1:I:188:ARG:NH2	2.18	0.76
1:M:456:ARG:NH2	8:M:4212:HOH:O	2.19	0.75
1:I:41:ALA:HB2	1:I:163:ARG:HG2	1.70	0.73
1:I:183:ASP:HB3	7:I:504:GOL:H2	1.72	0.72
1:I:413:ASP:OD2	8:I:1171:HOH:O	2.08	0.72
1:A:183:ASP:HB3	7:A:503:GOL:H2	1.72	0.71

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:M:41:ALA:HB2	1:M:163:ARG:HG2	1.73	0.71
1:I:398:ILE:HG23	1:I:418:LEU:HD22	1.73	0.69
1:E:166:GLU:OE1	1:E:166:GLU:N	2.25	0.69
1:A:98:GLU:HB2	6:A:502:ACT:H2	1.74	0.69
1:M:167:LYS:NZ	5:M:501:DCT:O1B	2.24	0.69
5:M:501:DCT:H6	5:M:501:DCT:H5"	1.74	0.69
1:A:458:TRP:O	1:A:461:SER:OG	2.10	0.68
1:I:113:THR:OG1	8:I:1161:HOH:O	2.10	0.68
1:A:310:MET:HE3	1:A:339:ILE:HG21	1.76	0.68
1:E:456:ARG:NH2	8:E:4214:HOH:O	2.27	0.68
1:M:78:VAL:HG13	1:M:252:ILE:HB	1.76	0.67
1:I:78:VAL:HG13	1:I:252:ILE:HB	1.75	0.67
2:B:595:C:H42	4:D:806:G:H1	1.42	0.67
1:A:41:ALA:HB2	1:A:163:ARG:HG2	1.77	0.66
1:A:157:TYR:HB2	1:A:176:ILE:HD11	1.77	0.65
1:A:291:CYS:HB2	7:A:503:GOL:H31	1.78	0.65
1:M:120:TYR:HB3	1:M:125:ILE:HB	1.77	0.65
1:E:41:ALA:HB2	1:E:163:ARG:HG2	1.79	0.65
1:I:135:THR:HG23	1:I:137:ASP:H	1.62	0.64
1:I:9:SER:HB3	1:I:14:PHE:HB2	1.81	0.63
1:E:9:SER:HB3	1:E:14:PHE:HB2	1.81	0.63
1:I:98:GLU:HB2	6:I:503:ACT:H3	1.79	0.62
1:M:7:GLU:OE1	7:M:504:GOL:H11	1.98	0.62
1:E:98:GLU:HB2	6:E:503:ACT:H3	1.81	0.62
1:E:108:GLU:O	1:E:188:ARG:NH2	2.28	0.62
1:A:120:TYR:HB3	1:A:125:ILE:HB	1.80	0.62
1:A:166:GLU:OE1	1:A:166:GLU:N	2.31	0.61
1:M:377:ARG:HD3	1:M:391:PRO:HB2	1.81	0.61
1:A:9:SER:HB3	1:A:14:PHE:HB2	1.83	0.61
1:A:154:MET:HE3	7:A:503:GOL:H11	1.82	0.61
1:E:78:VAL:HG13	1:E:252:ILE:HB	1.81	0.61
1:M:166:GLU:N	1:M:166:GLU:OE1	2.31	0.60
1:M:61:LYS:NZ	8:M:4261:HOH:O	2.35	0.60
1:M:291:CYS:O	1:M:294:THR:HG22	2.02	0.59
1:E:370:THR:O	1:E:380:ARG:NH2	2.32	0.59
1:E:120:TYR:HB3	1:E:125:ILE:HB	1.84	0.59
1:E:284:ARG:HD3	1:I:5:PHE:CD1	2.37	0.59
1:E:310:MET:HE3	1:E:339:ILE:HG21	1.84	0.59
1:A:174:ARG:NH2	5:A:501:DCT:HN42	2.00	0.59
1:A:108:GLU:O	1:A:188:ARG:NH2	2.32	0.59
1:I:310:MET:HE3	1:I:339:ILE:HG21	1.84	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:I:257:GLY:HA3	8:I:1149:HOH:O	2.03	0.58
1:I:53:ASN:OD1	1:I:56:GLU:HB2	2.04	0.57
1:A:135:THR:HG23	1:A:137:ASP:H	1.68	0.57
1:A:78:VAL:HG13	1:A:252:ILE:HB	1.85	0.57
1:M:135:THR:HG23	1:M:137:ASP:H	1.68	0.57
1:M:9:SER:HB3	1:M:14:PHE:HB2	1.86	0.57
3:G:699:G:H1'	8:G:901:HOH:O	2.04	0.57
1:A:126:LYS:HB3	8:A:662:HOH:O	2.04	0.57
1:I:291:CYS:O	1:I:294:THR:HG22	2.05	0.57
1:I:120:TYR:HB3	1:I:125:ILE:HB	1.86	0.57
1:A:53:ASN:OD1	1:A:56:GLU:HB2	2.03	0.57
1:E:157:TYR:HB2	1:E:176:ILE:HD11	1.86	0.56
1:I:377:ARG:HD3	1:I:391:PRO:HB2	1.85	0.56
1:M:157:TYR:HB2	1:M:176:ILE:HD11	1.87	0.56
1:I:126:LYS:HB3	8:I:1163:HOH:O	2.05	0.56
1:E:434:ILE:O	1:E:438:ARG:HG2	2.04	0.56
1:A:174:ARG:CZ	5:A:501:DCT:H5	2.35	0.56
1:E:101:VAL:HG13	1:E:110:LEU:HD12	1.87	0.56
1:E:53:ASN:OD1	1:E:56:GLU:HB2	2.05	0.56
1:I:157:TYR:HB2	1:I:176:ILE:HD11	1.87	0.56
1:M:310:MET:HE3	1:M:339:ILE:HG21	1.88	0.56
1:M:53:ASN:OD1	1:M:56:GLU:HB2	2.06	0.55
1:A:252:ILE:HG21	1:A:304:ILE:HD11	1.89	0.54
1:M:127:LYS:HD3	1:M:181:LEU:HD13	1.88	0.54
1:A:174:ARG:HH21	5:A:501:DCT:HN42	1.53	0.54
1:E:118:TYR:CD1	1:E:119:PRO:HA	2.43	0.54
1:I:154:MET:HE2	7:I:504:GOL:H32	1.89	0.54
1:I:210:VAL:HA	1:I:327:TYR:CE2	2.43	0.54
1:I:132:SER:HB3	1:I:135:THR:HG22	1.90	0.54
1:A:132:SER:HB3	1:A:135:THR:HG22	1.89	0.54
1:A:232:PHE:HZ	1:A:306:ILE:HG12	1.73	0.53
1:I:50:LEU:HD11	1:I:54:PHE:HB2	1.90	0.53
1:M:437:ILE:O	1:M:443:GLY:HA3	2.08	0.53
1:M:118:TYR:CG	1:M:119:PRO:HA	2.44	0.53
1:M:29:VAL:HG11	1:M:442:VAL:HG21	1.91	0.52
1:I:301:ILE:O	1:I:305:ILE:HG13	2.09	0.52
1:M:248:CYS:O	1:M:252:ILE:HG22	2.09	0.52
1:M:132:SER:HB3	1:M:135:THR:HG22	1.91	0.52
1:M:5:PHE:HB3	1:M:282:PHE:HD2	1.75	0.52
4:P:806:G:H2'	4:P:807:A:C8	2.44	0.52
2:B:602:U:H2'	2:B:603:C:C6	2.44	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:132:SER:HB3	1:E:135:THR:HG22	1.92	0.52
4:H:806:G:H2'	4:H:807:A:C8	2.44	0.52
1:E:164:SER:HB3	7:E:502:GOL:H11	1.93	0.51
1:I:166:GLU:N	1:I:166:GLU:OE1	2.37	0.51
1:I:111:ASP:O	1:I:127:LYS:HE2	2.10	0.51
1:E:81:TYR:CE2	1:E:85:LEU:HD11	2.45	0.51
1:E:270:CYS:O	1:E:285:GLY:N	2.44	0.51
2:N:602:U:H2'	2:N:603:C:C6	2.45	0.51
1:E:79:ASP:OD2	1:E:255:LYS:HE3	2.11	0.51
1:E:335:TYR:CD1	1:E:336:PRO:HD2	2.46	0.51
1:A:5:PHE:HB3	1:A:282:PHE:HD2	1.76	0.51
1:I:79:ASP:OD2	1:I:255:LYS:HE3	2.11	0.51
1:I:188:ARG:HD2	2:J:602:U:OP1	2.11	0.50
1:E:379:PHE:O	1:E:380:ARG:NH1	2.38	0.50
1:I:335:TYR:CD1	1:I:336:PRO:HD2	2.46	0.50
1:A:434:ILE:O	1:A:438:ARG:HG2	2.11	0.50
1:I:40:PRO:HD3	1:I:404:TRP:CH2	2.46	0.50
1:A:270:CYS:O	1:A:285:GLY:N	2.45	0.50
1:M:111:ASP:O	1:M:127:LYS:HE2	2.11	0.50
1:E:11:ASP:OD2	1:I:69:HIS:HA	2.12	0.50
1:I:248:CYS:O	1:I:252:ILE:HG22	2.12	0.50
1:A:218:TRP:CD1	1:A:391:PRO:HA	2.47	0.50
1:E:24:LYS:O	1:E:406:LYS:HA	2.11	0.50
1:M:335:TYR:CD1	1:M:336:PRO:HD2	2.47	0.50
1:A:210:VAL:HA	1:A:327:TYR:CE2	2.46	0.50
1:I:225:LEU:HD11	1:I:332:ILE:HG23	1.94	0.50
1:A:81:TYR:CE2	1:A:85:LEU:HD11	2.47	0.49
1:E:118:TYR:CG	1:E:119:PRO:HA	2.47	0.49
1:I:132:SER:CB	1:I:135:THR:HG22	2.42	0.49
1:I:412:GLN:HB3	8:I:1173:HOH:O	2.11	0.49
1:A:111:ASP:O	1:A:127:LYS:HE2	2.13	0.49
1:E:301:ILE:O	1:E:305:ILE:HG13	2.12	0.49
2:F:602:U:H2'	2:F:603:C:C6	2.48	0.49
1:M:270:CYS:O	1:M:285:GLY:N	2.45	0.49
1:A:225:LEU:HD11	1:A:332:ILE:HG23	1.95	0.49
1:A:335:TYR:CD1	1:A:336:PRO:HD2	2.46	0.49
1:I:118:TYR:CG	1:I:119:PRO:HA	2.47	0.49
1:I:437:ILE:O	1:I:443:GLY:HA3	2.12	0.49
1:I:101:VAL:HG13	1:I:110:LEU:HD12	1.94	0.49
2:N:606:U:H2'	2:N:607:C:C6	2.48	0.49
1:A:378:TYR:HB2	1:A:392:VAL:HB	1.94	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:174:ARG:CZ	5:A:501:DCT:C5	2.91	0.48
1:E:248:CYS:O	1:E:252:ILE:HG22	2.13	0.48
1:E:414:HIS:CD2	3:G:698:A:H4'	2.47	0.48
1:M:81:TYR:CE2	1:M:85:LEU:HD11	2.49	0.48
1:I:188:ARG:HH11	2:J:602:U:P	2.36	0.48
1:I:5:PHE:HB3	1:I:282:PHE:HD2	1.78	0.48
4:D:806:G:H2'	4:D:807:A:C8	2.49	0.48
1:I:379:PHE:O	1:I:380:ARG:NH1	2.35	0.48
1:A:301:ILE:O	1:A:305:ILE:HG13	2.13	0.48
8:M:4204:HOH:O	3:O:699:G:H1'	2.13	0.48
1:E:176:ILE:HG13	2:F:600:G:C8	2.49	0.47
2:J:602:U:H2'	2:J:603:C:C6	2.49	0.47
1:M:273:HIS:CD2	1:M:280:HIS:NE2	2.83	0.47
1:E:111:ASP:O	1:E:127:LYS:HE2	2.13	0.47
1:A:118:TYR:CG	1:A:119:PRO:HA	2.49	0.47
1:E:376:LYS:HD2	3:G:700:A:H5''	1.97	0.47
1:E:98:GLU:CB	6:E:503:ACT:H3	2.45	0.47
1:A:176:ILE:H	1:A:176:ILE:HD13	1.78	0.47
1:E:167:LYS:NZ	7:E:502:GOL:H32	2.29	0.47
1:M:416:ARG:NE	2:N:606:U:O2'	2.45	0.47
1:M:414:HIS:CD2	3:O:698:A:H4'	2.49	0.47
1:I:97:LEU:HD23	1:I:138:LEU:HD13	1.96	0.47
1:E:210:VAL:HA	1:E:327:TYR:CE2	2.49	0.47
1:A:165:ILE:HD12	1:A:165:ILE:HA	1.72	0.47
4:L:806:G:H2'	4:L:807:A:C8	2.49	0.47
1:I:218:TRP:CD1	1:I:391:PRO:HA	2.49	0.47
1:M:246:PHE:CD2	1:M:270:CYS:HB2	2.49	0.47
1:I:434:ILE:O	1:I:438:ARG:HG2	2.14	0.47
1:E:165:ILE:HD12	1:E:165:ILE:HA	1.74	0.47
1:M:434:ILE:O	1:M:438:ARG:HG2	2.15	0.47
1:I:135:THR:HG23	1:I:137:ASP:N	2.27	0.46
1:I:163:ARG:HA	1:I:163:ARG:HD2	1.73	0.46
1:I:24:LYS:O	1:I:406:LYS:HA	2.15	0.46
1:M:132:SER:CB	1:M:135:THR:HG22	2.45	0.46
1:A:377:ARG:HD3	1:A:391:PRO:HB2	1.97	0.46
1:M:246:PHE:CG	1:M:270:CYS:HB2	2.49	0.46
1:A:132:SER:CB	1:A:135:THR:HG22	2.44	0.46
1:M:379:PHE:O	1:M:380:ARG:NH1	2.39	0.46
1:I:167:LYS:NZ	7:I:502:GOL:H11	2.30	0.46
1:E:40:PRO:HD3	1:E:404:TRP:CH2	2.50	0.46
1:A:40:PRO:HD3	1:A:404:TRP:CH2	2.50	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:163:ARG:HA	1:A:163:ARG:HD2	1.78	0.46
1:A:248:CYS:O	1:A:252:ILE:HG22	2.15	0.46
2:N:603:C:H2'	2:N:604:U:C6	2.50	0.46
1:A:437:ILE:O	1:A:443:GLY:HA3	2.16	0.46
1:M:174:ARG:NH2	5:M:501:DCT:O2A	2.48	0.46
1:E:4:GLU:OE2	1:E:284:ARG:HD2	2.15	0.46
2:J:601:G:H2'	2:J:602:U:O4'	2.15	0.46
1:I:165:ILE:HD12	1:I:165:ILE:HA	1.79	0.46
2:F:603:C:H2'	2:F:604:U:C6	2.51	0.46
1:E:437:ILE:O	1:E:443:GLY:HA3	2.16	0.46
1:M:68:THR:HG22	1:M:69:HIS:O	2.16	0.46
1:M:301:ILE:O	1:M:305:ILE:HG13	2.15	0.46
1:I:209:ALA:HB3	1:I:327:TYR:HD2	1.80	0.45
1:E:225:LEU:HD11	1:E:332:ILE:HG23	1.98	0.45
1:M:118:TYR:CD1	1:M:119:PRO:HA	2.50	0.45
1:E:336:PRO:HB2	1:E:337:TRP:CE3	2.52	0.45
1:E:284:ARG:HD3	1:I:5:PHE:CG	2.52	0.45
1:A:359:ASP:OD1	1:A:373:THR:OG1	2.29	0.45
1:A:159:LYS:HE2	2:B:600:G:O6	2.17	0.45
1:A:145:MET:HA	1:A:182:ASN:ND2	2.31	0.45
1:I:154:MET:HE2	7:I:504:GOL:C3	2.46	0.45
1:E:456:ARG:NE	8:E:4224:HOH:O	2.49	0.45
1:E:135:THR:HG23	1:E:137:ASP:H	1.81	0.45
1:E:163:ARG:HD2	1:E:163:ARG:HA	1.74	0.45
1:A:8:SER:O	1:A:11:ASP:HB2	2.16	0.45
2:B:597:C:C2'	2:B:598:C:H5'	2.47	0.45
1:A:21:SER:HB2	1:A:44:ARG:HB3	1.98	0.44
1:M:187:MET:SD	7:M:503:GOL:H11	2.57	0.44
2:N:601:G:H2'	2:N:602:U:O4'	2.18	0.44
1:I:154:MET:CE	7:I:504:GOL:H12	2.47	0.44
1:A:336:PRO:HB2	1:A:337:TRP:CE3	2.53	0.44
1:I:280:HIS:HE1	1:I:282:PHE:CZ	2.36	0.44
1:A:379:PHE:O	1:A:380:ARG:NH1	2.43	0.44
1:E:252:ILE:HG21	1:E:304:ILE:HD11	2.00	0.44
4:L:803:G:N3	4:L:803:G:H2'	2.32	0.44
1:E:42:VAL:HG11	1:E:50:LEU:HD21	2.00	0.44
1:E:5:PHE:HB3	1:E:282:PHE:HD2	1.81	0.44
1:E:246:PHE:CG	1:E:270:CYS:HB2	2.52	0.43
1:A:149:GLY:O	1:A:150:LEU:HD23	2.18	0.43
1:M:218:TRP:CD1	1:M:391:PRO:HA	2.53	0.43
1:A:135:THR:HG23	1:A:137:ASP:N	2.33	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:M:127:LYS:CD	1:M:181:LEU:HD13	2.48	0.43
1:E:291:CYS:HB2	7:E:504:GOL:O1	2.18	0.43
1:I:232:PHE:HZ	1:I:306:ILE:HG12	1.83	0.43
1:E:5:PHE:CG	1:I:284:ARG:HD3	2.53	0.43
1:I:8:SER:O	1:I:11:ASP:HB2	2.18	0.43
1:I:399:HIS:O	1:I:403:ARG:HG3	2.18	0.43
1:E:271:ASN:OD1	7:E:505:GOL:H32	2.17	0.43
1:A:5:PHE:CE2	1:A:7:GLU:HB3	2.54	0.43
1:A:29:VAL:HG11	1:A:442:VAL:HG21	2.00	0.43
1:M:74:MET:HB3	1:M:248:CYS:SG	2.58	0.43
1:E:102:TYR:CE2	1:E:136:LYS:HA	2.54	0.43
1:M:79:ASP:OD2	1:M:255:LYS:HE3	2.18	0.43
1:I:154:MET:CE	7:I:504:GOL:H32	2.49	0.43
1:I:5:PHE:CE2	1:I:7:GLU:HB3	2.54	0.43
2:J:597:C:C2'	2:J:598:C:H5'	2.49	0.43
1:M:154:MET:CE	7:M:503:GOL:H2	2.49	0.43
1:E:132:SER:CB	1:E:135:THR:HG22	2.48	0.43
1:A:253:LEU:HA	1:A:253:LEU:HD23	1.83	0.43
1:M:8:SER:O	1:M:11:ASP:HB2	2.18	0.43
1:I:407:ASP:OD2	1:I:409:LYS:HE2	2.19	0.43
2:B:601:G:H2'	2:B:602:U:O4'	2.18	0.43
1:I:393:MET:HG2	1:I:398:ILE:HG13	2.00	0.42
1:M:252:ILE:HG21	1:M:304:ILE:HD11	2.00	0.42
1:I:98:GLU:CB	6:I:503:ACT:H3	2.46	0.42
2:B:603:C:H2'	2:B:604:U:C6	2.54	0.42
1:A:382:ASP:HB3	1:A:385:TYR:H	1.85	0.42
1:E:93:GLU:O	1:E:193:ASN:ND2	2.52	0.42
1:M:242:SER:HB3	8:M:4253:HOH:O	2.17	0.42
1:E:126:LYS:HB3	8:E:4250:HOH:O	2.18	0.42
1:I:68:THR:HG22	1:I:69:HIS:O	2.20	0.42
1:E:93:GLU:HA	1:E:94:PRO:HD3	1.94	0.42
1:E:377:ARG:HD3	1:E:391:PRO:HB2	2.00	0.42
1:M:376:LYS:HD2	3:O:700:A:H5"	2.01	0.42
1:A:96:LYS:HG2	6:A:502:ACT:O	2.19	0.42
1:I:455:ARG:O	1:I:459:LEU:HG	2.19	0.42
1:E:321:GLN:O	1:E:336:PRO:HD3	2.20	0.42
1:I:216:LEU:HD11	1:I:461:SER:HB3	2.00	0.42
1:E:76:GLU:HB3	1:E:311:LEU:HD13	2.00	0.42
2:N:597:C:C2'	2:N:598:C:H5'	2.49	0.42
1:I:378:TYR:HB2	1:I:392:VAL:HB	2.02	0.42
1:I:47:ASP:HA	1:I:48:PRO:HD3	1.91	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:249:LEU:O	1:A:252:ILE:HG23	2.20	0.42
1:A:188:ARG:HD2	2:B:602:U:OP1	2.20	0.42
1:A:114:THR:O	1:A:127:LYS:HG3	2.20	0.42
1:E:69:HIS:HA	1:I:11:ASP:OD2	2.20	0.42
1:M:5:PHE:CE2	1:M:7:GLU:HB3	2.55	0.42
1:A:84:GLN:NE2	1:A:205:VAL:O	2.51	0.42
1:I:50:LEU:CD1	1:I:54:PHE:HB2	2.49	0.41
1:E:20:PRO:HB2	2:F:599:A:C2	2.55	0.41
1:M:183:ASP:HB3	7:M:503:GOL:H31	2.01	0.41
1:E:249:LEU:O	1:E:252:ILE:HG23	2.21	0.41
1:I:280:HIS:CE1	1:I:282:PHE:CZ	3.08	0.41
4:P:803:G:N3	4:P:803:G:H2'	2.36	0.41
1:E:273:HIS:CD2	1:E:280:HIS:NE2	2.88	0.41
1:A:98:GLU:CB	6:A:502:ACT:H2	2.46	0.41
1:E:314:TYR:HB2	1:E:317:ILE:HD12	2.02	0.41
8:I:1104:HOH:O	3:K:699:G:H1'	2.20	0.41
1:M:76:GLU:HB3	1:M:311:LEU:HD13	2.01	0.41
1:I:204:VAL:HG13	1:I:325:ILE:HD11	2.03	0.41
1:A:167:LYS:NZ	5:A:501:DCT:O1B	2.53	0.41
1:E:159:LYS:HE2	2:F:600:G:O6	2.20	0.41
1:I:145:MET:HA	1:I:182:ASN:ND2	2.35	0.41
1:I:270:CYS:O	1:I:285:GLY:N	2.54	0.41
1:E:51:LYS:HD3	1:E:51:LYS:HA	1.96	0.41
1:M:210:VAL:HA	1:M:327:TYR:CE2	2.55	0.41
1:I:29:VAL:HG11	1:I:442:VAL:HG21	2.03	0.41
1:A:376:LYS:HD2	3:C:700:A:H5''	2.03	0.41
1:I:376:LYS:HD2	3:K:700:A:H5''	2.03	0.41
1:E:108:GLU:HG3	8:F:712:HOH:O	2.21	0.40
1:A:31:HIS:HD2	1:A:32:GLN:HE21	1.68	0.40
1:M:407:ASP:HA	1:M:408:PRO:HD3	1.91	0.40
1:E:8:SER:O	1:E:11:ASP:HB2	2.20	0.40
1:M:336:PRO:HB2	1:M:337:TRP:CE3	2.56	0.40
1:E:5:PHE:CD1	1:I:284:ARG:HD3	2.56	0.40
1:A:68:THR:HG22	1:A:69:HIS:O	2.21	0.40
2:F:597:C:C2'	2:F:598:C:H5'	2.52	0.40
1:E:407:ASP:HA	1:E:408:PRO:HD3	1.92	0.40
1:M:423:TRP:CZ2	1:M:424:HIS:CE1	3.09	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.



Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:M:135:THR:OG1	1:M:313:VAL:O[1_545]	2.19	0.01

## 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	461/472 (98%)	439 (95%)	21 (5%)	1 (0%)	52	80
1	E	461/472 (98%)	445 (96%)	16 (4%)	0	100	100
1	I	461/472 (98%)	443 (96%)	17 (4%)	1 (0%)	52	80
1	M	461/472 (98%)	443 (96%)	18 (4%)	0	100	100
All	All	1844/1888 (98%)	1770 (96%)	72 (4%)	2 (0%)	56	83

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	360	LYS
1	I	365	ASN

### 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	404/413 (98%)	386 (96%)	18 (4%)	34	63
1	E	404/413 (98%)	390 (96%)	14 (4%)	43	73
1	I	404/413 (98%)	391 (97%)	13 (3%)	46	76

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	M	404/413 (98%)	387 (96%)	17 (4%)	36 66
All	All	1616/1652 (98%)	1554 (96%)	62 (4%)	40 70

All (62) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	19	THR
1	A	22	LYS
1	A	37	ASN
1	A	44	ARG
1	A	45	SER
1	A	75	LEU
1	A	96	LYS
1	A	127	LYS
1	A	165	ILE
1	A	176	ILE
1	A	187	MET
1	A	216	LEU
1	A	218	TRP
1	A	252	ILE
1	A	260	HIS
1	A	273	HIS
1	A	393	MET
1	A	440	VAL
1	E	22	LYS
1	E	44	ARG
1	E	45	SER
1	E	75	LEU
1	E	96	LYS
1	E	127	LYS
1	E	176	ILE
1	E	187	MET
1	E	216	LEU
1	E	218	TRP
1	E	252	ILE
1	E	260	HIS
1	E	393	MET
1	E	440	VAL
1	I	22	LYS
1	I	37	ASN
1	I	44	ARG
1	I	45	SER

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Mol	Chain	Res	Type
1	I	75	LEU
1	I	132	SER
1	I	176	ILE
1	I	216	LEU
1	I	218	TRP
1	I	252	ILE
1	I	260	HIS
1	I	294	THR
1	I	396	LYS
1	M	19	THR
1	M	22	LYS
1	M	37	ASN
1	M	44	ARG
1	M	45	SER
1	M	75	LEU
1	M	96	LYS
1	M	127	LYS
1	M	132	SER
1	M	176	ILE
1	M	187	MET
1	M	216	LEU
1	M	218	TRP
1	M	252	ILE
1	M	260	HIS
1	M	294	THR
1	M	440	VAL

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

Mol	Chain	Res	Type
1	A	32	GLN
1	E	32	GLN
1	I	32	GLN
1	M	32	GLN

### 5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
2	B	17/24 (70%)	5 (29%)	1 (5%)
2	F	17/24 (70%)	5 (29%)	1 (5%)

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Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
2	J	17/24 (70%)	5 (29%)	1 (5%)
2	N	17/24 (70%)	5 (29%)	1 (5%)
3	C	10/15 (66%)	1 (10%)	0
3	G	10/15 (66%)	1 (10%)	0
3	K	10/15 (66%)	1 (10%)	0
3	O	10/15 (66%)	1 (10%)	0
4	D	4/9 (44%)	1 (25%)	0
4	H	5/9 (55%)	1 (20%)	1 (20%)
4	L	4/9 (44%)	1 (25%)	0
4	P	5/9 (55%)	1 (20%)	1 (20%)
All	All	126/192 (65%)	28 (22%)	6 (4%)

All (28) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
2	B	597	C
2	B	598	C
2	B	602	U
2	B	611	G
2	B	612	A
3	C	693	A
4	D	804	G
2	F	597	C
2	F	598	C
2	F	602	U
2	F	611	G
2	F	612	A
3	G	693	A
4	H	804	G
2	J	597	C
2	J	598	C
2	J	602	U
2	J	611	G
2	J	612	A
3	K	693	A
4	L	804	G
2	N	597	C
2	N	598	C
2	N	602	U
2	N	611	G
2	N	612	A
3	O	693	A

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Mol	Chain	Res	Type
4	P	804	G

All (6) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
2	B	596	U
2	F	596	U
4	H	803	G
2	J	596	U
2	N	596	U
4	P	803	G

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

4 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	$\# Z  > 2$
3	DOC	C	701	3,2	11,19,20	0.56	0	14,26,29	1.34	2 (14%)
3	DOC	G	701	3,2	11,19,20	0.59	0	14,26,29	1.38	2 (14%)
3	DOC	K	701	3,2	11,19,20	0.52	0	14,26,29	1.14	1 (7%)
3	DOC	O	701	3,2	11,19,20	0.61	0	14,26,29	1.49	4 (28%)

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	DOC	C	701	3,2	-	0/3/18/19	0/2/2/2
3	DOC	G	701	3,2	-	0/3/18/19	0/2/2/2
3	DOC	K	701	3,2	-	0/3/18/19	0/2/2/2
3	DOC	O	701	3,2	-	0/3/18/19	0/2/2/2

There are no bond length outliers.

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	O	701	DOC	N4-C4-N3	2.14	120.39	116.50
3	O	701	DOC	O4'-C4'-C5'	2.24	112.85	109.54
3	C	701	DOC	N4-C4-N3	2.26	120.61	116.50
3	O	701	DOC	C3'-C2'-C1'	2.29	105.26	102.71
3	G	701	DOC	O4'-C1'-C2'	2.37	109.24	106.67
3	C	701	DOC	C2-N3-C4	2.47	119.10	115.61
3	G	701	DOC	C2-N3-C4	2.74	119.48	115.61
3	O	701	DOC	C2-N3-C4	2.77	119.52	115.61
3	K	701	DOC	C2-N3-C4	2.87	119.67	115.61

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

## 5.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

## 5.6 Ligand geometry [i](#)

19 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	$\# Z  > 2$
5	DCT	A	501	-	20,28,28	0.96	1 (5%)	29,43,43	1.57	6 (20%)
6	ACT	A	502	-	1,3,3	1.43	0	0,3,3	0.00	-
7	GOL	A	503	-	5,5,5	0.37	0	5,5,5	0.46	0
7	GOL	A	504	-	5,5,5	0.26	0	5,5,5	0.36	0
7	GOL	A	505	-	5,5,5	0.31	0	5,5,5	0.38	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
5	DCT	E	501	-	20,28,28	1.01	0	29,43,43	1.76	7 (24%)
7	GOL	E	502	-	5,5,5	0.29	0	5,5,5	0.22	0
6	ACT	E	503	-	1,3,3	1.19	0	0,3,3	0.00	-
7	GOL	E	504	-	5,5,5	0.32	0	5,5,5	0.43	0
7	GOL	E	505	-	5,5,5	0.34	0	5,5,5	0.46	0
5	DCT	I	501	-	20,28,28	0.99	1 (5%)	29,43,43	1.49	5 (17%)
7	GOL	I	502	-	5,5,5	0.35	0	5,5,5	0.35	0
6	ACT	I	503	-	1,3,3	1.03	0	0,3,3	0.00	-
7	GOL	I	504	-	5,5,5	0.30	0	5,5,5	0.82	0
7	GOL	I	505	-	5,5,5	0.18	0	5,5,5	0.45	0
5	DCT	M	501	-	20,28,28	0.99	1 (5%)	29,43,43	1.73	8 (27%)
7	GOL	M	502	-	5,5,5	0.28	0	5,5,5	0.39	0
7	GOL	M	503	-	5,5,5	0.32	0	5,5,5	1.33	0
7	GOL	M	504	-	5,5,5	0.27	0	5,5,5	0.66	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
5	DCT	A	501	-	-	0/18/31/31	0/2/2/2
6	ACT	A	502	-	-	0/0/0/0	0/0/0/0
7	GOL	A	503	-	-	0/4/4/4	0/0/0/0
7	GOL	A	504	-	-	0/4/4/4	0/0/0/0
7	GOL	A	505	-	-	0/4/4/4	0/0/0/0
5	DCT	E	501	-	-	0/18/31/31	0/2/2/2
7	GOL	E	502	-	-	0/4/4/4	0/0/0/0
6	ACT	E	503	-	-	0/0/0/0	0/0/0/0
7	GOL	E	504	-	-	0/4/4/4	0/0/0/0
7	GOL	E	505	-	-	0/4/4/4	0/0/0/0
5	DCT	I	501	-	-	0/18/31/31	0/2/2/2
7	GOL	I	502	-	-	0/4/4/4	0/0/0/0
6	ACT	I	503	-	-	0/0/0/0	0/0/0/0
7	GOL	I	504	-	-	0/4/4/4	0/0/0/0
7	GOL	I	505	-	-	0/4/4/4	0/0/0/0
5	DCT	M	501	-	-	0/18/31/31	0/2/2/2
7	GOL	M	502	-	-	0/4/4/4	0/0/0/0
7	GOL	M	503	-	-	0/4/4/4	0/0/0/0
7	GOL	M	504	-	-	0/4/4/4	0/0/0/0

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	M	501	DCT	PG-O2G	2.05	1.62	1.54
5	I	501	DCT	PG-O2G	2.05	1.62	1.54
5	A	501	DCT	PG-O2G	2.10	1.62	1.54

All (26) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	E	501	DCT	PB-O3B-PG	-4.18	118.64	132.67
5	I	501	DCT	PB-O3B-PG	-3.89	119.62	132.67
5	A	501	DCT	PB-O3A-PA	-3.83	121.98	132.73
5	M	501	DCT	PB-O3B-PG	-3.70	120.26	132.67
5	E	501	DCT	PB-O3A-PA	-3.40	123.19	132.73
5	A	501	DCT	PB-O3B-PG	-3.36	121.42	132.67
5	I	501	DCT	C5-C4-N3	-2.68	118.42	121.80
5	E	501	DCT	C5-C4-N3	-2.61	118.50	121.80
5	M	501	DCT	PB-O3A-PA	-2.51	125.69	132.73
5	A	501	DCT	C5-C4-N3	-2.44	118.72	121.80
5	M	501	DCT	C5-C4-N3	-2.44	118.73	121.80
5	M	501	DCT	O3A-PA-O5'	-2.28	96.88	102.94
5	M	501	DCT	O4'-C4'-C5'	-2.11	106.42	109.54
5	I	501	DCT	PB-O3A-PA	-2.08	126.89	132.73
5	A	501	DCT	O4'-C4'-C5'	2.04	112.55	109.54
5	M	501	DCT	N4-C4-N3	2.11	120.34	116.50
5	E	501	DCT	C2'-C3'-C4'	2.19	106.86	102.59
5	I	501	DCT	N4-C4-N3	2.19	120.49	116.50
5	A	501	DCT	C3'-C2'-C1'	2.55	105.56	102.71
5	A	501	DCT	C2-N3-C4	2.75	119.49	115.61
5	E	501	DCT	N4-C4-N3	2.84	121.68	116.50
5	E	501	DCT	C3'-C2'-C1'	3.10	106.17	102.71
5	M	501	DCT	C2-N3-C4	3.11	120.00	115.61
5	I	501	DCT	C2-N3-C4	3.33	120.31	115.61
5	E	501	DCT	C2-N3-C4	3.43	120.45	115.61
5	M	501	DCT	C3'-C2'-C1'	3.79	106.95	102.71

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

13 monomers are involved in 33 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	501	DCT	5	0
6	A	502	ACT	3	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	A	503	GOL	3	0
7	E	502	GOL	2	0
6	E	503	ACT	2	0
7	E	504	GOL	1	0
7	E	505	GOL	1	0
7	I	502	GOL	1	0
6	I	503	ACT	2	0
7	I	504	GOL	5	0
5	M	501	DCT	3	0
7	M	503	GOL	4	0
7	M	504	GOL	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	463/472 (98%)	0.12	9 (1%) 70 71	30, 44, 63, 124	0
1	E	463/472 (98%)	0.16	14 (3%) 54 54	29, 43, 62, 123	0
1	I	463/472 (98%)	0.17	12 (2%) 59 60	29, 43, 62, 125	0
1	M	463/472 (98%)	0.15	11 (2%) 62 62	29, 43, 62, 125	0
2	B	18/24 (75%)	0.05	1 (5%) 28 27	38, 55, 129, 139	0
2	F	17/24 (70%)	-0.07	1 (5%) 26 25	37, 46, 116, 126	0
2	J	18/24 (75%)	0.06	0 100 100	35, 53, 128, 138	0
2	N	17/24 (70%)	0.17	2 (11%) 6 5	36, 47, 116, 126	0
3	C	11/15 (73%)	-0.34	0 100 100	38, 53, 115, 115	0
3	G	11/15 (73%)	-0.25	0 100 100	35, 52, 115, 116	0
3	K	11/15 (73%)	-0.19	0 100 100	35, 51, 114, 115	0
3	O	11/15 (73%)	-0.05	0 100 100	36, 49, 114, 114	0
4	D	5/9 (55%)	1.73	3 (60%) 0 0	124, 127, 131, 136	0
4	H	5/9 (55%)	1.70	2 (40%) 0 0	123, 127, 128, 135	0
4	L	5/9 (55%)	2.58	2 (40%) 0 0	124, 128, 130, 133	0
4	P	5/9 (55%)	0.89	0 100 100	124, 127, 129, 136	0
All	All	1986/2080 (95%)	0.16	57 (2%) 55 56	29, 44, 73, 139	0

All (57) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	M	362	GLU	6.9
4	L	807	A	4.8
4	L	806	G	4.7
1	A	362	GLU	4.4
2	B	595	C	4.3

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Mol	Chain	Res	Type	RSRZ
4	H	806	G	4.2
1	I	446	LEU	3.6
1	I	362	GLU	3.6
1	M	97	LEU	3.6
2	N	597	C	3.5
1	E	362	GLU	3.5
1	A	344	LEU	3.4
1	I	140	LYS	3.3
4	D	803	G	3.2
1	I	132	SER	3.1
1	I	291	CYS	3.1
1	E	364	PHE	3.0
1	A	343	LEU	3.0
1	E	240	SER	2.9
1	M	133	LYS	2.9
1	I	292	SER	2.8
1	E	361	GLY	2.8
1	E	16	VAL	2.8
1	I	156	THR	2.8
1	M	419	CYS	2.8
1	A	345	ALA	2.7
1	E	374	PHE	2.7
1	I	131	LEU	2.7
1	M	461	SER	2.6
1	M	310	MET	2.6
2	F	597	C	2.5
1	E	241	LEU	2.5
1	M	138	LEU	2.4
1	I	412	GLN	2.4
1	I	188	ARG	2.4
1	M	128	ARG	2.4
1	E	360	LYS	2.4
1	M	258	TYR	2.3
1	A	71	ASP	2.3
1	E	203	GLY	2.3
4	D	807	A	2.3
1	E	359	ASP	2.2
4	D	806	G	2.2
1	A	195	TYR	2.2
1	I	281	TYR	2.2
1	A	174	ARG	2.2
1	A	310	MET	2.2

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Mol	Chain	Res	Type	RSRZ
1	E	343	LEU	2.1
1	E	341	ALA	2.1
1	M	431	GLU	2.1
2	N	598	C	2.1
4	H	807	A	2.1
1	M	345	ALA	2.1
1	A	219	SER	2.1
1	I	433	PHE	2.1
1	E	236	GLY	2.0
1	E	50	LEU	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. 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
3	DOC	O	701	18/19	0.97	0.17	-	30,36,40,41	0
3	DOC	G	701	18/19	0.97	0.15	-	33,37,40,40	0
3	DOC	K	701	18/19	0.97	0.19	-	31,37,39,40	0
3	DOC	C	701	18/19	0.98	0.15	-	30,37,40,40	0

## 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
7	GOL	M	503	6/6	0.86	0.51	13.29	44,51,53,53	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors( $\text{\AA}^2$ )	Q<0.9
7	GOL	E	504	6/6	0.89	0.45	8.32	47,50,54,59	0
7	GOL	A	503	6/6	0.88	0.37	5.75	45,51,52,52	0
7	GOL	I	504	6/6	0.86	0.37	2.18	47,53,58,64	0
7	GOL	A	504	6/6	0.94	0.19	0.29	43,44,46,51	0
7	GOL	I	505	6/6	0.94	0.15	-0.05	34,41,43,48	0
7	GOL	E	505	6/6	0.96	0.17	-0.05	35,41,42,43	0
7	GOL	M	502	6/6	0.79	0.19	-0.10	54,66,74,74	0
5	DCT	M	501	27/27	0.91	0.15	-0.31	38,55,85,89	0
7	GOL	I	502	6/6	0.87	0.20	-0.35	53,71,76,76	0
7	GOL	M	504	6/6	0.95	0.14	-0.36	40,45,46,47	0
5	DCT	E	501	27/27	0.91	0.18	-0.45	39,57,90,91	0
5	DCT	I	501	27/27	0.92	0.15	-0.53	39,52,96,99	0
5	DCT	A	501	27/27	0.90	0.14	-0.75	39,52,89,94	0
7	GOL	E	502	6/6	0.85	0.16	-0.90	49,67,72,72	0
7	GOL	A	505	6/6	0.83	0.13	-1.49	52,66,75,79	0
6	ACT	E	503	4/4	0.86	0.57	-	67,69,69,74	0
6	ACT	A	502	4/4	0.88	0.21	-	66,67,69,70	0
6	ACT	I	503	4/4	0.91	0.24	-	61,61,63,65	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.