



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 5, 2026 – 01:43 PM UTC

PDB ID : 1D0I / pdb_00001d0i
Title : CRYSTAL STRUCTURE OF TYPE II DEHYDROQUINASE FROM STREPTOMYCES COELICOLOR COMPLEXED WITH PHOSPHATE IONS
Authors : Roszak, A.W.; Krell, T.; Hunter, I.S.; Coggins, J.R.; Lapthorn, A.J.
Deposited on : 1999-09-10
Resolution : 1.80 Å(reported)

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

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

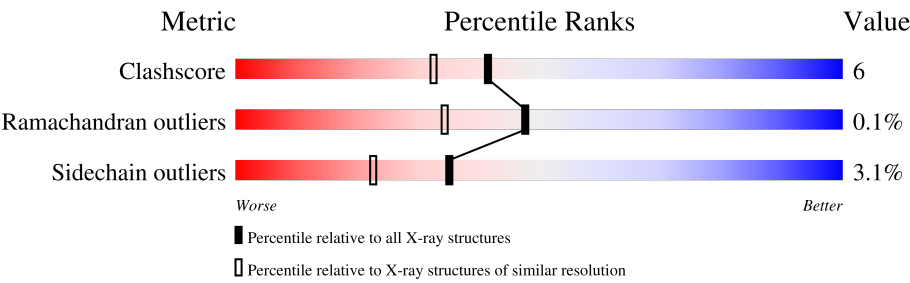
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.80 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))
Clashscore	190562	8479 (1.80-1.80)
Ramachandran outliers	187476	8391 (1.80-1.80)
Sidechain outliers	187428	8390 (1.80-1.80)

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

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	156	75% 18% ...
1	B	156	76% 17% ...
1	C	156	74% 19% ...
1	D	156	77% 18% ...
1	E	156	75% 19% ...
1	F	156	74% 20% ...
1	G	156	78% 15% ...
1	H	156	79% 14% ...

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
1	I	156	 79%13% . .
1	J	156	 70%22% . . .
1	K	156	 77%17% . . .
1	L	156	 78%17% . . .

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
2	PO4	A	3002	-	X	-	-
2	PO4	E	3006	-	X	-	-
2	PO4	G	3010	-	X	-	-
2	PO4	J	3013	-	X	-	-

2 Entry composition

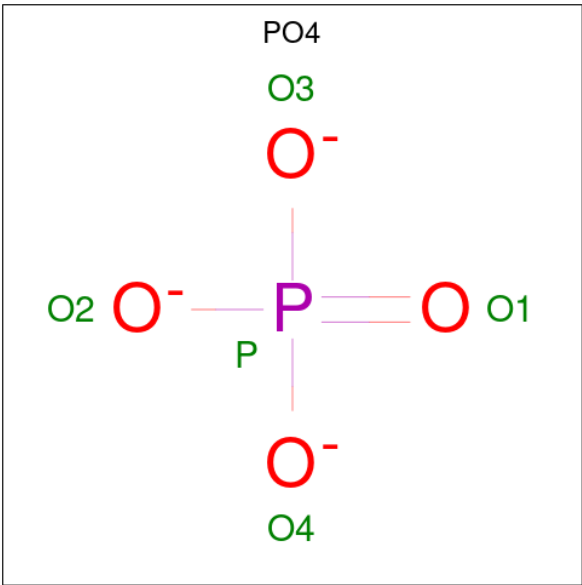
There are 4 unique types of molecules in this entry. The entry contains 15962 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 TYPE II 3-DEHYDROQUINATE HYDRATASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	150	Total	C	N	O	S	0	5	0
			1153	716	218	213	6			
1	B	150	Total	C	N	O	S	0	3	0
			1143	711	215	211	6			
1	C	150	Total	C	N	O	S	0	5	0
			1143	711	210	216	6			
1	D	151	Total	C	N	O	S	0	6	0
			1154	717	214	217	6			
1	E	152	Total	C	N	O	S	0	5	0
			1157	718	220	213	6			
1	F	151	Total	C	N	O	S	0	4	0
			1152	716	216	214	6			
1	G	151	Total	C	N	O	S	0	4	0
			1152	716	217	213	6			
1	H	153	Total	C	N	O	S	0	5	0
			1168	724	221	217	6			
1	I	150	Total	C	N	O	S	0	4	0
			1144	711	212	215	6			
1	J	150	Total	C	N	O	S	0	7	0
			1160	721	219	214	6			
1	K	151	Total	C	N	O	S	0	5	0
			1153	716	216	215	6			
1	L	151	Total	C	N	O	S	0	3	0
			1148	714	216	212	6			

- Molecule 2 is PHOSPHATE ION (CCD ID: PO4) (formula: O₄P).



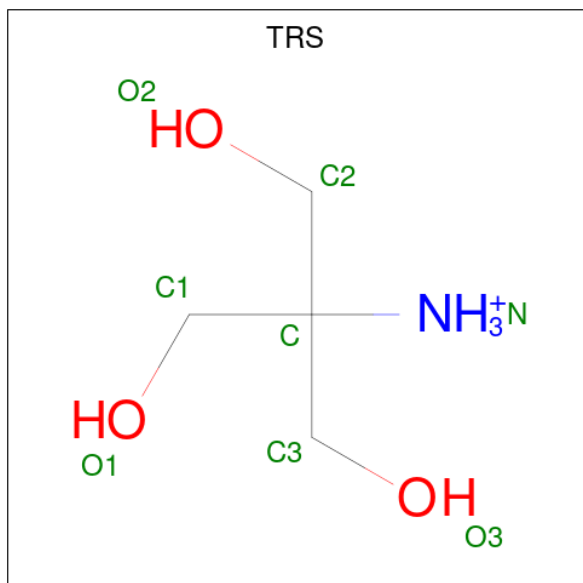
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	O	P	0	0
			5	4	1		
2	A	1	Total	O	P	0	0
			5	4	1		
2	B	1	Total	O	P	0	0
			5	4	1		
2	C	1	Total	O	P	0	0
			5	4	1		
2	D	1	Total	O	P	0	0
			5	4	1		
2	E	1	Total	O	P	0	0
			5	4	1		
2	E	1	Total	O	P	0	0
			5	4	1		
2	F	1	Total	O	P	0	0
			5	4	1		
2	G	1	Total	O	P	0	0
			5	4	1		
2	G	1	Total	O	P	0	0
			5	4	1		
2	H	1	Total	O	P	0	0
			5	4	1		
2	I	1	Total	O	P	0	0
			5	4	1		
2	J	1	Total	O	P	0	0
			5	4	1		
2	K	1	Total	O	P	0	0
			5	4	1		

Continued on next page...

Continued from previous page...

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	K	1	Total	O	P	0	0
			5	4	1		
2	L	1	Total	O	P	0	0
			5	4	1		

- Molecule 3 is 2-AMINO-2-HYDROXYMETHYL-PROPANE-1,3-DIOL (CCD ID: TRS) (formula: C₄H₁₂NO₃).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			8	4	1	3		
3	D	1	Total	C	N	O	0	0
			8	4	1	3		
3	G	1	Total	C	N	O	0	0
			8	4	1	3		
3	J	1	Total	C	N	O	0	0
			8	4	1	3		

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	194	Total	O	0	0
			194	194		
4	B	139	Total	O	0	0
			139	139		
4	C	114	Total	O	0	0
			114	114		

Continued on next page...

Continued from previous page...

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	D	171	Total 171	O 171	0	0
4	E	205	Total 205	O 205	0	0
4	F	174	Total 174	O 174	0	0
4	G	205	Total 205	O 205	0	0
4	H	190	Total 190	O 190	0	0
4	I	197	Total 197	O 197	0	0
4	J	116	Total 116	O 116	0	0
4	K	183	Total 183	O 183	0	0
4	L	135	Total 135	O 135	0	0

Note EDS was not executed.

Chain A: 75% 18% . . .



Chain B: 76% 17% . . .



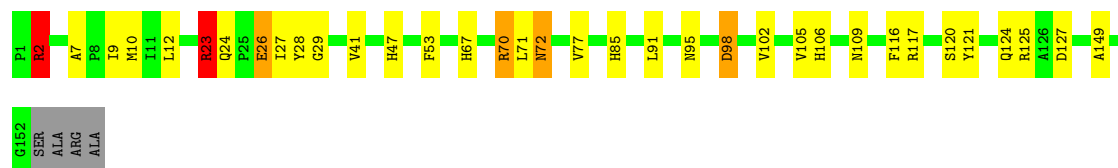
Chain C: 74% 19% . . .



Chain D: 77% 18% . .



Chain E: 75% 19% . . .



- Molecule 1: TYPE II 3-DEHYDROQUINATE HYDRATASE

Chain F: 74% 20%



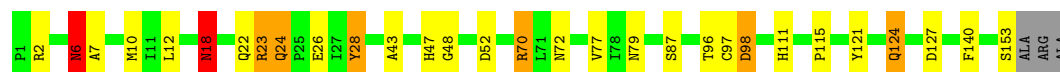
- Molecule 1: TYPE II 3-DEHYDROQUINATE HYDRATASE

Chain G: 78% 15%



- Molecule 1: TYPE II 3-DEHYDROQUINATE HYDRATASE

Chain H: 79% 14%



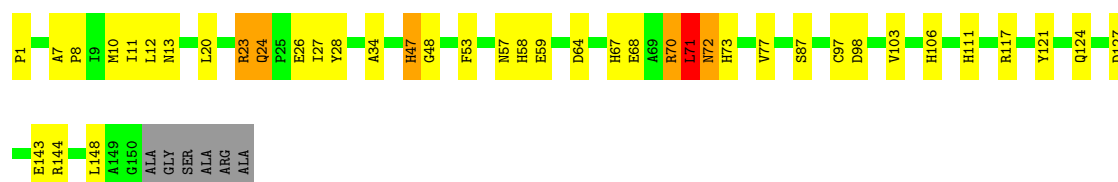
- Molecule 1: TYPE II 3-DEHYDROQUINATE HYDRATASE

Chain I: 79% 13%



- Molecule 1: TYPE II 3-DEHYDROQUINATE HYDRATASE

Chain J: 70% 22%



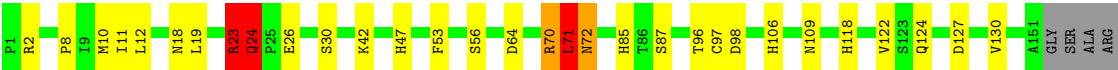
- Molecule 1: TYPE II 3-DEHYDROQUINATE HYDRATASE

Chain K:

77%

17%

..



ALA

• Molecule 1: TYPE II 3-DEHYDROQUINATE HYDRATASE

Chain L:

78%

17%

..



4 Data and refinement statistics

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	113.20Å 137.50Å 140.20Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	45.03 – 1.80	Depositor
% Data completeness (in resolution range)	98.7 (45.03-1.80)	Depositor
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	REFMAC	Depositor
R, R_{free}	0.171 , 0.223	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	15962	wwPDB-VP
Average B, all atoms (Å ²)	30.0	wwPDB-VP

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: PO4, TRS

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	0.99	0/1202	1.78	21/1634 (1.3%)
1	B	0.96	0/1182	1.87	29/1608 (1.8%)
1	C	0.92	0/1192	1.88	33/1623 (2.0%)
1	D	1.04	0/1208	1.76	18/1644 (1.1%)
1	E	1.10	1/1207 (0.1%)	1.82	28/1641 (1.7%)
1	F	1.02	0/1196	1.83	28/1627 (1.7%)
1	G	1.16	0/1196	1.85	24/1627 (1.5%)
1	H	0.97	0/1217	1.84	29/1654 (1.8%)
1	I	1.09	0/1189	1.85	23/1619 (1.4%)
1	J	2.02	10/1219 (0.8%)	2.12	49/1657 (3.0%)
1	K	1.07	1/1202 (0.1%)	1.89	34/1635 (2.1%)
1	L	0.99	0/1187	1.85	27/1615 (1.7%)
All	All	1.15	12/14397 (0.1%)	1.87	343/19584 (1.8%)

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

The worst 5 of 12 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	J	71[A]	LEU	CB-CG	32.62	2.18	1.53
1	J	71[B]	LEU	CB-CG	32.62	2.18	1.53
1	J	71[A]	LEU	CA-CB	18.62	1.83	1.53
1	J	71[B]	LEU	CA-CB	18.62	1.83	1.53
1	J	71[A]	LEU	CG-CD1	14.40	2.00	1.52

The worst 5 of 343 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	J	71[A]	LEU	CB-CA-C	14.57	134.79	110.17
1	J	71[B]	LEU	CB-CA-C	14.57	134.79	110.17
1	J	71[A]	LEU	N-CA-C	-14.06	94.45	113.30
1	J	71[B]	LEU	N-CA-C	-14.06	94.45	113.30
1	C	70	ARG	CD-NE-CZ	12.01	141.21	124.40

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	E	72	ASN	Mainchain

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	1153	0	1133	16	0
1	B	1143	0	1122	14	0
1	C	1143	0	1110	12	0
1	D	1154	0	1124	13	0
1	E	1157	0	1133	12	0
1	F	1152	0	1129	15	0
1	G	1152	0	1131	14	0
1	H	1168	0	1146	12	0
1	I	1144	0	1113	15	0
1	J	1160	0	1144	37	0
1	K	1153	0	1130	8	0
1	L	1148	0	1127	7	0
2	A	10	0	0	1	0
2	B	5	0	0	0	0
2	C	5	0	0	0	0
2	D	5	0	0	0	0
2	E	10	0	0	0	0
2	F	5	0	0	0	0
2	G	10	0	0	0	0
2	H	5	0	0	0	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	I	5	0	0	0	0
2	J	5	0	0	0	0
2	K	10	0	0	0	0
2	L	5	0	0	0	0
3	A	8	0	12	0	0
3	D	8	0	12	0	0
3	G	8	0	12	0	0
3	J	8	0	12	0	0
4	A	194	0	0	4	0
4	B	139	0	0	1	0
4	C	114	0	0	0	0
4	D	171	0	0	2	0
4	E	205	0	0	3	0
4	F	174	0	0	2	0
4	G	205	0	0	3	0
4	H	190	0	0	2	0
4	I	197	0	0	4	0
4	J	116	0	0	4	0
4	K	183	0	0	2	0
4	L	135	0	0	1	0
All	All	15962	0	13590	174	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 6.

The worst 5 of 174 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:J:71[A]:LEU:CG	1:J:71[A]:LEU:CD2	1.99	1.41
1:J:71[A]:LEU:CG	1:J:71[A]:LEU:CD1	2.00	1.39
1:J:71[B]:LEU:CG	1:J:71[B]:LEU:CD1	2.07	1.33
1:J:71[A]:LEU:HD21	1:J:72:ASN:HD21	1.30	0.94
1:J:67:HIS:HA	1:J:70[B]:ARG:HD3	1.53	0.90

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	153/156 (98%)	151 (99%)	2 (1%)	0	100	100
1	B	151/156 (97%)	147 (97%)	4 (3%)	0	100	100
1	C	153/156 (98%)	149 (97%)	4 (3%)	0	100	100
1	D	155/156 (99%)	149 (96%)	5 (3%)	1 (1%)	21	11
1	E	155/156 (99%)	151 (97%)	4 (3%)	0	100	100
1	F	153/156 (98%)	149 (97%)	4 (3%)	0	100	100
1	G	153/156 (98%)	148 (97%)	5 (3%)	0	100	100
1	H	156/156 (100%)	150 (96%)	6 (4%)	0	100	100
1	I	152/156 (97%)	148 (97%)	4 (3%)	0	100	100
1	J	155/156 (99%)	151 (97%)	4 (3%)	0	100	100
1	K	154/156 (99%)	150 (97%)	4 (3%)	0	100	100
1	L	152/156 (97%)	148 (97%)	4 (3%)	0	100	100
All	All	1842/1872 (98%)	1791 (97%)	50 (3%)	1 (0%)	48	34

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	150	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	123/120 (102%)	120 (98%)	3 (2%)	43	31
1	B	121/120 (101%)	118 (98%)	3 (2%)	42	30
1	C	122/120 (102%)	116 (95%)	6 (5%)	22	10
1	D	123/120 (102%)	120 (98%)	3 (2%)	43	31
1	E	122/120 (102%)	117 (96%)	5 (4%)	27	15
1	F	122/120 (102%)	119 (98%)	3 (2%)	42	30
1	G	122/120 (102%)	118 (97%)	4 (3%)	33	21
1	H	124/120 (103%)	119 (96%)	5 (4%)	28	15
1	I	122/120 (102%)	119 (98%)	3 (2%)	42	30
1	J	125/120 (104%)	119 (95%)	6 (5%)	23	11
1	K	123/120 (102%)	119 (97%)	4 (3%)	33	21
1	L	121/120 (101%)	117 (97%)	4 (3%)	33	21
All	All	1470/1440 (102%)	1421 (97%)	49 (3%)	35	21

5 of 49 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	H	18	ASN
1	J	23[A]	ARG
1	H	23	ARG
1	I	23	ARG
1	J	24	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 21 such sidechains are listed below:

Mol	Chain	Res	Type
1	J	6	ASN
1	K	6	ASN
1	L	22	GLN
1	K	72	ASN
1	J	72	ASN

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 oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

20 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
2	PO4	E	3007	-	4,4,4	2.14	2 (50%)	6,6,6	1.53	1 (16%)
2	PO4	F	3008	-	4,4,4	1.77	1 (25%)	6,6,6	1.04	0
2	PO4	L	3016	-	4,4,4	1.63	1 (25%)	6,6,6	1.08	0
2	PO4	H	3011	-	4,4,4	1.79	1 (25%)	6,6,6	1.40	1 (16%)
3	TRS	D	3302	-	7,7,7	1.07	0	9,9,9	1.23	1 (11%)
3	TRS	J	3304	-	7,7,7	0.88	0	9,9,9	0.84	0
2	PO4	A	3001	-	4,4,4	2.34	1 (25%)	6,6,6	1.52	2 (33%)
2	PO4	G	3009	-	4,4,4	2.08	1 (25%)	6,6,6	1.01	1 (16%)
2	PO4	B	3003	-	4,4,4	2.05	1 (25%)	6,6,6	1.60	2 (33%)
2	PO4	A	3002	-	4,4,4	1.70	1 (25%)	6,6,6	2.31	4 (66%)
2	PO4	D	3005	-	4,4,4	1.76	1 (25%)	6,6,6	1.66	1 (16%)
3	TRS	A	3301	-	7,7,7	0.94	0	9,9,9	1.14	0
2	PO4	K	3015	-	4,4,4	1.66	1 (25%)	6,6,6	1.10	1 (16%)
2	PO4	G	3010	-	4,4,4	2.73	3 (75%)	6,6,6	3.08	5 (83%)
3	TRS	G	3303	-	7,7,7	1.08	0	9,9,9	0.71	0
2	PO4	C	3004	-	4,4,4	1.98	1 (25%)	6,6,6	1.23	0
2	PO4	J	3013	-	4,4,4	2.61	2 (50%)	6,6,6	2.00	3 (50%)
2	PO4	K	3014	-	4,4,4	2.64	1 (25%)	6,6,6	2.14	1 (16%)
2	PO4	E	3006	-	4,4,4	1.81	1 (25%)	6,6,6	2.59	3 (50%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	PO4	I	3012	-	4,4,4	1.77	1 (25%)	6,6,6	1.31	1 (16%)

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	TRS	G	3303	-	-	0/9/9/9	-
3	TRS	A	3301	-	-	0/9/9/9	-
3	TRS	D	3302	-	-	0/9/9/9	-
3	TRS	J	3304	-	-	0/9/9/9	-

The worst 5 of 20 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	K	3014	PO4	P-O1	4.86	1.61	1.50
2	J	3013	PO4	P-O1	4.76	1.61	1.50
2	A	3001	PO4	P-O1	4.54	1.61	1.50
2	G	3009	PO4	P-O1	4.08	1.60	1.50
2	B	3003	PO4	P-O1	3.95	1.59	1.50

The worst 5 of 27 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	K	3014	PO4	O4-P-O3	4.38	121.53	107.91
2	G	3010	PO4	O3-P-O2	3.83	119.81	107.91
2	E	3006	PO4	O4-P-O1	-3.72	97.81	110.95
2	G	3010	PO4	O4-P-O3	-3.61	96.69	107.91
2	G	3010	PO4	O4-P-O1	-3.58	98.30	110.95

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	3002	PO4	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

EDS was not executed - this section is therefore empty.

6.2 Non-standard residues in protein, DNA, RNA chains

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

6.4 Ligands

EDS was not executed - this section is therefore empty.

6.5 Other polymers

EDS was not executed - this section is therefore empty.