



# Full wwPDB X-ray Structure Validation Report ⓘ

Jan 31, 2016 – 09:20 PM GMT

PDB ID : 1OI9  
Title : STRUCTURE OF HUMAN THR160-PHOSPHO CDK2/CYCLIN A COM-  
PLEXED WITH A 6-CYCLOHEXYLMETHYLOXY-2-ANILINO-PURINE  
INHIBITOR  
Authors : Pratt, D.J.; Endicott, J.A.; Noble, M.E.M.  
Deposited on : 2003-06-10  
Resolution : 2.10 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.  
We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)  
A user guide is available at  
<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

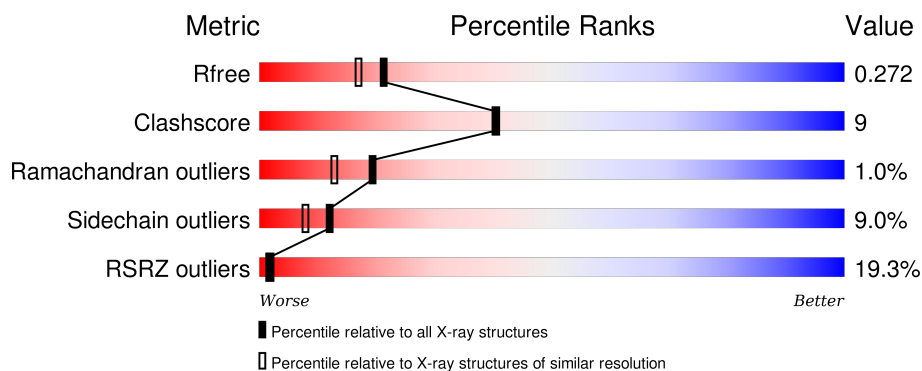
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.10 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	91344	3939 (2.10-2.10)
Clashscore	102246	4460 (2.10-2.10)
Ramachandran outliers	100387	4413 (2.10-2.10)
Sidechain outliers	100360	4414 (2.10-2.10)
RSRZ outliers	91569	3948 (2.10-2.10)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. 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	302	<div> <div>6%</div> <div> <div></div> <div>73%</div> <div>22%</div> <div>..</div> </div> </div>
1	C	302	<div> <div>31%</div> <div> <div></div> <div>67%</div> <div>25%</div> <div>7%</div> <div>.</div> </div> </div>
2	B	260	<div> <div>8%</div> <div> <div></div> <div>83%</div> <div>13%</div> <div>..</div> </div> </div>
2	D	260	<div> <div>32%</div> <div> <div></div> <div>74%</div> <div>21%</div> <div>..</div> </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 crite-

ria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	SGM	B	1193	-	-	-	X

## 2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 9318 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.

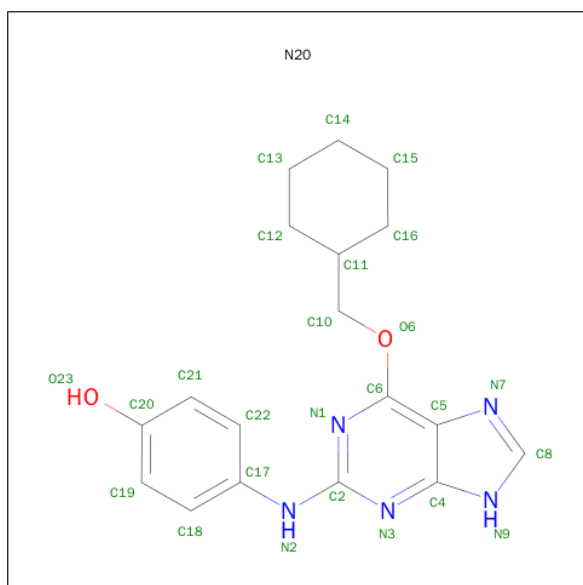
- Molecule 1 is a protein called CELL DIVISION PROTEIN KINASE 2.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	296	Total	C	N	O	P	S	0	3	0
			2388	1549	404	426	1	8			
1	C	297	Total	C	N	O	P	S	0	1	0
			2392	1552	405	426	1	8			

- Molecule 2 is a protein called CYCLIN A2.

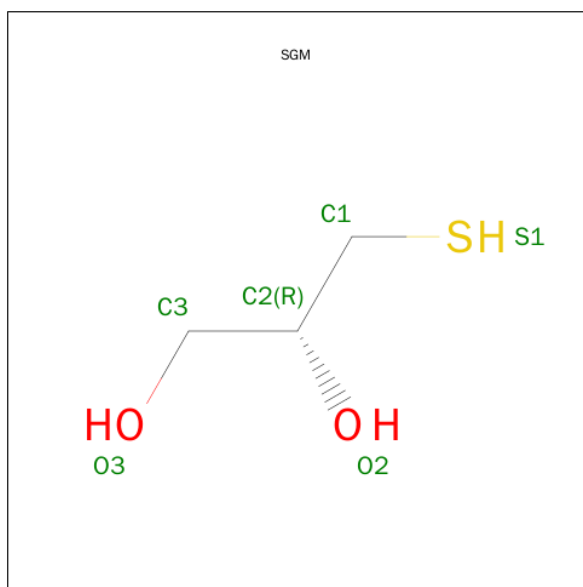
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	258	Total	C	N	O	S	0	2	0
			2089	1354	339	383	13			
2	D	253	Total	C	N	O	S	0	0	0
			2045	1326	333	375	11			

- Molecule 3 is 6-CYCLOHEXYLMETHYLOXY-2-(4'-HYDROXYANILINO)PURINE (three-letter code: N20) (formula: C<sub>18</sub>H<sub>21</sub>N<sub>5</sub>O<sub>2</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			25	18	5	2		
3	C	1	Total	C	N	O	0	0
			25	18	5	2		

- Molecule 4 is MONOTHIOGLYCEROL (three-letter code: SGM) (formula:  $C_3H_8O_2S$ ).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	B	1	Total	C	O	S	0	0
			6	3	2	1		
4	D	1	Total	C	O	S	0	0
			6	3	2	1		

- Molecule 5 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	B	1	Total	Mg	0	0
			1	1		

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	144	Total	O	0	0
			144	144		
6	B	132	Total	O	0	0
			132	132		

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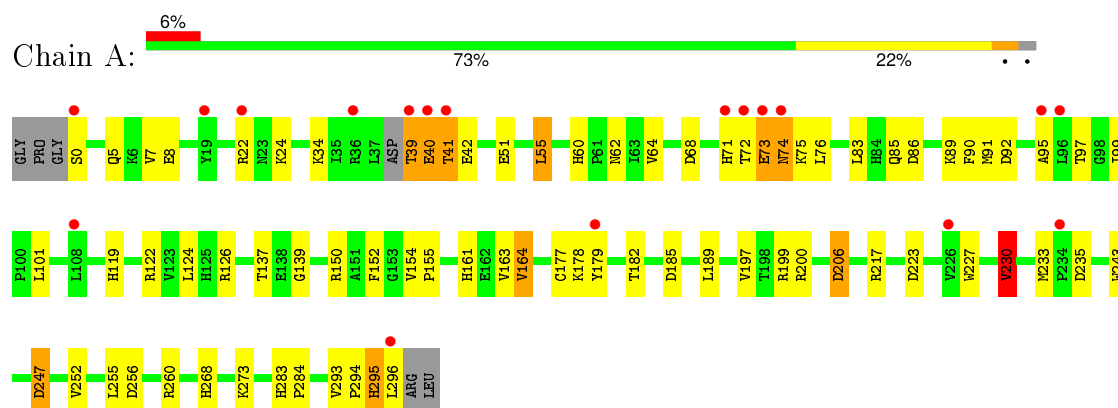
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	C	41	Total	O	0	0
			41	41		
6	D	24	Total	O	0	0
			24	24		

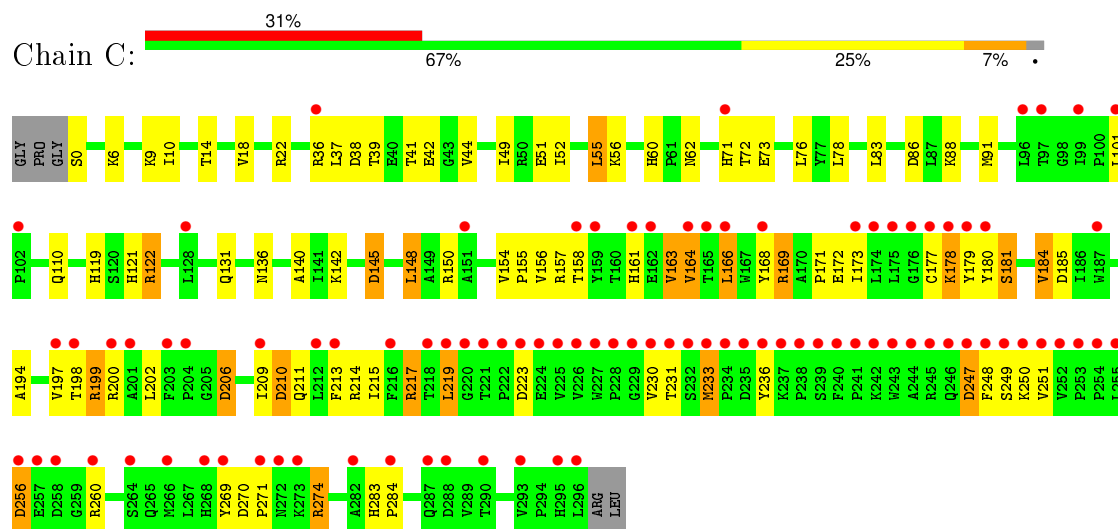
### 3 Residue-property plots [i](#)

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.

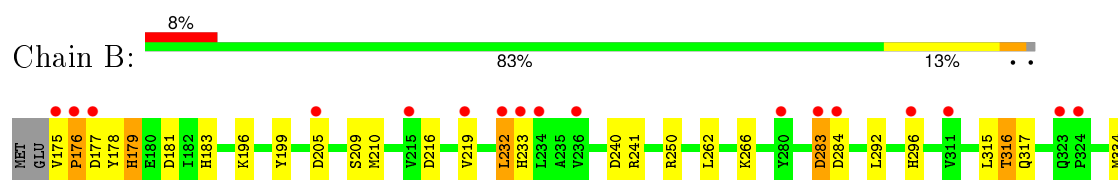
#### • Molecule 1: CELL DIVISION PROTEIN KINASE 2

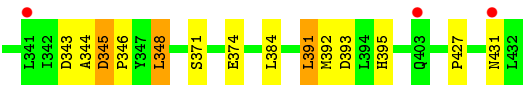


#### • Molecule 1: CELL DIVISION PROTEIN KINASE 2

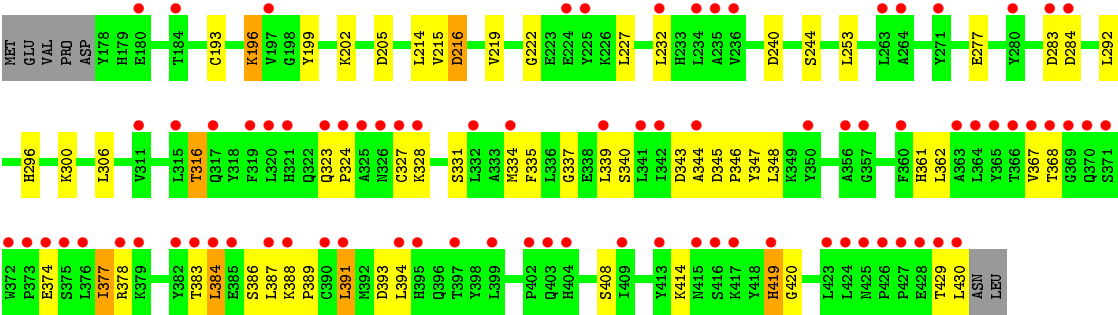


#### • Molecule 2: CYCLIN A2





● Molecule 2: CYCLIN A2





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	74.12Å 134.73Å 148.24Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	100.00 – 2.10 35.95 – 2.10	Depositor EDS
% Data completeness (in resolution range)	98.7 (100.00-2.10) 98.6 (35.95-2.10)	Depositor EDS
$R_{merge}$	0.08	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.60 (at 2.10Å)	Xtriage
Refinement program	REFMAC	Depositor
R, $R_{free}$	0.233 , 0.276 0.232 , 0.272	Depositor DCC
$R_{free}$ test set	4305 reflections (5.26%)	DCC
Wilson B-factor (Å <sup>2</sup> )	29.0	Xtriage
Anisotropy	0.153	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.38 , 53.7	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.47$ , $\langle L^2 \rangle = 0.30$	Xtriage
Outliers	0 of 86090 reflections	Xtriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	9318	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	36.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.08% 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: TPO, MG, N20, SGM

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	0.64	0/2451	0.84	10/3324 (0.3%)
1	C	0.50	0/2446	0.75	7/3319 (0.2%)
2	B	0.64	0/2147	0.77	10/2915 (0.3%)
2	D	0.48	0/2094	0.72	6/2842 (0.2%)
All	All	0.57	0/9138	0.77	33/12400 (0.3%)

There are no bond length outliers.

All (33) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	230	VAL	CB-CA-C	-6.99	98.12	111.40
1	C	210	ASP	CB-CG-OD2	6.78	124.40	118.30
1	A	247	ASP	CB-CG-OD2	6.76	124.38	118.30
1	A	86	ASP	CB-CG-OD2	6.47	124.12	118.30
1	C	86	ASP	CB-CG-OD2	6.37	124.03	118.30
2	B	240	ASP	CB-CG-OD2	6.01	123.71	118.30
1	A	256[A]	ASP	CB-CG-OD2	5.74	123.47	118.30
1	A	256[B]	ASP	CB-CG-OD2	5.74	123.47	118.30
2	D	343	ASP	CB-CG-OD2	5.70	123.43	118.30
1	A	223	ASP	CB-CG-OD2	5.66	123.40	118.30
2	D	393	ASP	CB-CG-OD2	5.62	123.36	118.30
1	A	92	ASP	CB-CG-OD2	5.60	123.34	118.30
2	D	283	ASP	CB-CG-OD2	5.55	123.29	118.30
1	A	235	ASP	CB-CG-OD2	5.54	123.29	118.30
2	B	205	ASP	CB-CG-OD2	5.49	123.24	118.30
2	D	205	ASP	CB-CG-OD2	5.47	123.23	118.30
2	B	343	ASP	CB-CG-OD2	5.46	123.21	118.30
2	B	181	ASP	CB-CG-OD2	5.36	123.13	118.30
2	B	283	ASP	CB-CG-OD2	5.30	123.07	118.30
1	A	206	ASP	CB-CG-OD2	5.28	123.05	118.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	216	ASP	CB-CG-OD2	5.24	123.02	118.30
1	C	206	ASP	CB-CG-OD2	5.23	123.00	118.30
1	C	223	ASP	CB-CG-OD2	5.20	122.98	118.30
2	D	240	ASP	CB-CG-OD2	5.19	122.97	118.30
2	B	393	ASP	CB-CG-OD2	5.18	122.96	118.30
1	C	256	ASP	CB-CG-OD2	5.10	122.89	118.30
1	C	38	ASP	CB-CG-OD2	5.08	122.88	118.30
1	C	247	ASP	CB-CG-OD2	5.06	122.85	118.30
2	B	391	LEU	CA-CB-CG	5.05	126.92	115.30
2	B	345	ASP	CB-CG-OD2	5.05	122.84	118.30
2	D	216	ASP	CB-CG-OD2	5.05	122.84	118.30
1	A	68	ASP	CB-CG-OD2	5.02	122.82	118.30
2	B	241	ARG	NE-CZ-NH2	-5.02	117.79	120.30

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	2388	0	2428	45	1
1	C	2392	0	2432	54	0
2	B	2089	0	2112	31	1
2	D	2045	0	2070	35	0
3	A	25	0	20	3	0
3	C	25	0	20	2	0
4	B	6	0	7	0	0
4	D	6	0	8	1	0
5	B	1	0	0	0	0
6	A	144	0	0	6	0
6	B	132	0	0	8	0
6	C	41	0	0	4	0
6	D	24	0	0	0	0
All	All	9318	0	9097	158	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 (158) 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)
2:B:210:MET:HE3	2:B:250:ARG:HB2	1.45	0.95
2:B:210:MET:CE	2:B:250:ARG:HB2	2.07	0.84
1:A:60:HIS:HD2	1:A:62:ASN:H	1.26	0.84
1:A:227:TRP:O	1:A:230:VAL:HG22	1.84	0.77
1:C:39:THR:HG21	6:C:2023:HOH:O	1.85	0.77
2:D:222:GLY:HA2	2:D:227:LEU:HD12	1.66	0.76
1:A:60:HIS:CD2	1:A:62:ASN:H	2.02	0.76
2:B:177:ASP:OD2	6:B:2015:HOH:O	2.05	0.74
1:A:71:HIS:CD2	1:A:76:LEU:HD13	2.23	0.74
1:A:154:VAL:O	2:B:316:THR:HG23	1.91	0.70
1:C:60:HIS:HD2	1:C:62:ASN:H	1.38	0.70
1:C:71:HIS:NE2	2:D:296:HIS:CE1	2.60	0.70
2:B:315:LEU:HD12	2:B:334[A]:MET:CE	2.23	0.69
2:B:315:LEU:CD1	2:B:334[A]:MET:HE2	2.23	0.68
2:D:335:PHE:CZ	2:D:339:LEU:HD11	2.29	0.68
1:C:60:HIS:CD2	1:C:62:ASN:H	2.12	0.68
1:C:168:TYR:O	6:C:2036:HOH:O	2.13	0.67
2:B:315:LEU:HD13	2:B:334[A]:MET:HE2	1.77	0.67
2:B:344:ALA:HB1	2:B:348:LEU:HD22	1.77	0.67
1:A:154:VAL:O	2:B:316:THR:CG2	2.43	0.66
1:A:295:HIS:ND1	1:A:295:HIS:N	2.43	0.66
2:D:193:CYS:SG	4:D:1193:SGM:S1	2.55	0.64
1:A:161:HIS:HD2	6:A:2087:HOH:O	1.81	0.63
1:A:268:HIS:CD2	1:A:273:LYS:HB2	2.34	0.63
1:A:89:LYS:HD2	6:A:2144:HOH:O	1.98	0.62
2:B:219:VAL:HG22	2:B:232:LEU:HD11	1.81	0.62
2:B:315:LEU:CD1	2:B:334[A]:MET:CE	2.78	0.61
1:C:52:ILE:HD11	1:C:78:LEU:HD21	1.81	0.61
1:C:83:LEU:HD11	1:C:142:LYS:HD2	1.83	0.61
2:B:210:MET:HE3	2:B:250:ARG:CB	2.25	0.61
1:A:177:CYS:SG	1:A:179:TYR:O	2.53	0.60
1:A:74:ASN:N	1:A:74:ASN:OD1	2.35	0.59
1:A:137:THR:O	1:A:293:VAL:HG13	2.02	0.59
1:C:156:VAL:HG21	1:C:180:TYR:O	2.02	0.58
2:D:414:LYS:HA	2:D:420:GLY:HA2	1.85	0.58
1:A:197:VAL:HG11	1:A:252:VAL:CG1	2.33	0.58
2:B:183:HIS:HB2	2:B:317:GLN:HE22	1.67	0.58
1:C:71:HIS:CD2	2:D:296:HIS:CE1	2.92	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:260:ARG:HD3	6:C:2039:HOH:O	2.03	0.57
2:D:344:ALA:HB1	2:D:348:LEU:HD22	1.87	0.56
2:B:175:VAL:N	2:B:179:HIS:HE1	2.02	0.56
1:C:213:PHE:O	1:C:217:ARG:HB2	2.04	0.56
2:D:337:GLY:O	2:D:340:SER:OG	2.23	0.56
2:B:395:HIS:HE1	2:B:427:PRO:O	1.89	0.56
1:C:177:CYS:C	1:C:179:TYR:H	2.09	0.55
1:C:219:LEU:HB2	1:C:269:TYR:HE2	1.72	0.55
1:C:177:CYS:O	1:C:179:TYR:N	2.40	0.55
2:D:347:TYR:OH	2:D:394:LEU:HA	2.08	0.54
2:D:388:LYS:HB3	2:D:389:PRO:HD3	1.88	0.54
2:B:175:VAL:O	6:B:2012:HOH:O	2.19	0.54
1:C:51:GLU:O	1:C:55:LEU:HB2	2.07	0.54
1:C:88:LYS:HE3	1:C:131:GLN:NE2	2.23	0.54
1:C:177:CYS:C	1:C:179:TYR:N	2.61	0.53
1:C:88:LYS:HB2	1:C:131:GLN:HE21	1.73	0.53
1:C:163:VAL:HG13	1:C:164:VAL:HG23	1.89	0.53
2:B:316:THR:HG21	6:B:2005:HOH:O	2.08	0.53
1:A:154:VAL:HG13	2:B:179:HIS:CE1	2.45	0.52
2:D:383:THR:O	2:D:386:SER:N	2.42	0.52
1:A:64:VAL:HG21	3:A:1298:N20:C8	2.40	0.52
1:C:219:LEU:HB2	1:C:269:TYR:CE2	2.45	0.52
1:A:126:ARG:HB3	1:A:163:VAL:HG22	1.91	0.52
1:A:95:ALA:HA	6:A:2044:HOH:O	2.11	0.51
1:A:197:VAL:HG11	1:A:252:VAL:HG12	1.93	0.51
1:C:72:THR:HG22	1:C:73:GLU:N	2.26	0.51
1:C:172:GLU:CD	1:C:274:ARG:HH22	2.13	0.51
3:A:1298:N20:N1	3:A:1298:N20:H18	2.26	0.50
2:B:233:HIS:HE1	6:B:2089:HOH:O	1.93	0.50
1:A:39:THR:C	1:A:41:THR:H	2.15	0.50
1:A:119:HIS:HD2	6:B:2016:HOH:O	1.94	0.50
1:C:83:LEU:HD23	1:C:136:ASN:HB3	1.94	0.49
1:A:227:TRP:CE3	1:A:230:VAL:HG13	2.47	0.49
1:A:5:GLN:HB2	1:A:24:LYS:HE2	1.94	0.49
1:C:181:SER:O	1:C:184:VAL:HG13	2.12	0.49
2:D:374:GLU:HA	2:D:377:ILE:HG13	1.94	0.48
1:C:71:HIS:CD2	1:C:76:LEU:HD13	2.48	0.48
1:A:126:ARG:HB3	1:A:163:VAL:CG2	2.43	0.48
2:D:361:HIS:HD2	2:D:391:LEU:HD21	1.77	0.48
1:C:154:VAL:O	2:D:316:THR:HB	2.13	0.48
2:B:175:VAL:O	2:B:177:ASP:N	2.46	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:119:HIS:CD2	1:A:182:THR:HB	2.48	0.48
1:C:110:GLN:OE1	1:C:140:ALA:HA	2.13	0.48
2:D:216:ASP:OD2	2:D:408:SER:HB2	2.13	0.48
2:B:296:HIS:CD2	6:B:2067:HOH:O	2.66	0.48
1:A:163:VAL:HG13	1:A:164:VAL:HG23	1.96	0.48
1:C:49:ILE:HG23	2:D:306:LEU:HD12	1.95	0.48
1:C:71:HIS:CE1	2:D:296:HIS:NE2	2.82	0.47
1:A:72:THR:HG22	1:A:73:GLU:H	1.79	0.47
1:C:155:PRO:HD2	2:D:316:THR:HG22	1.95	0.47
1:C:42:GLU:HB3	6:C:2013:HOH:O	2.13	0.47
2:D:419:HIS:N	2:D:419:HIS:ND1	2.62	0.47
2:B:175:VAL:N	2:B:179:HIS:CE1	2.81	0.47
1:A:51:GLU:O	1:A:55:LEU:HB2	2.15	0.47
2:D:367:VAL:HG12	2:D:368:THR:HG23	1.96	0.47
1:A:139:GLY:HA2	1:A:294:PRO:HD3	1.97	0.46
1:C:10:ILE:HD12	1:C:18:VAL:HG12	1.97	0.46
1:A:124:LEU:HG	1:A:152:PHE:CD1	2.51	0.46
2:B:296:HIS:NE2	6:B:2065:HOH:O	2.36	0.46
3:C:1298:N20:C18	3:C:1298:N20:N1	2.78	0.46
1:A:85:GLN:HE21	1:A:90:PHE:HB2	1.81	0.45
1:A:283:HIS:CG	1:A:284:PRO:HD2	2.51	0.45
1:C:62:ASN:HA	1:C:142:LYS:HG2	1.98	0.45
2:D:196:LYS:HB3	2:D:244:SER:HB3	1.99	0.45
2:B:176:PRO:HA	2:B:179:HIS:CG	2.52	0.45
1:C:211:GLN:O	1:C:215:ILE:HG12	2.17	0.45
1:A:126:ARG:HD2	1:A:163:VAL:HG21	1.99	0.44
2:B:345:ASP:HA	2:B:346:PRO:HA	1.74	0.44
1:C:119:HIS:HE1	1:C:185:ASP:OD2	2.00	0.44
1:C:194:ALA:CB	1:C:202:LEU:HD22	2.48	0.44
1:C:248:PHE:HA	1:C:251:VAL:HG23	2.00	0.44
1:A:7:VAL:HG12	1:A:8:GLU:HG2	1.99	0.44
1:C:231:THR:HA	1:C:236:TYR:CD1	2.52	0.44
1:C:161:HIS:CD2	1:C:173:ILE:HG22	2.53	0.44
1:A:268:HIS:CD2	6:A:2130:HOH:O	2.70	0.44
2:B:183:HIS:HB2	2:B:317:GLN:NE2	2.32	0.44
1:C:71:HIS:CE1	2:D:296:HIS:CD2	3.06	0.43
2:D:344:ALA:O	2:D:348:LEU:HB2	2.18	0.43
3:A:1298:N20:N1	3:A:1298:N20:C18	2.79	0.43
1:A:260:ARG:HD3	6:A:2123:HOH:O	2.17	0.43
1:A:293:VAL:HG13	1:A:294:PRO:HD2	2.01	0.43
1:C:210:ASP:O	1:C:214:ARG:HG3	2.18	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:262:LEU:HD11	2:B:266:LYS:HE3	1.99	0.43
1:C:166:LEU:HA	1:C:169:ARG:HH21	1.83	0.43
1:A:177:CYS:HB2	1:A:233:MET:CE	2.48	0.43
1:C:88:LYS:HA	1:C:91:MET:HE2	2.01	0.43
1:C:161:HIS:HD2	1:C:173:ILE:HG22	1.83	0.43
1:C:37:LEU:HD22	1:C:44:VAL:HG22	2.00	0.43
3:C:1298:N20:H18	3:C:1298:N20:N1	2.34	0.43
2:D:215:VAL:O	2:D:219:VAL:HG23	2.18	0.43
2:D:323:GLN:OE1	2:D:323:GLN:HA	2.19	0.43
1:C:283:HIS:CG	1:C:284:PRO:HD2	2.54	0.43
1:C:71:HIS:NE2	2:D:296:HIS:NE2	2.67	0.43
2:B:199:TYR:CE2	2:B:348:LEU:HD21	2.54	0.43
1:C:14:THR:HG23	1:C:145:ASP:OD2	2.19	0.43
1:A:91:MET:HG2	1:A:99:ILE:HD11	2.01	0.42
1:A:60:HIS:HD2	1:A:62:ASN:N	2.07	0.42
1:C:177:CYS:HB2	1:C:233:MET:CE	2.50	0.42
2:B:210:MET:CE	2:B:250:ARG:CB	2.87	0.42
1:A:154:VAL:HA	1:A:155:PRO:HA	1.86	0.42
2:D:335:PHE:CE2	2:D:339:LEU:HD11	2.54	0.42
6:A:2039:HOH:O	2:D:202:LYS:HE2	2.20	0.42
2:D:327:CYS:HB3	2:D:419:HIS:CD2	2.54	0.42
2:D:196:LYS:HG2	2:D:199:TYR:HB3	2.01	0.42
2:D:323:GLN:HA	2:D:324:PRO:HA	1.76	0.42
1:C:121:HIS:C	1:C:122:ARG:HG3	2.40	0.42
1:C:169:ARG:HB2	1:C:169:ARG:HE	1.59	0.41
2:D:345:ASP:HA	2:D:346:PRO:HA	1.76	0.41
1:C:270:ASP:O	1:C:271:PRO:C	2.58	0.41
1:A:41:THR:HB	1:A:42:GLU:H	1.60	0.41
1:A:217:ARG:HG2	1:A:243:TRP:CE2	2.55	0.41
2:D:214:LEU:HD22	2:D:253:LEU:HG	2.03	0.41
1:A:217:ARG:HG2	1:A:243:TRP:CD2	2.56	0.41
1:C:148:LEU:HD12	1:C:148:LEU:HA	1.86	0.41
2:B:178:TYR:N	6:B:2012:HOH:O	2.23	0.41
1:A:119:HIS:HE1	1:A:185:ASP:OD2	2.04	0.41
1:C:198:THR:O	1:C:199:ARG:HB2	2.21	0.41
2:D:386:SER:C	2:D:388:LYS:H	2.24	0.40
2:D:361:HIS:CD2	2:D:391:LEU:HD21	2.56	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:A:199:ARG:NH2	2:B:374:GLU:OE2[4_456]	2.07	0.13

## 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	294/302 (97%)	283 (96%)	9 (3%)	2 (1%)	26	21
1	C	295/302 (98%)	270 (92%)	19 (6%)	6 (2%)	9	4
2	B	258/260 (99%)	254 (98%)	3 (1%)	1 (0%)	39	37
2	D	251/260 (96%)	236 (94%)	13 (5%)	2 (1%)	24	17
All	All	1098/1124 (98%)	1043 (95%)	44 (4%)	11 (1%)	19	13

All (11) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	176	PRO
1	C	164	VAL
1	C	166	LEU
1	C	178	LYS
1	A	40	GLU
1	A	164	VAL
1	C	145	ASP
2	D	387	LEU
1	C	199	ARG
2	D	384	LEU
1	C	171	PRO

### 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	263/264 (100%)	239 (91%)	24 (9%)	12	7
1	C	262/264 (99%)	230 (88%)	32 (12%)	6	3
2	B	234/234 (100%)	220 (94%)	14 (6%)	24	20
2	D	227/234 (97%)	209 (92%)	18 (8%)	15	11
All	All	986/996 (99%)	898 (91%)	88 (9%)	12	8

All (88) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	0	SER
1	A	22	ARG
1	A	34	LYS
1	A	39	THR
1	A	40	GLU
1	A	41	THR
1	A	55	LEU
1	A	73	GLU
1	A	74	ASN
1	A	75	LYS
1	A	83	LEU
1	A	97	THR
1	A	101	LEU
1	A	122	ARG
1	A	150	ARG
1	A	178	LYS
1	A	189	LEU
1	A	200	ARG
1	A	206	ASP
1	A	230	VAL
1	A	247	ASP
1	A	255	LEU
1	A	295	HIS
1	A	296	LEU
2	B	179	HIS
2	B	196	LYS
2	B	209	SER
2	B	232	LEU
2	B	283	ASP
2	B	284	ASP

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Mol	Chain	Res	Type
2	B	292	LEU
2	B	316	THR
2	B	348	LEU
2	B	371	SER
2	B	384	LEU
2	B	391	LEU
2	B	392	MET
2	B	431	ASN
1	C	0	SER
1	C	6	LYS
1	C	9	LYS
1	C	22	ARG
1	C	36	ARG
1	C	41	THR
1	C	55	LEU
1	C	56	LYS
1	C	101	LEU
1	C	122	ARG
1	C	148	LEU
1	C	150	ARG
1	C	157	ARG
1	C	158	THR
1	C	163	VAL
1	C	169	ARG
1	C	178	LYS
1	C	181	SER
1	C	184	VAL
1	C	197	VAL
1	C	200	ARG
1	C	206	ASP
1	C	209	ILE
1	C	217	ARG
1	C	219	LEU
1	C	230	VAL
1	C	233	MET
1	C	247	ASP
1	C	249	SER
1	C	250	LYS
1	C	256	ASP
1	C	274	ARG
2	D	196	LYS
2	D	232	LEU

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Mol	Chain	Res	Type
2	D	277	GLU
2	D	284	ASP
2	D	292	LEU
2	D	300	LYS
2	D	316	THR
2	D	328	LYS
2	D	331	SER
2	D	334	MET
2	D	362	LEU
2	D	377	ILE
2	D	378	ARG
2	D	384	LEU
2	D	391	LEU
2	D	419	HIS
2	D	429	THR
2	D	430	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (17) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	60	HIS
1	A	71	HIS
1	A	85	GLN
1	A	119	HIS
1	A	161	HIS
1	A	268	HIS
2	B	179	HIS
2	B	233	HIS
2	B	296	HIS
2	B	317	GLN
2	B	395	HIS
1	C	60	HIS
1	C	119	HIS
1	C	131	GLN
1	C	161	HIS
2	D	296	HIS
2	D	361	HIS

### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

2 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$
1	TPO	A	160	1	8,10,11	1.29	1 (12%)	7,14,16	1.11	1 (14%)
1	TPO	C	160	1	8,10,11	1.09	1 (12%)	7,14,16	1.04	1 (14%)

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
1	TPO	A	160	1	-	0/8/11/13	0/0/0/0
1	TPO	C	160	1	-	0/8/11/13	0/0/0/0

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	160	TPO	P-O1P	2.30	1.58	1.51
1	A	160	TPO	P-O1P	3.05	1.61	1.51

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	160	TPO	O-C-CA	-2.19	119.66	125.44
1	C	160	TPO	O-C-CA	-2.06	120.01	125.44

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

There are no carbohydrates in this entry.

## 5.6 Ligand geometry

Of 5 ligands modelled in this entry, 1 is monoatomic - leaving 4 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# $ Z  > 2$	Counts	RMSZ	# $ Z  > 2$
3	N20	A	1298	-	25,28,28	1.19	4 (16%)	29,38,38	1.82	7 (24%)
4	SGM	B	1193	-	5,5,5	0.74	0	5,5,5	0.45	0
3	N20	C	1298	-	25,28,28	0.88	0	29,38,38	1.97	7 (24%)
4	SGM	D	1193	-	5,5,5	0.36	0	5,5,5	0.82	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
3	N20	A	1298	-	-	0/9/17/17	0/4/4/4
4	SGM	B	1193	-	-	0/4/4/4	0/0/0/0
3	N20	C	1298	-	-	0/9/17/17	0/4/4/4
4	SGM	D	1193	-	-	0/4/4/4	0/0/0/0

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	1298	N20	C17-N2	-2.24	1.35	1.40
3	A	1298	N20	C6-N1	2.04	1.35	1.31
3	A	1298	N20	C4-N9	2.58	1.39	1.34
3	A	1298	N20	O6-C6	3.16	1.37	1.35

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	1298	N20	C5-C6-N1	-3.56	117.53	123.81
3	C	1298	N20	N3-C2-N1	-3.52	120.82	126.22
3	A	1298	N20	N3-C2-N1	-3.03	121.58	126.22
3	C	1298	N20	C5-C6-N1	-2.93	118.64	123.81
3	C	1298	N20	C17-N2-C2	-2.17	123.44	129.19
3	A	1298	N20	C15-C16-C11	-2.13	108.78	112.22
3	A	1298	N20	C10-O6-C6	2.21	119.54	117.23
3	C	1298	N20	O6-C6-C5	3.11	119.93	115.07
3	A	1298	N20	O6-C6-C5	3.44	120.44	115.07
3	A	1298	N20	C2-N3-C4	3.58	119.40	115.09
3	C	1298	N20	C2-N3-C4	4.10	120.03	115.09
3	C	1298	N20	C10-O6-C6	4.44	121.87	117.23
3	C	1298	N20	C2-N1-C6	5.24	122.79	115.32
3	A	1298	N20	C2-N1-C6	5.44	123.08	115.32

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

3 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	1298	N20	3	0
3	C	1298	N20	2	0
4	D	1193	SGM	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	295/302 (97%)	0.49	18 (6%) 25 33	12, 21, 45, 62	0
1	C	296/302 (98%)	1.72	93 (31%) 1 1	23, 46, 75, 79	0
2	B	258/260 (99%)	0.51	20 (7%) 16 22	11, 23, 41, 53	0
2	D	253/260 (97%)	1.66	82 (32%) 1 1	21, 49, 70, 76	0
All	All	1102/1124 (98%)	1.09	213 (19%) 2 2	11, 33, 69, 79	0

All (213) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	234	PRO	9.4
1	C	173	ILE	8.1
2	B	175	VAL	7.7
1	C	243	TRP	7.6
1	C	229	GLY	7.4
1	C	253	PRO	7.1
2	D	384	LEU	7.0
1	C	233	MET	6.9
1	C	250	LYS	6.9
1	C	236	TYR	6.6
1	C	246	GLN	6.6
2	D	372	TRP	6.5
1	A	40	GLU	6.4
1	A	39	THR	6.1
1	C	232	SER	6.1
1	C	224	GLU	6.1
1	C	228	PRO	5.9
1	A	96	LEU	5.9
1	C	175	LEU	5.8
1	C	225	VAL	5.8
2	D	429	THR	5.8

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Mol	Chain	Res	Type	RSRZ
1	C	227	TRP	5.7
1	C	249	SER	5.7
1	C	248	PHE	5.7
2	D	280	TYR	5.5
2	D	399	LEU	5.4
2	D	367	VAL	5.4
1	C	295	HIS	5.4
2	D	423	LEU	5.4
2	D	430	LEU	5.3
1	C	231	THR	5.2
1	C	235	ASP	5.2
2	D	325	ALA	5.2
2	D	364	LEU	5.1
2	D	391	LEU	5.0
2	B	323	GLN	4.9
1	C	247	ASP	4.9
2	D	428	GLU	4.9
1	C	245	ARG	4.9
1	A	73	GLU	4.8
2	D	368	THR	4.8
2	D	427	PRO	4.8
1	C	273	LYS	4.8
2	D	320	LEU	4.7
2	D	360	PHE	4.7
1	C	244	ALA	4.6
1	C	166	LEU	4.6
2	D	324	PRO	4.5
1	C	251	VAL	4.5
1	C	223	ASP	4.5
2	D	284	ASP	4.5
2	D	388	LYS	4.4
1	C	230	VAL	4.4
2	D	424	LEU	4.3
2	D	395	HIS	4.3
2	D	327	CYS	4.2
2	B	284	ASP	4.2
2	D	416	SER	4.2
1	C	238	PRO	4.1
1	C	101	LEU	4.1
1	C	256	ASP	4.1
1	C	178	LYS	4.0
1	C	221	THR	4.0

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Mol	Chain	Res	Type	RSRZ
2	D	382	TYR	4.0
2	D	369	GLY	4.0
1	C	241	PRO	3.9
1	C	242	LYS	3.9
1	C	219	LEU	3.9
1	C	293	VAL	3.9
1	C	174	LEU	3.8
2	D	373	PRO	3.8
1	C	180	TYR	3.8
1	C	288	ASP	3.7
1	C	220	GLY	3.7
2	D	363	ALA	3.7
2	D	375	SER	3.7
1	C	258	ASP	3.7
1	C	159	TYR	3.6
1	C	213	PHE	3.6
2	D	197	VAL	3.6
1	C	102	PRO	3.6
1	A	36	ARG	3.6
2	D	419	HIS	3.6
2	D	366	THR	3.5
1	A	95	ALA	3.5
2	D	326	ASN	3.5
2	D	376	LEU	3.4
2	B	234	LEU	3.4
2	D	350	TYR	3.4
2	D	390	CYS	3.4
2	D	356	ALA	3.4
1	C	97	THR	3.3
1	C	257	GLU	3.3
2	D	283	ASP	3.3
1	C	296	LEU	3.3
2	D	328	LYS	3.3
2	D	341	LEU	3.3
1	C	254	PRO	3.3
1	C	282	ALA	3.2
1	C	226	VAL	3.2
1	C	271	PRO	3.2
1	C	99	ILE	3.2
2	D	180	GLU	3.2
2	D	365	TYR	3.2
1	C	237	LYS	3.2

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Mol	Chain	Res	Type	RSRZ
1	C	209	ILE	3.2
1	A	179	TYR	3.2
2	D	387	LEU	3.2
2	D	402	PRO	3.1
1	C	203	PHE	3.1
1	A	71	HIS	3.1
2	B	324	PRO	3.1
2	D	370	GLN	3.1
1	C	177	CYS	3.1
2	B	177	ASP	3.1
2	D	415	ASN	3.1
1	A	296	LEU	3.1
1	C	187	TRP	3.1
1	C	200	ARG	3.1
1	C	252	VAL	3.0
1	C	216	PHE	3.0
1	A	41	THR	3.0
2	D	378	ARG	3.0
1	C	179	TYR	3.0
2	D	311	VAL	3.0
1	A	72	THR	2.9
1	C	158	THR	2.9
1	C	198	THR	2.9
2	D	374	GLU	2.9
2	B	341	LEU	2.9
2	D	425	ASN	2.9
1	C	260	ARG	2.9
2	D	232	LEU	2.9
1	C	222	PRO	2.9
2	D	403	GLN	2.8
2	B	176	PRO	2.8
2	D	426	PRO	2.8
1	C	176	GLY	2.8
2	D	379	LYS	2.8
1	C	204	PRO	2.7
2	D	321	HIS	2.7
1	C	240	PHE	2.7
2	D	323	GLN	2.7
2	D	417	LYS	2.7
1	C	287	GLN	2.7
1	C	164	VAL	2.7
1	C	290	THR	2.7

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Mol	Chain	Res	Type	RSRZ
1	C	128	LEU	2.7
2	B	283	ASP	2.7
1	C	239	SER	2.7
1	A	0	SER	2.6
1	C	268	HIS	2.6
2	D	184	THR	2.6
1	C	266	MET	2.6
1	C	272	ASN	2.6
1	C	269	TYR	2.6
2	D	332	LEU	2.6
1	C	255	LEU	2.6
1	C	165	THR	2.5
2	D	334	MET	2.5
1	A	74	ASN	2.5
2	D	385	GLU	2.5
1	C	71	HIS	2.5
1	C	218	THR	2.5
2	B	236	VAL	2.5
2	B	403	GLN	2.5
1	C	162	GLU	2.4
2	D	315	LEU	2.4
1	C	197	VAL	2.4
2	D	317	GLN	2.4
2	D	394	LEU	2.4
2	D	224	GLU	2.4
2	D	234	LEU	2.4
1	C	96	LEU	2.4
2	B	232	LEU	2.4
2	D	339	LEU	2.4
1	C	201	ALA	2.3
2	D	344	ALA	2.3
1	A	19	TYR	2.3
1	C	168	TYR	2.3
2	D	409	ILE	2.3
2	D	271	TYR	2.3
2	D	383	THR	2.3
1	C	36	ARG	2.3
1	A	108	LEU	2.3
2	B	233	HIS	2.2
2	D	371	SER	2.2
1	A	22	ARG	2.2
1	C	161	HIS	2.2

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Mol	Chain	Res	Type	RSRZ
2	D	397	THR	2.2
2	D	235	ALA	2.2
1	C	284	PRO	2.2
2	B	280	TYR	2.2
2	D	225	TYR	2.2
1	A	226	VAL	2.2
2	B	215	VAL	2.2
2	B	219	VAL	2.2
2	B	431	ASN	2.2
1	C	264	SER	2.1
2	B	205	ASP	2.1
2	D	413	TYR	2.1
2	D	264	ALA	2.1
2	D	319	PHE	2.1
2	B	311	VAL	2.1
2	D	236	VAL	2.1
1	C	151	ALA	2.1
1	C	212	LEU	2.1
2	D	404	HIS	2.1
1	A	234	PRO	2.0
2	D	263	LEU	2.0
2	B	296	HIS	2.0
2	D	357	GLY	2.0
2	D	342	ILE	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
1	TPO	C	160	11/12	0.92	0.16	-	39,48,51,52	0
1	TPO	A	160	11/12	0.99	0.10	-	14,18,19,20	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
4	SGM	B	1193	6/6	0.91	0.17	2.16	34,38,41,47	0
4	SGM	D	1193	6/6	0.85	0.18	1.08	51,54,55,55	0
3	N20	C	1298	25/25	0.94	0.14	0.03	29,35,38,42	0
3	N20	A	1298	25/25	0.96	0.12	-0.17	24,26,29,30	0
5	MG	B	1433	1/1	0.99	0.09	-1.12	35,35,35,35	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.