Full wwPDB X-ray Structure Validation Report ⓘ

Feb 8, 2024 – 09:44 AM EST

PDB ID	:	2HSD
Title	:	THE REFINED THREE-DIMENSIONAL STRUCTURE OF 3ALPHA,20BETA-HYDROXYSTEROID DEHYDROGENASE AND POSSIBLE ROLES OF THE RESIDUES CONSERVED IN SHORT-CHAIN DEHYDROGENASES
Authors	:	Ghosh, D.; Duax, W.L.
Deposited on	:	1994-03-28
Resolution	:	2.64 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*
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:

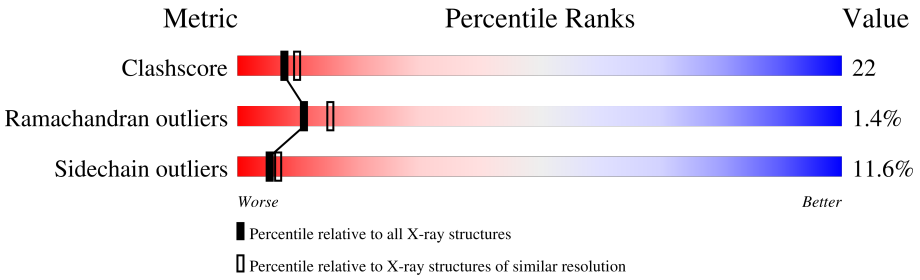
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

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 2.64 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	141614	1472 (2.66-2.62)
Ramachandran outliers	138981	1446 (2.66-2.62)
Sidechain outliers	138945	1446 (2.66-2.62)

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 <=5%

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	253	58% 36% 5% •
1	B	253	64% 31% •
1	C	253	57% 36% 7%
1	D	253	59% 35% 6%

2 Entry composition (i)

There are 2 unique types of molecules in this entry. The entry contains 7544 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.

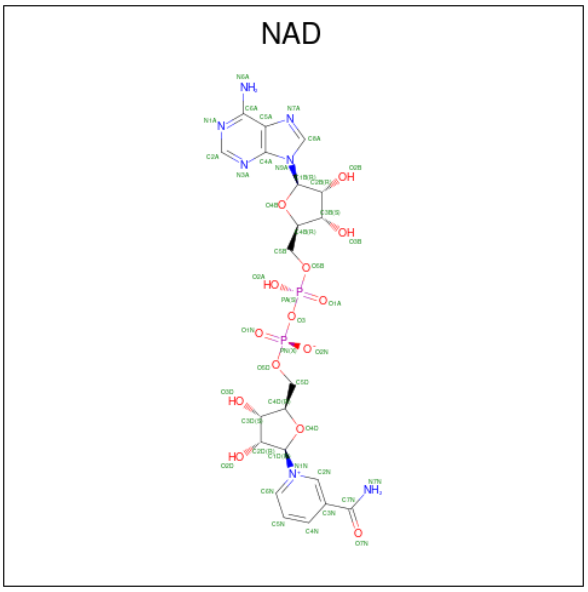
- Molecule 1 is a protein called 3-ALPHA, 20 BETA-HYDROXYSTEROID DEHYDROGENASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	253	Total	C	N	O	S	0	0	0
			1842	1144	323	367	8			
1	B	253	Total	C	N	O	S	0	0	0
			1842	1144	323	367	8			
1	C	253	Total	C	N	O	S	0	0	0
			1842	1144	323	367	8			
1	D	253	Total	C	N	O	S	0	0	0
			1842	1144	323	367	8			

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	109	GLU	ASP	conflict	UNP P19992
A	?	-	ASN	deletion	UNP P19992
B	109	GLU	ASP	conflict	UNP P19992
B	?	-	ASN	deletion	UNP P19992
C	109	GLU	ASP	conflict	UNP P19992
C	?	-	ASN	deletion	UNP P19992
D	109	GLU	ASP	conflict	UNP P19992
D	?	-	ASN	deletion	UNP P19992

- Molecule 2 is NICOTINAMIDE-ADENINE-DINUCLEOTIDE (three-letter code: NAD) (formula: $C_{21}H_{27}N_7O_{14}P_2$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			44	21	7	14	2		
2	B	1	Total	C	N	O	P	0	0
			44	21	7	14	2		
2	C	1	Total	C	N	O	P	0	0
			44	21	7	14	2		
2	D	1	Total	C	N	O	P	0	0
			44	21	7	14	2		

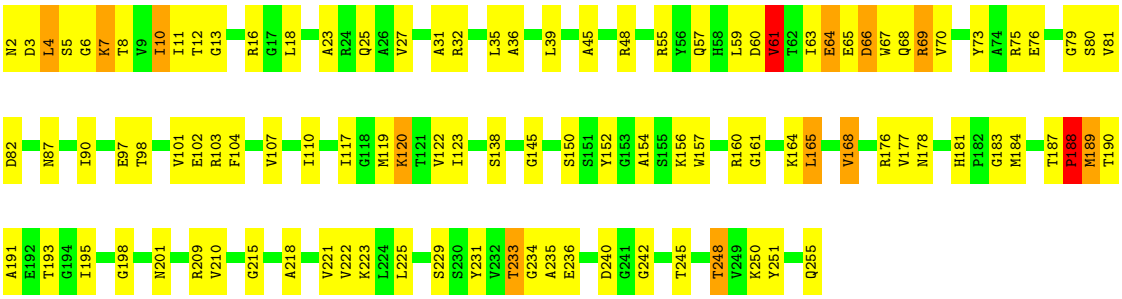
3 Residue-property plots (i)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. 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. 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.

Note EDS was not executed.

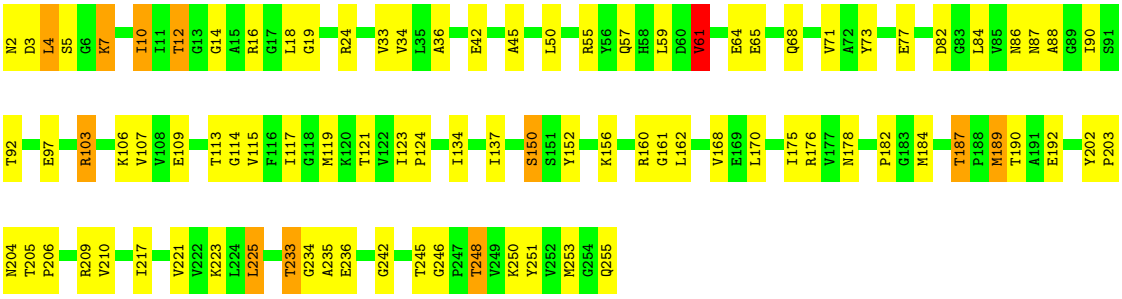
• Molecule 1: 3-ALPHA, 20 BETA-HYDROXYSTEROID DEHYDROGENASE

Chain A:



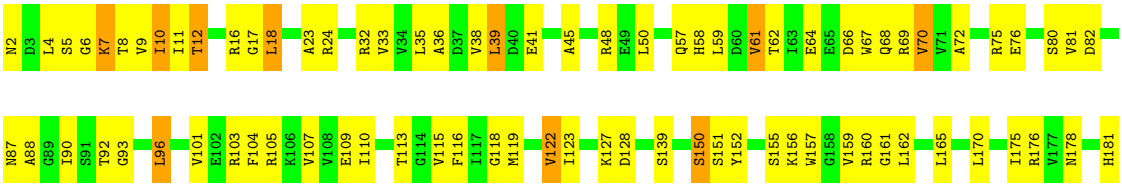
• Molecule 1: 3-ALPHA, 20 BETA-HYDROXYSTEROID DEHYDROGENASE

Chain B:



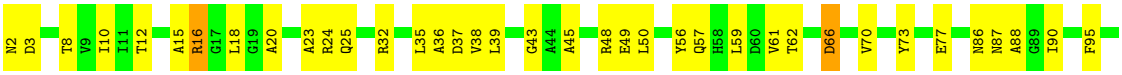
• Molecule 1: 3-ALPHA, 20 BETA-HYDROXYSTEROID DEHYDROGENASE

Chain C:



• Molecule 1: 3-ALPHA, 20 BETA-HYDROXYSTEROID DEHYDROGENASE

Chain D:



4 Data and refinement statistics (i)

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

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α, β, γ	106.20Å 106.20Å 203.80Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	8.00 – 2.64	Depositor
% Data completeness (in resolution range)	(Not available) (8.00-2.64)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	PROLSQ, X-PLOR	Depositor
R, R_{free}	0.188 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	7544	wwPDB-VP
Average B, all atoms (Å^2)	14.0	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: NAD

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	0.55	0/1867	0.79	1/2529 (0.0%)
1	B	0.60	0/1867	0.80	0/2529
1	C	0.58	0/1867	0.82	1/2529 (0.0%)
1	D	0.60	0/1867	0.78	0/2529
All	All	0.58	0/7468	0.80	2/10116 (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	C	0	1
1	D	0	2
All	All	0	3

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	C	96	LEU	CA-CB-CG	5.24	127.34	115.30
1	A	60	ASP	N-CA-C	-5.23	96.87	111.00

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	C	251	TYR	Sidechain
1	D	186	TYR	Sidechain

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Mol	Chain	Res	Type	Group
1	D	251	TYR	Sidechain

5.2 Too-close contacts (i)

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	1842	0	1835	110	0
1	B	1842	0	1835	70	0
1	C	1842	0	1835	96	0
1	D	1842	0	1835	84	0
2	A	44	0	26	3	0
2	B	44	0	26	3	0
2	C	44	0	26	7	0
2	D	44	0	26	1	0
All	All	7544	0	7444	326	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 22.

All (326) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:90:ILE:HD11	1:A:107:VAL:HA	1.42	1.00
1:C:92:THR:HA	1:C:103:ARG:NH2	1.91	0.85
1:A:59:LEU:HD12	1:A:66:ASP:HB2	1.58	0.84
1:D:12:THR:HG22	1:D:88:ALA:HB2	1.60	0.83
1:D:45:ALA:O	1:D:49:GLU:HG2	1.79	0.82
1:A:251:TYR:HA	1:A:255:GLN:HB2	1.60	0.82
1:D:59:LEU:HD22	1:D:70:VAL:HG11	1.61	0.81
1:B:113:THR:O	1:B:117:ILE:HG13	1.79	0.81
1:D:178:ASN:HD22	1:D:235:ALA:H	1.28	0.80
1:B:113:THR:HG21	1:D:105:ARG:HD2	1.64	0.80
1:C:190:THR:HA	1:C:193:THR:HG22	1.64	0.78
1:C:92:THR:HA	1:C:103:ARG:HH21	1.47	0.75
1:A:57:GLN:HB3	1:A:70:VAL:HG22	1.67	0.75
1:D:178:ASN:ND2	1:D:235:ALA:H	1.84	0.74

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:24:ARG:HA	1:B:50:LEU:HD21	1.69	0.73
1:C:64:GLU:O	1:C:68:GLN:HG3	1.89	0.72
1:A:190:THR:O	1:A:193:THR:HB	1.90	0.72
1:B:242:GLY:O	1:B:245:THR:HG22	1.90	0.71
1:B:2:ASN:OD1	1:C:2:ASN:HA	1.91	0.70
1:D:24:ARG:HG2	1:D:50:LEU:HD21	1.73	0.70
1:A:117:ILE:HG12	1:C:101:VAL:HG11	1.73	0.70
1:A:234:GLY:HA3	1:D:245:THR:HG21	1.73	0.69
1:D:104:PHE:CD1	1:D:151:SER:HB3	2.27	0.69
1:D:188:PRO:HA	1:D:191:ALA:HB3	1.75	0.69
1:A:12:THR:O	1:A:87:ASN:HB3	1.92	0.68
1:A:2:ASN:HB3	1:D:2:ASN:ND2	2.08	0.67
1:A:248:THR:HG22	1:A:251:TYR:HB2	1.75	0.67
1:B:119:MET:O	1:B:123:ILE:HG13	1.94	0.67
1:B:234:GLY:HA3	1:C:245:THR:HG21	1.74	0.67
1:C:72:ALA:O	1:C:76:GLU:HG2	1.94	0.67
1:A:3:ASP:N	1:D:2:ASN:HA	2.10	0.67
1:B:178:ASN:HD22	1:B:235:ALA:H	1.43	0.67
1:C:189:MET:SD	1:C:189:MET:C	2.73	0.66
1:B:36:ALA:HA	1:B:57:GLN:O	1.95	0.66
1:A:187:THR:CG2	1:A:189:MET:HG3	2.25	0.66
1:A:177:VAL:H	1:A:233:THR:HG22	1.61	0.65
1:C:4:LEU:HG	1:C:5:SER:N	2.12	0.65
1:B:7:LYS:HB2	1:B:82:ASP:HB2	1.77	0.65
1:D:112:LEU:O	1:D:115:VAL:HG12	1.96	0.65
1:C:23:ALA:CB	1:C:35:LEU:HD21	2.27	0.65
1:A:10:ILE:HD12	1:A:11:ILE:N	2.12	0.64
1:A:69:ARG:HH11	1:A:69:ARG:HB3	1.62	0.64
1:A:255:GLN:HB3	1:B:204:ASN:HD21	1.61	0.64
1:A:23:ALA:O	1:A:27:VAL:HG23	1.99	0.63
1:B:18:LEU:HB2	2:B:256:NAD:H51N	1.79	0.63
1:A:187:THR:HG23	1:A:189:MET:HG3	1.80	0.63
1:D:184:MET:HB3	1:D:210:VAL:CG2	2.28	0.63
1:C:12:THR:HG23	1:C:88:ALA:CB	2.29	0.63
1:A:36:ALA:HA	1:A:57:GLN:O	2.00	0.62
1:C:23:ALA:HB1	1:C:35:LEU:HD21	1.79	0.62
1:A:231:TYR:HB2	1:D:216:GLU:OE1	1.99	0.62
1:A:255:GLN:OE1	1:B:255:GLN:HB3	2.00	0.62
1:D:182:PRO:CB	1:D:217:ILE:HD13	2.30	0.61
1:D:182:PRO:HB3	1:D:217:ILE:HD13	1.82	0.61
1:C:101:VAL:O	1:C:105:ARG:HG3	2.01	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:7:LYS:NZ	1:C:7:LYS:HB3	2.15	0.61
1:A:255:GLN:HG2	1:B:255:GLN:HG2	1.83	0.61
1:B:61:VAL:HG13	1:B:114:GLY:HA3	1.84	0.60
1:C:81:VAL:HG11	1:C:122:VAL:CG2	2.31	0.60
1:A:189:MET:SD	1:A:189:MET:C	2.80	0.60
1:D:250:LYS:HG2	1:D:255:GLN:HB2	1.83	0.60
1:C:90:ILE:HD13	1:C:110:ILE:HD12	1.84	0.59
1:D:66:ASP:O	1:D:70:VAL:HG12	2.03	0.59
1:C:240:ASP:OD2	1:C:244:THR:HB	2.03	0.59
1:B:187:THR:HG23	1:B:190:THR:H	1.66	0.59
1:B:12:THR:O	1:B:87:ASN:HB3	2.03	0.58
1:D:62:THR:HG22	1:D:109:GLU:HG3	1.85	0.58
1:D:73:TYR:CZ	1:D:77:GLU:HG3	2.38	0.58
1:C:155:SER:O	1:C:159:VAL:HG23	2.04	0.58
1:A:64:GLU:O	1:A:68:GLN:HG3	2.04	0.58
1:C:45:ALA:O	1:C:48:ARG:HB3	2.04	0.58
1:A:223:LYS:HG3	1:D:223:LYS:HG3	1.85	0.58
1:D:121:THR:O	1:D:124:PRO:HD2	2.04	0.58
1:A:7:LYS:HA	1:A:32:ARG:HH21	1.69	0.57
1:A:195:ILE:HG23	1:A:210:VAL:HG11	1.86	0.57
1:A:119:MET:HE3	1:A:177:VAL:HG11	1.86	0.57
1:B:71:VAL:HG21	1:B:121:THR:HG22	1.86	0.57
1:C:90:ILE:HD11	1:C:107:VAL:HA	1.86	0.57
1:D:176:ARG:HA	1:D:233:THR:HG23	1.86	0.57
1:A:161:GLY:HA3	1:C:157:TRP:CG	2.39	0.57
1:C:170:LEU:HB3	1:C:175:ILE:HB	1.86	0.57
1:A:90:ILE:HD13	1:A:110:ILE:HD12	1.86	0.56
1:B:170:LEU:HB3	1:B:175:ILE:HB	1.87	0.56
1:D:36:ALA:HA	1:D:57:GLN:O	2.05	0.56
1:B:97:GLU:HA	1:D:120:LYS:HG3	1.88	0.56
1:D:20:ALA:O	1:D:24:ARG:HG3	2.06	0.56
1:D:223:LYS:HE3	1:D:229:SER:HB3	1.86	0.56
1:D:12:THR:HG22	1:D:88:ALA:CB	2.34	0.56
1:C:187:THR:HG22	1:C:189:MET:H	1.70	0.56
1:A:2:ASN:HA	1:D:3:ASP:N	2.21	0.56
1:B:92:THR:OG1	1:B:103:ARG:NH2	2.38	0.56
1:C:190:THR:CA	1:C:193:THR:HG22	2.34	0.55
1:A:23:ALA:CB	1:A:35:LEU:HD21	2.36	0.55
1:C:178:ASN:HD22	1:C:235:ALA:H	1.53	0.55
1:D:104:PHE:CE1	1:D:151:SER:HA	2.42	0.55
1:B:64:GLU:O	1:B:68:GLN:HG3	2.06	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:77:GLU:O	1:B:77:GLU:HG3	2.07	0.55
1:A:2:ASN:HA	1:D:3:ASP:H	1.72	0.54
1:B:4:LEU:HG	1:B:5:SER:H	1.72	0.54
2:C:256:NAD:H52N	2:C:256:NAD:H2N	1.88	0.54
1:A:4:LEU:HG	1:A:5:SER:N	2.22	0.54
1:A:188:PRO:O	1:A:191:ALA:HB3	2.06	0.54
1:D:25:GLN:NE2	1:D:218:ALA:HB3	2.22	0.54
1:A:69:ARG:NH1	1:A:70:VAL:HG23	2.23	0.54
1:D:176:ARG:NH2	1:D:224:LEU:O	2.41	0.54
1:B:250:LYS:CE	1:B:255:GLN:HG3	2.38	0.54
1:A:13:GLY:CA	2:A:256:NAD:H4B	2.38	0.53
1:C:12:THR:HG22	1:C:87:ASN:H	1.72	0.53
1:A:6:GLY:H	1:A:7:LYS:HD2	1.72	0.53
1:A:98:THR:O	1:A:98:THR:HG22	2.08	0.53
1:D:86:ASN:CG	1:D:115:VAL:HG23	2.28	0.53
1:C:16:ARG:HD2	2:C:256:NAD:O2A	2.09	0.53
1:B:106:LYS:O	1:B:109:GLU:HB2	2.08	0.53
1:D:35:LEU:HD11	1:D:50:LEU:HD12	1.90	0.53
1:A:117:ILE:HG12	1:C:101:VAL:CG1	2.37	0.53
1:C:104:PHE:CD2	1:C:151:SER:HB3	2.44	0.53
1:B:4:LEU:HG	1:B:5:SER:N	2.24	0.53
1:B:24:ARG:HA	1:B:50:LEU:CD2	2.37	0.53
1:D:62:THR:CG2	1:D:109:GLU:HG3	2.40	0.53
1:D:12:THR:O	1:D:87:ASN:HB3	2.08	0.52
1:B:42:GLU:O	1:B:45:ALA:HB3	2.09	0.52
1:C:12:THR:HG23	1:C:88:ALA:HB3	1.91	0.52
1:D:38:VAL:HG23	1:D:39:LEU:HD12	1.91	0.52
1:D:190:THR:O	1:D:193:THR:HB	2.09	0.52
1:A:178:ASN:HD22	1:A:235:ALA:H	1.57	0.52
1:C:187:THR:HG23	1:C:188:PRO:HD2	1.91	0.52
1:A:189:MET:SD	1:A:190:THR:N	2.83	0.52
1:C:12:THR:CG2	1:C:88:ALA:H	2.23	0.52
1:B:90:ILE:HD11	1:B:107:VAL:HA	1.91	0.52
1:A:164:LYS:O	1:A:168:VAL:HG12	2.10	0.52
1:A:160:ARG:HD2	1:A:236:GLU:OE1	2.10	0.51
1:C:7:LYS:HB2	1:C:82:ASP:HB2	1.92	0.51
1:C:190:THR:O	1:C:193:THR:HG22	2.10	0.51
1:A:161:GLY:HA3	1:C:157:TRP:CD1	2.46	0.51
1:C:35:LEU:HD11	1:C:50:LEU:HD12	1.93	0.51
1:C:10:ILE:HD12	1:C:11:ILE:N	2.25	0.51
1:A:25:GLN:NE2	1:A:218:ALA:HB3	2.25	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:12:THR:HG22	1:B:88:ALA:H	1.75	0.51
1:D:16:ARG:HH21	1:D:39:LEU:HD21	1.76	0.51
1:B:10:ILE:HG13	1:B:84:LEU:HD12	1.93	0.50
1:D:115:VAL:HG11	1:D:159:VAL:HG22	1.91	0.50
1:A:176:ARG:HA	1:A:233:THR:CG2	2.42	0.50
1:A:55:ARG:HD2	1:A:73:TYR:OH	2.11	0.50
1:C:4:LEU:HG	1:C:5:SER:H	1.74	0.50
1:C:9:VAL:HG13	1:C:33:VAL:HG22	1.94	0.50
1:C:182:PRO:HB3	1:C:217:ILE:HD12	1.93	0.50
1:C:187:THR:HB	1:C:190:THR:HG23	1.94	0.50
1:C:247:PRO:HB2	1:C:251:TYR:CD1	2.46	0.50
1:B:87:ASN:HD22	1:B:137:ILE:HG13	1.76	0.49
1:A:25:GLN:HE22	1:A:215:GLY:HA2	1.77	0.49
1:A:104:PHE:CE2	1:C:113:THR:HA	2.47	0.49
1:B:250:LYS:HG2	1:B:255:GLN:HA	1.94	0.49
1:B:184:MET:HB3	1:B:210:VAL:HG23	1.94	0.49
1:A:154:ALA:HB2	1:C:162:LEU:HD13	1.95	0.49
1:C:11:ILE:HD12	1:C:23:ALA:HA	1.93	0.49
1:C:119:MET:O	1:C:123:ILE:HG13	2.12	0.49
1:A:187:THR:HG22	1:A:190:THR:HG23	1.95	0.49
1:A:250:LYS:CE	1:A:255:GLN:HG3	2.43	0.49
1:C:18:LEU:HB2	2:C:256:NAD:O2N	2.12	0.49
1:D:59:LEU:HD12	1:D:66:ASP:HB3	1.94	0.49
1:A:10:ILE:HD12	1:A:11:ILE:H	1.76	0.49
1:C:189:MET:SD	1:C:189:MET:O	2.71	0.49
1:A:59:LEU:HD12	1:A:66:ASP:CB	2.36	0.49
1:C:113:THR:O	1:C:116:PHE:HB3	2.13	0.49
1:A:8:THR:HB	1:A:80:SER:O	2.12	0.48
1:A:248:THR:CG2	1:A:251:TYR:H	2.26	0.48
1:C:24:ARG:HA	1:C:50:LEU:HD21	1.94	0.48
1:A:8:THR:HA	1:A:32:ARG:O	2.12	0.48
1:A:120:LYS:HB2	1:A:120:LYS:NZ	2.28	0.48
1:C:59:LEU:HD13	1:C:66:ASP:HB3	1.93	0.48
1:A:248:THR:HG22	1:A:251:TYR:CB	2.40	0.48
1:A:120:LYS:HA	1:A:123:ILE:HD12	1.96	0.48
1:A:145:GLY:O	1:B:246:GLY:HA3	2.14	0.48
1:C:152:TYR:O	1:C:156:LYS:HG2	2.12	0.48
1:A:218:ALA:O	1:A:222:VAL:HG23	2.14	0.48
1:A:248:THR:HG23	1:A:251:TYR:H	1.78	0.48
1:B:202:TYR:O	1:B:205:THR:HG22	2.13	0.48
1:A:165:LEU:HA	1:A:168:VAL:HG13	1.96	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:5:SER:HB2	1:A:31:ALA:HB2	1.96	0.47
1:B:250:LYS:HG2	1:B:255:GLN:CB	2.45	0.47
1:C:185:THR:O	1:C:190:THR:HG21	2.14	0.47
1:A:3:ASP:H	1:D:2:ASN:HA	1.77	0.47
1:A:198:GLY:O	1:A:201:ASN:HB2	2.15	0.47
1:D:113:THR:O	1:D:117:ILE:HG13	2.14	0.47
1:A:164:LYS:HB3	1:D:245:THR:OG1	2.15	0.47
1:B:182:PRO:HB3	1:B:217:ILE:HG12	1.97	0.47
1:D:109:GLU:O	1:D:113:THR:HB	2.15	0.47
1:D:178:ASN:HD22	1:D:235:ALA:N	2.03	0.47
1:A:23:ALA:HB1	1:A:35:LEU:HD21	1.95	0.47
1:C:198:GLY:O	1:C:201:ASN:HB2	2.15	0.47
1:B:176:ARG:HA	1:B:233:THR:HG23	1.97	0.47
1:C:16:ARG:NH2	1:C:39:LEU:HD21	2.29	0.47
1:A:90:ILE:HG13	1:A:107:VAL:HG13	1.96	0.46
1:B:161:GLY:HA3	1:D:157:TRP:CD1	2.50	0.46
1:A:119:MET:O	1:A:123:ILE:HG13	2.16	0.46
1:D:16:ARG:HD2	2:D:256:NAD:O2A	2.16	0.46
1:D:184:MET:HB3	1:D:210:VAL:HG22	1.96	0.46
1:A:66:ASP:OD1	1:A:66:ASP:N	2.49	0.46
1:D:221:VAL:HG12	1:D:225:LEU:HD22	1.96	0.46
1:A:156:LYS:HA	1:A:156:LYS:HD3	1.74	0.46
1:D:152:TYR:CE1	1:D:156:LYS:HE3	2.51	0.46
1:C:12:THR:HG23	1:C:88:ALA:HB2	1.98	0.46
1:C:36:ALA:HA	1:C:57:GLN:O	2.16	0.46
1:A:195:ILE:HD13	1:A:195:ILE:HA	1.75	0.46
1:A:119:MET:CE	1:A:177:VAL:HG11	2.46	0.46
1:C:223:LYS:HE3	1:C:229:SER:HB3	1.98	0.45
1:A:101:VAL:HG22	1:A:102:GLU:OE2	2.16	0.45
1:A:152:TYR:O	1:A:156:LYS:HG2	2.16	0.45
1:A:234:GLY:HA3	1:D:245:THR:CG2	2.43	0.45
1:D:147:ALA:O	1:D:148:LEU:HB2	2.16	0.45
1:A:152:TYR:CE1	1:A:156:LYS:HE3	2.51	0.45
1:C:12:THR:HG22	1:C:88:ALA:H	1.81	0.45
1:A:13:GLY:HA2	2:A:256:NAD:H1B	1.98	0.45
1:A:157:TRP:CG	1:C:161:GLY:HA3	2.52	0.45
1:A:221:VAL:O	1:A:225:LEU:HB2	2.17	0.45
1:A:245:THR:HG23	1:D:168:VAL:HG12	1.98	0.45
1:B:250:LYS:HE2	1:B:255:GLN:HG3	1.99	0.45
1:B:14:GLY:HA2	1:B:19:GLY:HA3	1.99	0.45
1:D:23:ALA:HB1	1:D:35:LEU:HD21	1.98	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:87:ASN:O	2:C:256:NAD:H4D	2.17	0.45
1:A:87:ASN:O	2:A:256:NAD:H4D	2.17	0.45
1:A:120:LYS:HB2	1:A:120:LYS:HZ2	1.81	0.45
1:A:69:ARG:HB3	1:A:69:ARG:NH1	2.30	0.45
1:C:176:ARG:HA	1:C:233:THR:HG23	1.97	0.45
1:D:250:LYS:HA	1:D:255:GLN:HE21	1.81	0.45
1:A:2:ASN:HB3	1:D:2:ASN:CG	2.37	0.44
1:A:181:HIS:NE2	1:A:236:GLU:HB2	2.32	0.44
1:B:189:MET:SD	1:B:190:THR:N	2.90	0.44
1:C:36:ALA:HB1	1:C:59:LEU:HB3	1.99	0.44
1:C:197:GLN:H	1:C:197:GLN:NE2	2.15	0.44
1:A:190:THR:HA	1:A:193:THR:OG1	2.17	0.44
1:C:8:THR:HA	1:C:32:ARG:O	2.17	0.44
1:C:92:THR:HG23	1:C:103:ARG:HH21	1.83	0.44
1:B:7:LYS:HB2	1:B:82:ASP:CB	2.43	0.44
1:A:255:GLN:OE1	1:B:251:TYR:HD2	2.01	0.44
1:B:152:TYR:O	1:B:156:LYS:HG2	2.17	0.44
1:B:221:VAL:HG12	1:B:225:LEU:HD22	2.00	0.44
1:D:90:ILE:HD11	1:D:107:VAL:HG22	2.00	0.44
1:D:182:PRO:HB2	1:D:217:ILE:HD13	1.99	0.44
1:B:3:ASP:HB2	1:C:2:ASN:N	2.33	0.44
1:B:59:LEU:O	2:B:256:NAD:H2A	2.18	0.44
1:C:187:THR:H	1:C:190:THR:HG1	1.65	0.44
1:A:7:LYS:HB2	1:A:82:ASP:CG	2.38	0.44
1:B:84:LEU:HD23	1:B:134:ILE:HG23	1.99	0.44
1:C:190:THR:HA	1:C:193:THR:CG2	2.42	0.44
1:D:103:ARG:O	1:D:107:VAL:HG23	2.17	0.44
1:A:75:ARG:O	1:A:79:GLY:N	2.49	0.43
1:D:167:ALA:HB1	1:D:233:THR:HG22	2.00	0.43
1:B:178:ASN:ND2	1:B:235:ALA:H	2.12	0.43
1:A:251:TYR:OH	1:B:248:THR:HB	2.18	0.43
1:C:8:THR:HG21	1:C:80:SER:O	2.19	0.43
1:D:181:HIS:O	1:D:238:ALA:HA	2.18	0.43
1:D:245:THR:HG23	1:D:245:THR:O	2.18	0.43
1:B:123:ILE:HB	1:B:124:PRO:HD3	1.98	0.43
1:C:72:ALA:O	1:C:75:ARG:HB3	2.18	0.43
1:C:156:LYS:HE3	2:C:256:NAD:O2D	2.18	0.43
1:C:107:VAL:HB	1:C:151:SER:HB2	2.01	0.43
1:A:242:GLY:O	1:A:245:THR:HG22	2.18	0.43
1:B:24:ARG:CA	1:B:50:LEU:HD21	2.43	0.43
1:B:250:LYS:CD	1:B:255:GLN:HG3	2.49	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:45:ALA:HA	1:A:48:ARG:HE	1.83	0.43
1:A:250:LYS:HE2	1:A:255:GLN:HG3	2.00	0.43
1:C:11:ILE:CD1	1:C:23:ALA:HA	2.49	0.43
1:C:88:ALA:HB1	2:C:256:NAD:C4A	2.49	0.43
1:C:93:GLY:H	1:C:103:ARG:HH22	1.66	0.43
1:B:7:LYS:HE3	1:B:7:LYS:HB3	1.77	0.43
1:B:160:ARG:HD2	1:B:236:GLU:OE1	2.18	0.43
1:C:62:THR:HG21	1:C:109:GLU:HG3	2.00	0.43
1:D:43:GLY:HA3	1:D:56:TYR:CE1	2.54	0.42
1:A:104:PHE:HE2	1:C:113:THR:HA	1.84	0.42
1:C:67:TRP:CD2	1:C:118:GLY:HA2	2.54	0.42
1:D:186:TYR:CG	1:D:197:GLN:HB3	2.54	0.42
1:B:55:ARG:HD2	1:B:73:TYR:OH	2.19	0.42
1:B:65:GLU:HA	1:B:68:GLN:HE21	1.84	0.42
1:B:84:LEU:HD21	1:B:86:ASN:HD21	1.85	0.42
1:C:67:TRP:CZ2	1:C:118:GLY:HA3	2.55	0.42
1:D:164:LYS:O	1:D:168:VAL:HG13	2.19	0.42
1:A:61:VAL:HG23	1:A:67:TRP:CZ2	2.55	0.42
1:C:189:MET:O	1:C:192:GLU:HB2	2.20	0.42
1:D:15:ALA:HB3	1:D:37:ASP:OD2	2.20	0.42
1:D:45:ALA:O	1:D:48:ARG:HB3	2.20	0.42
1:D:104:PHE:O	1:D:108:VAL:HG23	2.20	0.42
1:D:182:PRO:HA	1:D:239:VAL:O	2.20	0.42
1:A:176:ARG:NH2	1:A:229:SER:O	2.53	0.42
1:B:90:ILE:HD11	1:B:106:LYS:HD2	2.02	0.42
2:B:256:NAD:O5D	2:B:256:NAD:H2N	2.20	0.42
1:C:4:LEU:CG	1:C:5:SER:N	2.82	0.42
1:B:113:THR:HG21	1:D:105:ARG:HH11	1.85	0.41
1:C:59:LEU:CD1	1:C:66:ASP:HB3	2.49	0.41
1:C:59:LEU:HB2	1:C:70:VAL:HG11	2.01	0.41
1:A:25:GLN:NE2	1:A:215:GLY:HA2	2.35	0.41
1:A:165:LEU:HD11	1:C:150:SER:HA	2.02	0.41
1:C:165:LEU:HD12	1:C:165:LEU:C	2.41	0.41
1:D:187:THR:HG22	1:D:189:MET:H	1.85	0.41
1:D:247:PRO:HB2	1:D:251:TYR:CD1	2.55	0.41
1:B:189:MET:SD	1:B:189:MET:C	2.98	0.41
1:D:95:PHE:O	1:D:98:THR:HB	2.19	0.41
1:D:147:ALA:O	1:D:148:LEU:CB	2.69	0.41
1:D:250:LYS:CG	1:D:255:GLN:HB2	2.50	0.41
1:A:184:MET:HA	1:A:184:MET:CE	2.50	0.41
1:B:184:MET:HG3	1:B:202:TYR:CZ	2.56	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:58:HIS:O	1:C:69:ARG:NH2	2.54	0.41
1:A:63:ILE:O	1:A:65:GLU:N	2.53	0.41
1:B:250:LYS:HG2	1:B:255:GLN:HB2	2.02	0.41
1:D:213:GLU:HB2	1:D:216:GLU:HG3	2.02	0.41
1:A:251:TYR:CA	1:A:255:GLN:HB2	2.41	0.41
1:C:204:ASN:HD22	1:D:254:GLY:HA2	1.86	0.41
1:C:247:PRO:HB2	1:C:251:TYR:HD1	1.84	0.41
1:D:250:LYS:HA	1:D:255:GLN:NE2	2.35	0.41
1:A:103:ARG:O	1:A:107:VAL:HG23	2.20	0.41
1:A:178:ASN:ND2	1:A:235:ALA:H	2.18	0.41
1:A:57:GLN:CB	1:A:70:VAL:HG22	2.44	0.41
1:B:92:THR:HG21	1:B:150:SER:HB3	2.03	0.41
1:B:202:TYR:HA	1:B:203:PRO:HD2	1.92	0.41
1:D:36:ALA:HB1	1:D:59:LEU:HB3	2.01	0.41
1:A:168:VAL:HA	1:D:206:PRO:HB3	2.03	0.40
1:C:81:VAL:HG11	1:C:122:VAL:HG21	2.01	0.40
1:A:183:GLY:HA3	1:A:240:ASP:CB	2.52	0.40
1:C:7:LYS:HB2	1:C:82:ASP:CB	2.51	0.40
1:B:162:LEU:HD12	1:B:162:LEU:HA	1.87	0.40
1:B:33:VAL:HG12	1:B:34:VAL:N	2.37	0.40
1:D:242:GLY:HA2	1:D:245:THR:HG22	2.04	0.40
1:C:139:SER:HB3	1:C:156:LYS:HG3	2.03	0.40
1:C:152:TYR:OH	2:C:256:NAD:H2D	2.22	0.40
1:C:160:ARG:HD3	1:C:181:HIS:CE1	2.57	0.40
1:C:192:GLU:C	1:C:194:GLY:H	2.25	0.40

There are no symmetry-related clashes.

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	251/253 (99%)	232 (92%)	14 (6%)	5 (2%)	7 10

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	B	251/253 (99%)	233 (93%)	16 (6%)	2 (1%)	19 28
1	C	251/253 (99%)	234 (93%)	13 (5%)	4 (2%)	9 13
1	D	251/253 (99%)	232 (92%)	16 (6%)	3 (1%)	13 18
All	All	1004/1012 (99%)	931 (93%)	59 (6%)	14 (1%)	11 15

All (14) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	64	GLU
1	A	150	SER
1	B	61	VAL
1	C	17	GLY
1	C	61	VAL
1	C	150	SER
1	D	246	GLY
1	B	150	SER
1	D	150	SER
1	A	138	SER
1	D	204	ASN
1	A	61	VAL
1	C	6	GLY
1	A	188	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	187/187 (100%)	166 (89%)	21 (11%)	6 8
1	B	187/187 (100%)	168 (90%)	19 (10%)	7 9
1	C	187/187 (100%)	162 (87%)	25 (13%)	4 4
1	D	187/187 (100%)	165 (88%)	22 (12%)	5 6
All	All	748/748 (100%)	661 (88%)	87 (12%)	5 7

All (87) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	4	LEU
1	A	7	LYS
1	A	10	ILE
1	A	16	ARG
1	A	18	LEU
1	A	39	LEU
1	A	61	VAL
1	A	66	ASP
1	A	69	ARG
1	A	76	GLU
1	A	81	VAL
1	A	97	GLU
1	A	120	LYS
1	A	122	VAL
1	A	165	LEU
1	A	168	VAL
1	A	188	PRO
1	A	189	MET
1	A	209	ARG
1	A	233	THR
1	A	248	THR
1	B	4	LEU
1	B	7	LYS
1	B	10	ILE
1	B	12	THR
1	B	16	ARG
1	B	61	VAL
1	B	103	ARG
1	B	115	VAL
1	B	168	VAL
1	B	187	THR
1	B	189	MET
1	B	192	GLU
1	B	206	PRO
1	B	209	ARG
1	B	223	LYS
1	B	225	LEU
1	B	233	THR
1	B	248	THR
1	B	253	MET
1	C	7	LYS
1	C	10	ILE

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Mol	Chain	Res	Type
1	C	12	THR
1	C	18	LEU
1	C	38	VAL
1	C	39	LEU
1	C	41	GLU
1	C	61	VAL
1	C	70	VAL
1	C	96	LEU
1	C	115	VAL
1	C	122	VAL
1	C	127	LYS
1	C	128	ASP
1	C	189	MET
1	C	197	GLN
1	C	199	GLU
1	C	206	PRO
1	C	209	ARG
1	C	223	LYS
1	C	225	LEU
1	C	233	THR
1	C	244	THR
1	C	245	THR
1	C	248	THR
1	D	8	THR
1	D	10	ILE
1	D	16	ARG
1	D	18	LEU
1	D	32	ARG
1	D	61	VAL
1	D	66	ASP
1	D	98	THR
1	D	103	ARG
1	D	105	ARG
1	D	122	VAL
1	D	165	LEU
1	D	168	VAL
1	D	187	THR
1	D	206	PRO
1	D	210	VAL
1	D	223	LYS
1	D	225	LEU
1	D	231	TYR

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Mol	Chain	Res	Type
1	D	233	THR
1	D	245	THR
1	D	248	THR

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

Mol	Chain	Res	Type
1	A	2	ASN
1	A	25	GLN
1	A	178	ASN
1	A	197	GLN
1	B	68	GLN
1	B	86	ASN
1	B	178	ASN
1	B	204	ASN
1	C	2	ASN
1	C	68	GLN
1	C	87	ASN
1	C	178	ASN
1	C	197	GLN
1	C	255	GLN
1	D	25	GLN
1	D	57	GLN
1	D	87	ASN
1	D	178	ASN
1	D	255	GLN

5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

4 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	NAD	B	256	-	42,48,48	1.41	6 (14%)	50,73,73	1.69	13 (26%)
2	NAD	A	256	-	42,48,48	1.26	6 (14%)	50,73,73	1.43	7 (14%)
2	NAD	D	256	-	42,48,48	1.52	6 (14%)	50,73,73	1.71	12 (24%)
2	NAD	C	256	-	42,48,48	1.44	5 (11%)	50,73,73	1.80	10 (20%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NAD	B	256	-	-	7/26/62/62	0/5/5/5
2	NAD	A	256	-	-	7/26/62/62	0/5/5/5
2	NAD	D	256	-	-	14/26/62/62	0/5/5/5
2	NAD	C	256	-	-	4/26/62/62	0/5/5/5

All (23) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	256	NAD	C2N-N1N	5.98	1.42	1.35
2	C	256	NAD	C2N-N1N	5.71	1.41	1.35
2	A	256	NAD	C2N-N1N	4.97	1.41	1.35
2	B	256	NAD	C2N-N1N	4.91	1.40	1.35
2	D	256	NAD	O4D-C1D	4.06	1.46	1.41
2	C	256	NAD	O4D-C1D	3.59	1.46	1.41
2	B	256	NAD	C3N-C7N	3.18	1.55	1.50
2	D	256	NAD	C3N-C7N	3.06	1.55	1.50
2	B	256	NAD	C2B-C1B	-3.03	1.49	1.53
2	D	256	NAD	O4B-C1B	2.98	1.45	1.41

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	256	NAD	O4B-C1B	2.95	1.45	1.41
2	A	256	NAD	O4D-C1D	2.81	1.45	1.41
2	B	256	NAD	O4B-C1B	2.79	1.45	1.41
2	B	256	NAD	O4D-C1D	2.72	1.44	1.41
2	C	256	NAD	C6N-N1N	2.63	1.41	1.35
2	D	256	NAD	C6N-N1N	2.44	1.41	1.35
2	A	256	NAD	O4B-C1B	2.40	1.44	1.41
2	B	256	NAD	C6N-N1N	2.37	1.41	1.35
2	C	256	NAD	C3N-C7N	2.28	1.54	1.50
2	D	256	NAD	C2B-C1B	-2.16	1.50	1.53
2	A	256	NAD	C3N-C7N	2.08	1.53	1.50
2	A	256	NAD	C2A-N3A	2.08	1.35	1.32
2	A	256	NAD	C6N-N1N	2.03	1.40	1.35

All (42) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	C	256	NAD	N3A-C2A-N1A	-5.54	120.03	128.68
2	D	256	NAD	C4A-C5A-N7A	5.06	114.67	109.40
2	C	256	NAD	C3D-C2D-C1D	4.79	108.19	100.98
2	B	256	NAD	N3A-C2A-N1A	-4.50	121.64	128.68
2	A	256	NAD	N3A-C2A-N1A	-4.40	121.80	128.68
2	B	256	NAD	C3D-C2D-C1D	4.39	107.59	100.98
2	D	256	NAD	N3A-C2A-N1A	-4.21	122.10	128.68
2	B	256	NAD	C4A-C5A-N7A	4.16	113.74	109.40
2	D	256	NAD	O4B-C1B-C2B	-4.15	100.87	106.93
2	C	256	NAD	C4A-C5A-N7A	3.86	113.42	109.40
2	A	256	NAD	C4A-C5A-N7A	3.72	113.28	109.40
2	D	256	NAD	C6N-N1N-C2N	-3.55	118.74	121.97
2	C	256	NAD	O4B-C1B-C2B	-3.48	101.83	106.93
2	B	256	NAD	O4B-C1B-C2B	-3.13	102.35	106.93
2	C	256	NAD	C6N-N1N-C2N	-3.07	119.17	121.97
2	D	256	NAD	N6A-C6A-N1A	3.04	124.89	118.57
2	C	256	NAD	C2A-N1A-C6A	3.03	123.94	118.75
2	C	256	NAD	O5D-C5D-C4D	-2.86	99.14	108.99
2	C	256	NAD	N6A-C6A-N1A	2.82	124.42	118.57
2	B	256	NAD	C5D-C4D-C3D	-2.71	105.03	115.18
2	A	256	NAD	C6N-N1N-C2N	-2.65	119.56	121.97
2	C	256	NAD	C5A-C6A-N1A	-2.63	114.39	120.35
2	D	256	NAD	C3B-C2B-C1B	-2.58	97.09	100.98
2	D	256	NAD	C2A-N1A-C6A	2.56	123.13	118.75
2	C	256	NAD	O4B-C4B-C5B	2.55	117.76	109.37

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	256	NAD	N6A-C6A-N1A	2.53	123.83	118.57
2	D	256	NAD	C5A-C6A-N1A	-2.51	114.65	120.35
2	A	256	NAD	O4B-C1B-C2B	-2.43	103.38	106.93
2	B	256	NAD	C2A-N1A-C6A	2.40	122.86	118.75
2	B	256	NAD	O2B-C2B-C3B	2.36	119.47	111.82
2	B	256	NAD	O4D-C4D-C3D	2.34	109.75	105.11
2	B	256	NAD	C5A-C6A-N1A	-2.30	115.14	120.35
2	B	256	NAD	C6N-N1N-C2N	-2.25	119.93	121.97
2	A	256	NAD	N6A-C6A-N1A	2.24	123.22	118.57
2	D	256	NAD	O7N-C7N-C3N	2.22	122.28	119.63
2	A	256	NAD	C3D-C2D-C1D	-2.17	97.71	100.98
2	D	256	NAD	PN-O3-PA	2.11	140.08	132.83
2	A	256	NAD	O4B-C4B-C5B	2.10	116.29	109.37
2	B	256	NAD	O7N-C7N-C3N	2.09	122.13	119.63
2	B	256	NAD	O3B-C3B-C4B	2.06	117.00	111.05
2	D	256	NAD	O2B-C2B-C3B	2.03	118.40	111.82
2	D	256	NAD	C3D-C2D-C1D	2.01	104.00	100.98

There are no chirality outliers.

All (32) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	256	NAD	O4B-C4B-C5B-O5B
2	A	256	NAD	O4D-C4D-C5D-O5D
2	A	256	NAD	C3D-C4D-C5D-O5D
2	C	256	NAD	PA-O3-PN-O5D
2	D	256	NAD	C5B-O5B-PA-O1A
2	D	256	NAD	PN-O3-PA-O5B
2	D	256	NAD	C5D-O5D-PN-O2N
2	D	256	NAD	O4D-C1D-N1N-C2N
2	D	256	NAD	O4D-C1D-N1N-C6N
2	D	256	NAD	C2D-C1D-N1N-C2N
2	D	256	NAD	C2D-C1D-N1N-C6N
2	B	256	NAD	O4B-C4B-C5B-O5B
2	A	256	NAD	C3B-C4B-C5B-O5B
2	D	256	NAD	O4D-C4D-C5D-O5D
2	A	256	NAD	PN-O3-PA-O5B
2	C	256	NAD	PN-O3-PA-O5B
2	D	256	NAD	C5D-O5D-PN-O3
2	D	256	NAD	C5D-O5D-PN-O1N
2	A	256	NAD	C4B-C5B-O5B-PA
2	D	256	NAD	PA-O3-PN-O2N

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Mol	Chain	Res	Type	Atoms
2	B	256	NAD	C2N-C3N-C7N-O7N
2	B	256	NAD	PN-O3-PA-O1A
2	D	256	NAD	C3D-C4D-C5D-O5D
2	B	256	NAD	C2N-C3N-C7N-N7N
2	C	256	NAD	C4B-C5B-O5B-PA
2	D	256	NAD	O4B-C4B-C5B-O5B
2	B	256	NAD	C4N-C3N-C7N-O7N
2	D	256	NAD	C5B-O5B-PA-O3
2	A	256	NAD	PA-O3-PN-O1N
2	B	256	NAD	PN-O3-PA-O2A
2	C	256	NAD	PA-O3-PN-O1N
2	B	256	NAD	C4N-C3N-C7N-N7N

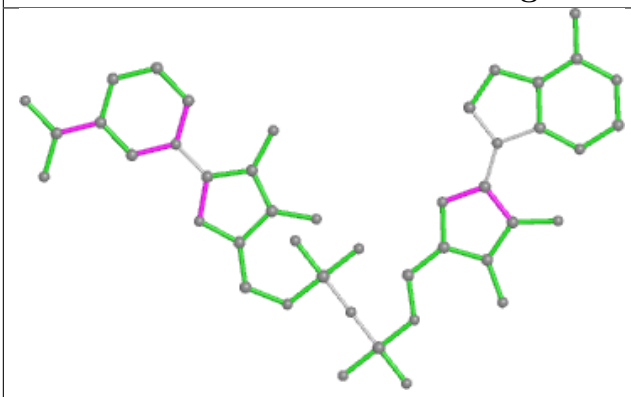
There are no ring outliers.

4 monomers are involved in 14 short contacts:

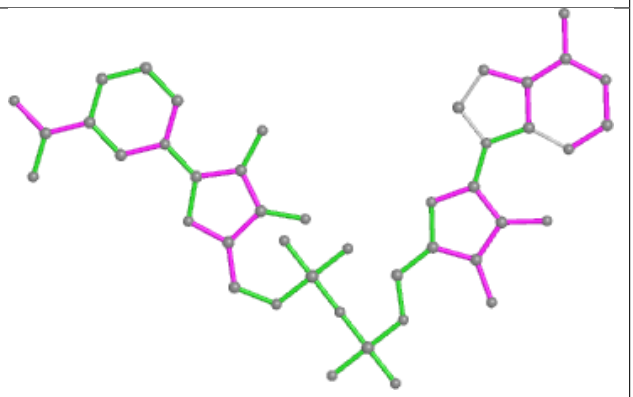
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	256	NAD	3	0
2	A	256	NAD	3	0
2	D	256	NAD	1	0
2	C	256	NAD	7	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

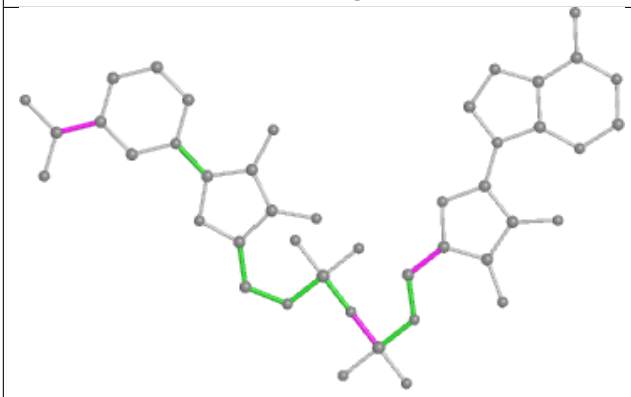
Ligand NAD B 256



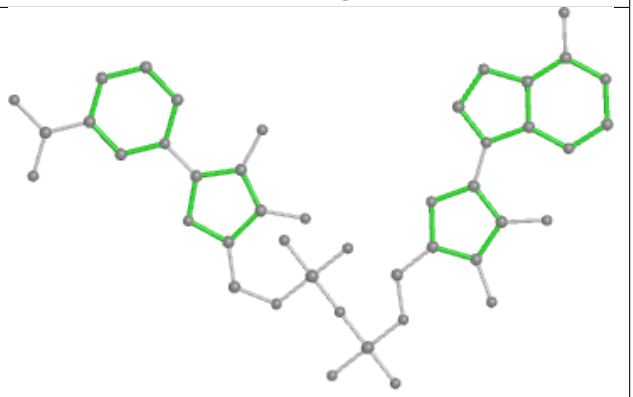
Bond lengths



Bond angles

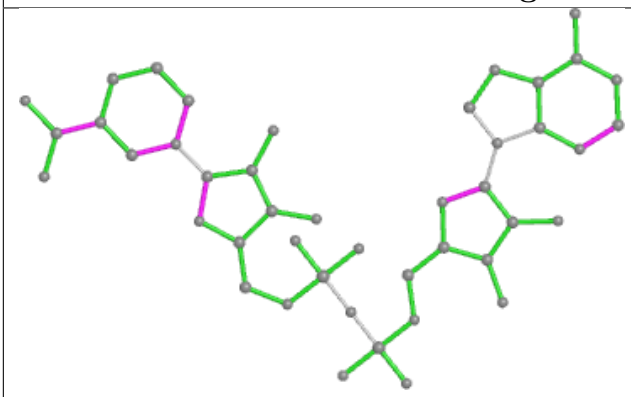


Torsions

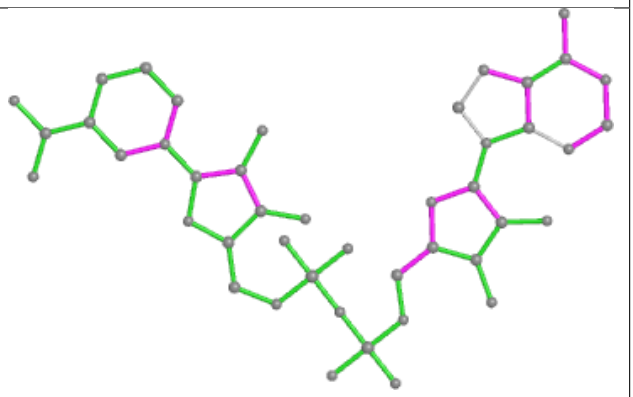


Rings

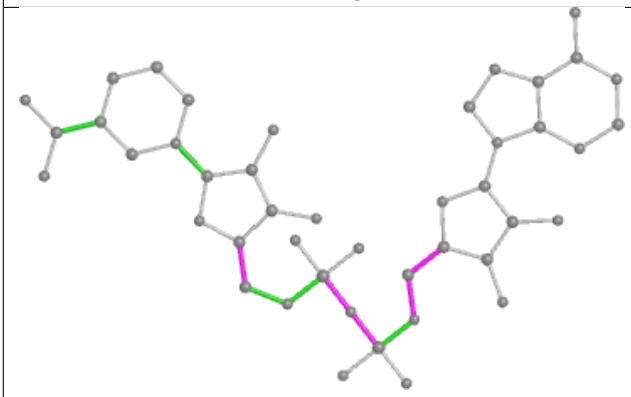
Ligand NAD A 256



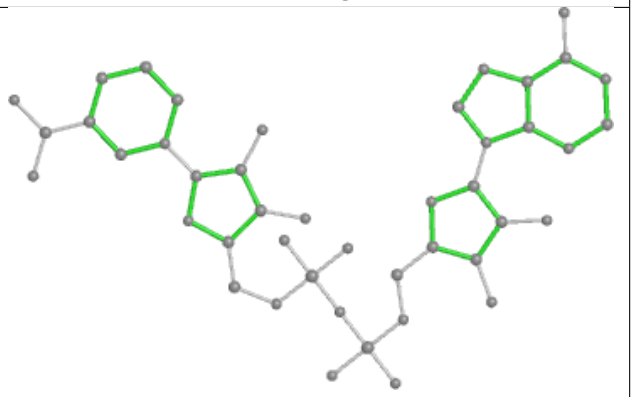
Bond lengths



Bond angles

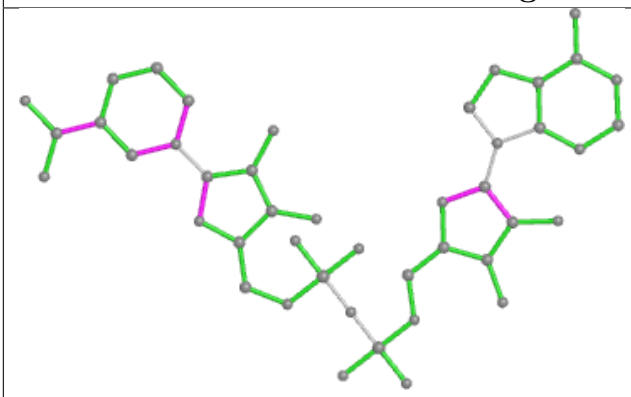


Torsions

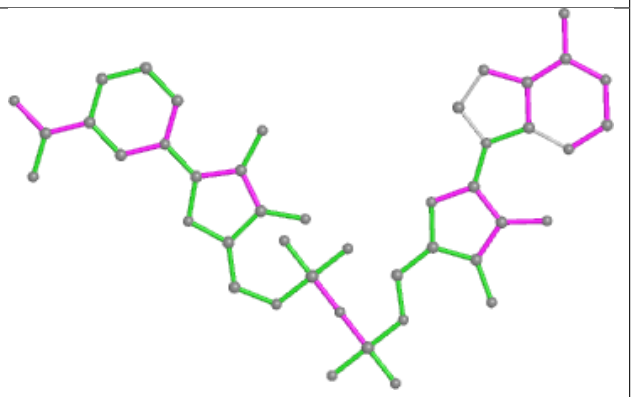


Rings

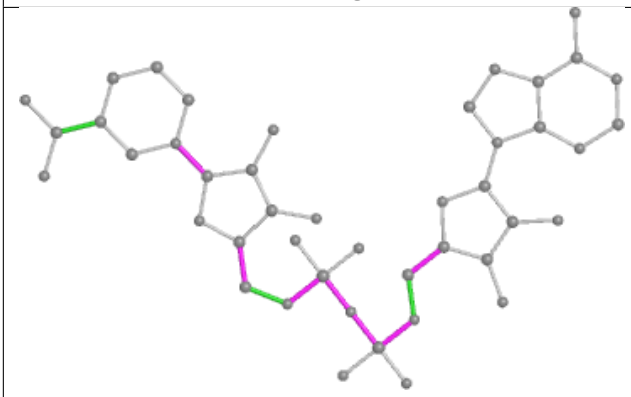
Ligand NAD D 256



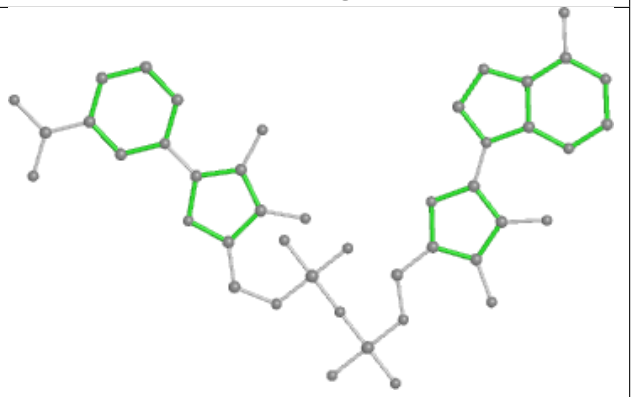
Bond lengths



Bond angles

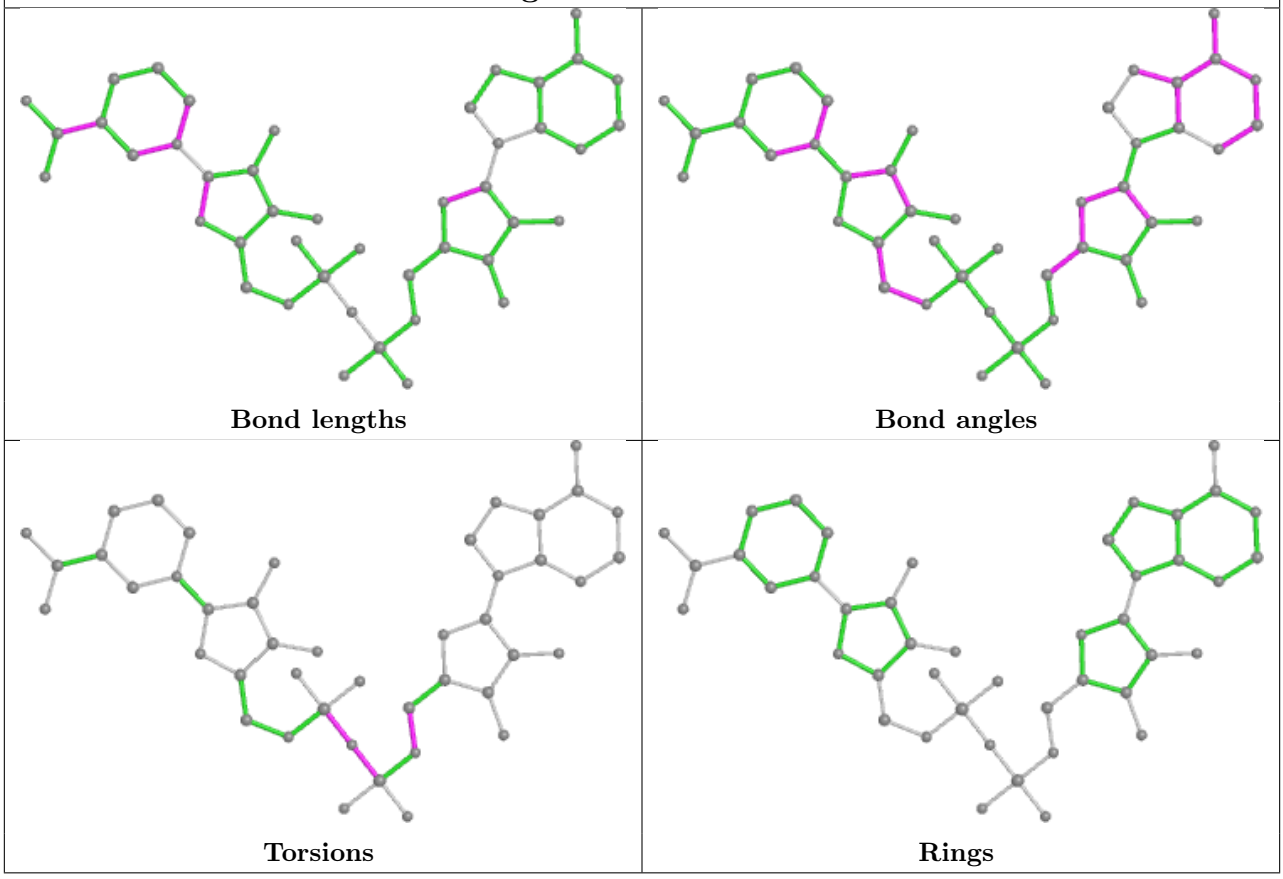


Torsions



Rings

Ligand NAD C 256



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.