wwPDB X-ray Structure Validation Summary Report (i)

Jan 31, 2016 – 07:46 PM GMT

PDB ID	:	1H69
Title	:	CRYSTAL STRUCTURE OF HUMAN NAD[P]H-QUINONE OXIDOREDUCTASE CO WITH 2,3,5,6,TETRAMETHYL-P-BENZOQUINONE (DUROQUINONE) AT 2.5 ANGSTROM RESOLUTION
Authors	:	Faig, M.; Bianchet, M.A.; Chen, S.; Winski, S.; Ross, D.; Amzel, L.M.
Deposited on	:	2001-06-08
Resolution	:	1.86 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
http://wwpdb.org/validation/2016/XrayValidationReportHelp
with specific help available everywhere you see the (i) symbol.

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

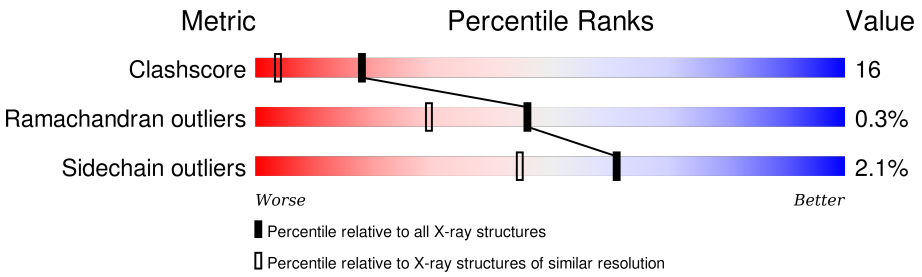
MolProbity	:	4.02b-467
Mogul	:	1.7 (RC4), CSD as536be (2015)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20151230.v01 (using entries in the PDB archive December 30th 2015)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	trunk26865

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 1.86 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	102246	1898 (1.86-1.86)
Ramachandran outliers	100387	1875 (1.86-1.86)
Sidechain outliers	100360	1875 (1.86-1.86)

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 >=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 <=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.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	273	74% 25% .
1	B	273	74% 25% .
1	C	273	71% 28% .
1	D	273	70% 29% .

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
3	ARH	D	1275	-	-	X	-

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 9295 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.

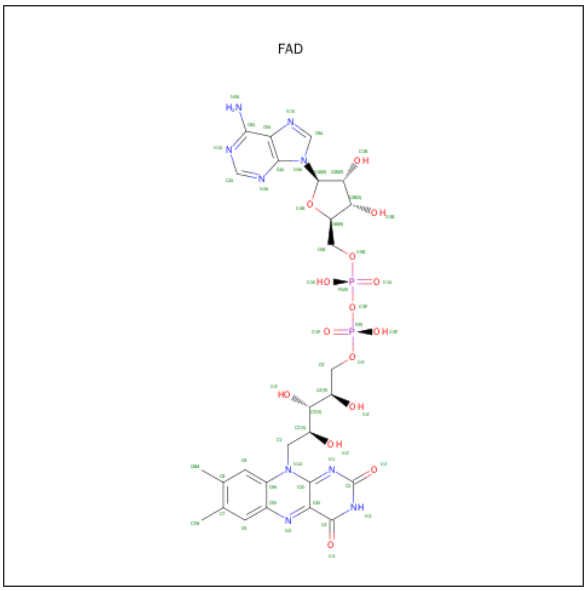
- Molecule 1 is a protein called NAD(P)H DEHYDROGENASE [QUINONE] 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	273	2173	1412	365	389	7	0	0	0
1	B	273	2173	1412	365	389	7	0	0	0
1	C	273	2173	1412	365	389	7	0	0	0
1	D	273	2173	1412	365	389	7	0	0	0

There are 4 discrepancies between the modelled and reference sequences:

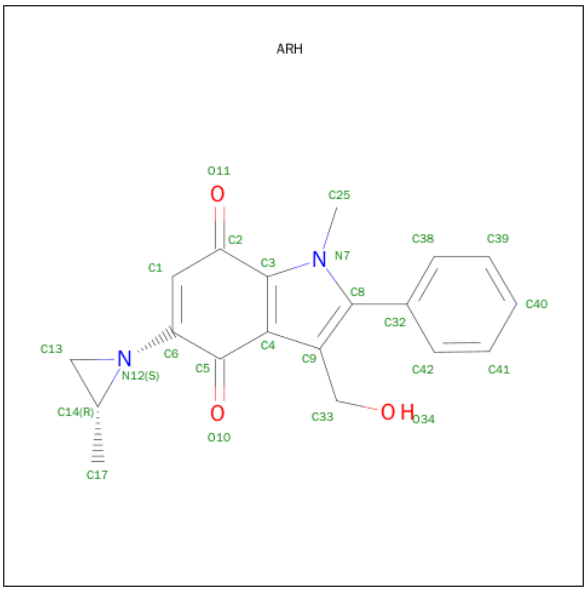
Chain	Residue	Modelled	Actual	Comment	Reference
A	1	ALA	VAL	CONFLICT	UNP P15559
B	1	ALA	VAL	CONFLICT	UNP P15559
C	1	ALA	VAL	CONFLICT	UNP P15559
D	1	ALA	VAL	CONFLICT	UNP P15559

- Molecule 2 is FLAVIN-ADENINE DINUCLEOTIDE (three-letter code: FAD) (formula: $C_{27}H_{33}N_9O_{15}P_2$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
2	B	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
2	C	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
2	D	1	Total	C	N	O	P	0	0
			53	27	9	15	2		

- Molecule 3 is 3-(HYDROXYMETHYL)-1-METHYL-5-(2-METHYLAZIRIDIN-1-YL)-2-PHENYL-1H-INDOLE-4,7-DIONE (three-letter code: ARH) (formula: $C_{19}H_{18}N_2O_3$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
3	A	1	24	19	2	3	0	0
3	B	1	24	19	2	3	0	0
3	C	1	24	19	2	3	0	0
3	D	1	24	19	2	3	0	0

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
4	A	82	82	82	0	0
4	B	80	80	80	0	0
4	C	59	59	59	0	0
4	D	74	74	74	0	0

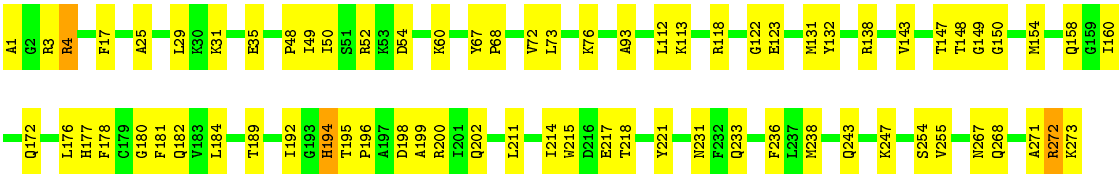
3 Residue-property plots (i)

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.

Note EDS was not executed.

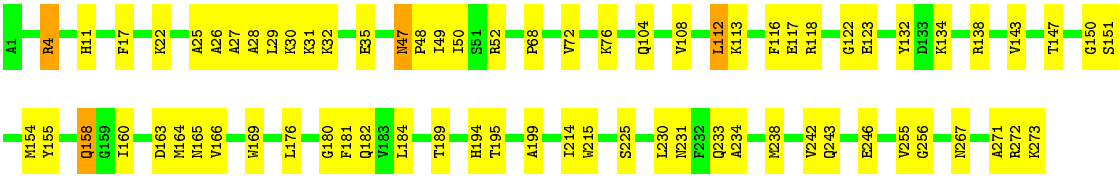
• Molecule 1: NAD(P)H DEHYDROGENASE [QUINONE] 1

Chain A:



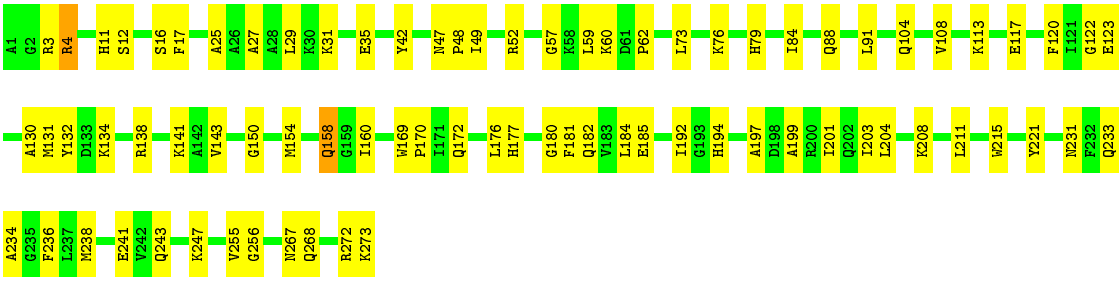
• Molecule 1: NAD(P)H DEHYDROGENASE [QUINONE] 1

Chain B:



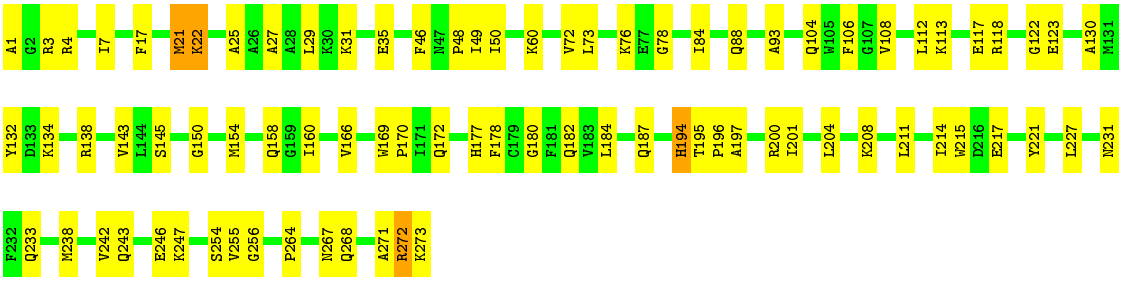
• Molecule 1: NAD(P)H DEHYDROGENASE [QUINONE] 1

Chain C:



• Molecule 1: NAD(P)H DEHYDROGENASE [QUINONE] 1

Chain D:


A1
G2
R3
R4
I7
F17
M21
K22
A25
A26
A27
A28
L29
K30
K31
E35
F46
N47
P48
I49
I50
K60
V72
L73
K76
E77
G78
I84
Q88
A93
Q104
W105
F106
G107
V108
L112
K113
E117
R118
G122
E123
A130
M131
Y132
D133
K134
R138
V143
L144
S145
G150
M154
Q158
G159
I160
V166
W169
P170
I171
Q172
H177
F178
C179
G180
F181
Q182
V183
L184
Q187
H194
T195
P196
A197
R200
I201
L204
K208
L211
I214
W215
D216
E217
Y221
L227
N231
F232
Q233
M238
V242
Q243
E246
K247
S254
V255
G256
P264
N267
Q268
A271
R272
K273

4 Data and refinement statistics (i)

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

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α, β, γ	55.52Å 56.91Å 97.05Å 77.06° 76.81° 86.86°	Depositor
Resolution (Å)	32.34 – 1.86	Depositor
% Data completeness (in resolution range)	93.7 (32.34-1.86)	Depositor
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	CNS 1.0	Depositor
R, R_{free}	0.229 , 0.274	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	9295	wwPDB-VP
Average B, all atoms (Å^2)	27.0	wwPDB-VP

5 Model quality (i)

5.1 Standard geometry (i)

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

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	0.39	0/2231	0.63	1/3012 (0.0%)
1	B	0.40	0/2231	0.64	1/3012 (0.0%)
1	C	0.41	0/2231	0.61	1/3012 (0.0%)
1	D	0.40	0/2231	0.61	1/3012 (0.0%)
All	All	0.40	0/8924	0.62	4/12048 (0.0%)

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	D	182	GLN	N-CA-C	-5.79	95.36	111.00
1	A	182	GLN	N-CA-C	-5.70	95.62	111.00
1	C	182	GLN	N-CA-C	-5.16	97.08	111.00
1	B	182	GLN	N-CA-C	-5.07	97.32	111.00

There are no chirality outliers.

There are no planarity outliers.

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	2173	0	2175	65	0
1	B	2173	0	2175	61	0
1	C	2173	0	2175	63	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	D	2173	0	2175	76	0
2	A	53	0	31	6	0
2	B	53	0	31	5	0
2	C	53	0	31	4	0
2	D	53	0	31	7	0
3	A	24	0	18	8	0
3	B	24	0	18	7	0
3	C	24	0	18	7	0
3	D	24	0	18	12	0
4	A	82	0	0	4	0
4	B	80	0	0	6	0
4	C	59	0	0	2	0
4	D	74	0	0	3	0
All	All	9295	0	8896	281	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 16.

The worst 5 of 281 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:B:17:PHE:HB2	2:B:1274:FAD:H52A	1.40	1.01
3:C:1275:ARH:H251	3:C:1275:ARH:HC83	1.48	0.95
3:D:1275:ARH:HC24	3:D:1275:ARH:H332	1.50	0.94
3:A:1275:ARH:HC24	3:A:1275:ARH:H332	1.47	0.93
1:C:17:PHE:HB2	2:C:1274:FAD:H52A	1.50	0.93

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	271/273 (99%)	255 (94%)	15 (6%)	1 (0%)	39	22
1	B	271/273 (99%)	257 (95%)	14 (5%)	0	100	100
1	C	271/273 (99%)	255 (94%)	15 (6%)	1 (0%)	39	22
1	D	271/273 (99%)	255 (94%)	15 (6%)	1 (0%)	39	22
All	All	1084/1092 (99%)	1022 (94%)	59 (5%)	3 (0%)	46	29

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	272	ARG
1	D	272	ARG
1	A	272	ARG

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	226/226 (100%)	221 (98%)	5 (2%)	60	43
1	B	226/226 (100%)	220 (97%)	6 (3%)	52	34
1	C	226/226 (100%)	222 (98%)	4 (2%)	66	52
1	D	226/226 (100%)	222 (98%)	4 (2%)	66	52
All	All	904/904 (100%)	885 (98%)	19 (2%)	61	45

5 of 19 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	112	LEU
1	B	233	GLN
1	D	21	MET
1	B	47	ASN
1	D	22	LYS

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 26 such sidechains are listed below:

Mol	Chain	Res	Type
1	C	47	ASN
1	C	158	GLN
1	D	267	ASN
1	C	64	ASN
1	C	79	HIS

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 carbohydrates in this entry.

5.6 Ligand geometry (i)

8 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	FAD	A	1274	-	48,58,58	2.20	14 (29%)	54,89,89	2.16	12 (22%)
3	ARH	A	1275	-	22,27,27	1.84	7 (31%)	23,41,41	3.19	5 (21%)
2	FAD	B	1274	-	48,58,58	2.25	18 (37%)	54,89,89	2.10	12 (22%)
3	ARH	B	1275	-	22,27,27	1.80	5 (22%)	23,41,41	2.83	6 (26%)
2	FAD	C	1274	-	48,58,58	2.29	14 (29%)	54,89,89	2.12	13 (24%)
3	ARH	C	1275	-	22,27,27	1.84	5 (22%)	23,41,41	2.68	6 (26%)
2	FAD	D	1274	-	48,58,58	2.29	16 (33%)	54,89,89	2.05	12 (22%)
3	ARH	D	1275	-	22,27,27	1.86	6 (27%)	23,41,41	3.18	5 (21%)

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	FAD	A	1274	-	-	0/30/50/50	0/6/6/6
3	ARH	A	1275	-	-	0/5/31/31	0/3/4/4
2	FAD	B	1274	-	-	0/30/50/50	0/6/6/6
3	ARH	B	1275	-	-	0/5/31/31	0/3/4/4
2	FAD	C	1274	-	-	0/30/50/50	0/6/6/6
3	ARH	C	1275	-	-	0/5/31/31	0/3/4/4
2	FAD	D	1274	-	-	0/30/50/50	0/6/6/6
3	ARH	D	1275	-	-	0/5/31/31	0/3/4/4

The worst 5 of 85 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	1274	FAD	PA-O2A	-4.72	1.34	1.54
2	C	1274	FAD	PA-O2A	-4.64	1.35	1.54
2	A	1274	FAD	PA-O2A	-4.52	1.35	1.54
2	D	1274	FAD	PA-O2A	-4.33	1.36	1.54
2	A	1274	FAD	P-O2P	-4.07	1.37	1.54

The worst 5 of 71 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	C	1274	FAD	C4X-C4-N3	-4.80	117.03	123.59
2	A	1274	FAD	C4X-C4-N3	-4.55	117.36	123.59
2	B	1274	FAD	C4X-C4-N3	-4.46	117.49	123.59
2	D	1274	FAD	C4X-C4-N3	-4.46	117.50	123.59
2	B	1274	FAD	C4X-C10-N10	-4.10	118.10	120.52

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

8 monomers are involved in 52 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	1274	FAD	6	0
3	A	1275	ARH	8	0
2	B	1274	FAD	5	0
3	B	1275	ARH	7	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	1274	FAD	4	0
3	C	1275	ARH	7	0
2	D	1274	FAD	7	0
3	D	1275	ARH	12	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 (i)

6.1 Protein, DNA and RNA chains (i)

EDS was not executed - this section will therefore be empty.

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

EDS was not executed - this section will therefore be empty.

6.3 Carbohydrates (i)

EDS was not executed - this section will therefore be empty.

6.4 Ligands (i)

EDS was not executed - this section will therefore be empty.

6.5 Other polymers (i)

EDS was not executed - this section will therefore be empty.