Full wwPDB NMR Structure Validation Report (i)

Mar 6, 2022 – 07:04 PM EST

PDB ID	:	2KO3
Title	:	Nedd8 solution structure
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Deposited on	:	2009-09-09

This is a Full wwPDB NMR 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/NMRValidationReportHelp
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:

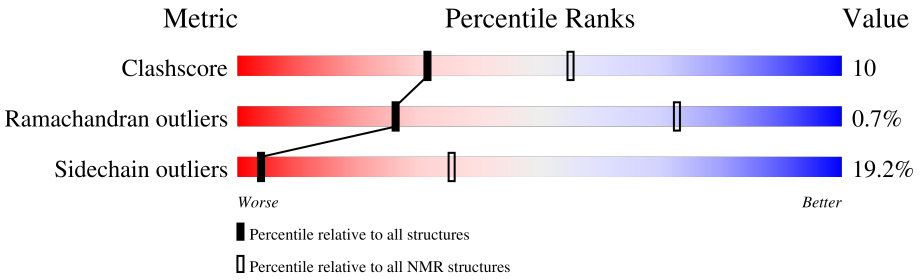
MolProbity	:	4.02b-467
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
RCI	:	v_1n_11_5_13_A (Berjanski et al., 2005)
PANAV	:	Wang et al. (2010)
ShiftChecker	:	2.27
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.27

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
SOLUTION NMR

The overall completeness of chemical shifts assignment was not calculated.

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)	NMR archive (#Entries)
Clashscore	158937	12864
Ramachandran outliers	154571	11451
Sidechain outliers	154315	11428

The table below summarises the geometric issues observed across the polymeric chains and their fit to the experimental data. The red, orange, yellow and green segments indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria. A cyan segment indicates the fraction of residues that are not part of the well-defined cores, and 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%

Mol	Chain	Length	Quality of chain
1	A	76	64% 25% • 8%

2 Ensemble composition and analysis (i)

This entry contains 20 models. Model 3 is the overall representative, medoid model (most similar to other models). The authors have identified model 1 as representative, based on the following criterion: *lowest energy*.

The following residues are included in the computation of the global validation metrics.

Well-defined (core) protein residues			
Well-defined core	**Residue range (total)**	**Backbone RMSD (Å)**	**Medoid model**
1	A:1-A:70 (70)	0.26	3

Ill-defined regions of proteins are excluded from the global statistics.

Ligands and non-protein polymers are included in the analysis.

NmrClust was unable to cluster the ensemble.

Error message: Inconsistent models

3 Entry composition (i)

There is only 1 type of molecule in this entry. The entry contains 1239 atoms, of which 639 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called NEDD8.

Mol	Chain	Residues	Atoms						Trace
			Total	C	H	N	O	S	
1	A	76	1239	378	639	104	116	2	0

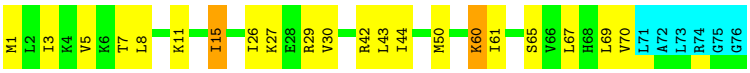
4 Residue-property plots (i)

4.1 Average score per residue in the NMR ensemble

These plots are provided for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic is the same as shown in the summary in section 1 of this report. The second graphic shows the sequence where residues are colour-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 outliers are shown as green connectors. Residues which are classified as ill-defined in the NMR ensemble, are shown in cyan with an underline colour-coded according to the previous scheme. Residues which were present in the experimental sample, but not modelled in the final structure are shown in grey.

• Molecule 1: NEDD8

Chain A:



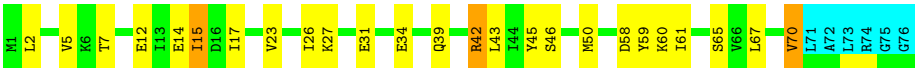
4.2 Scores per residue for each member of the ensemble

Colouring as in section 4.1 above.

4.2.1 Score per residue for model 1

• Molecule 1: NEDD8

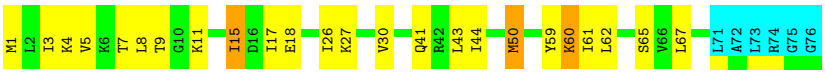
Chain A:



4.2.2 Score per residue for model 2

• Molecule 1: NEDD8

Chain A:



4.2.3 Score per residue for model 3 (medoid)

- Molecule 1: NEDD8

Chain A: 61% 28% • 8%

4.2.4 Score per residue for model 4

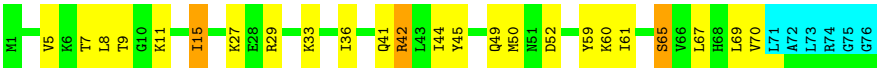
- Molecule 1: NEDD8

Chain A: 61% 29% • 8%

4.2.5 Score per residue for model 5

- Molecule 1: NEDD8

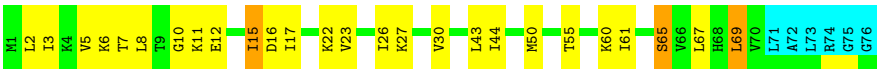
Chain A: 61% 28% • 8%



4.2.6 Score per residue for model 6

- Molecule 1: NEDD8

Chain A: 58% 30% • 8%



4.2.7 Score per residue for model 7

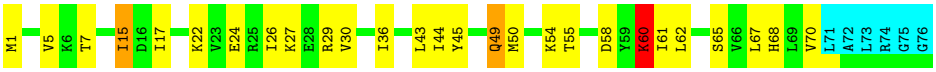
- Molecule 1: NEDD8

Chain A: 55% 34% • 8%

4.2.8 Score per residue for model 8

- Molecule 1: NEDD8

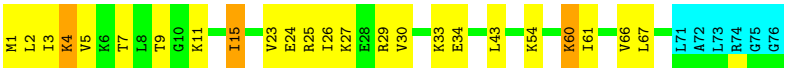
Chain A: 57% 32% • • 8%



4.2.9 Score per residue for model 9

- Molecule 1: NEDD8

Chain A: 61% 28% • 8%



4.2.10 Score per residue for model 10

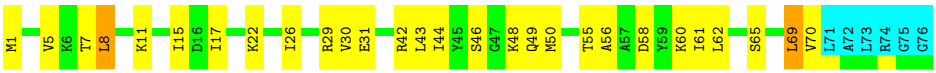
- Molecule 1: NEDD8

Chain A: 68% 21% • 8%

4.2.11 Score per residue for model 11

- Molecule 1: NEDD8

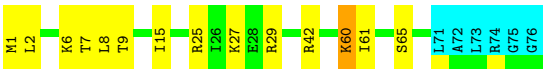
Chain A: 55% 34% • 8%



4.2.12 Score per residue for model 12

- Molecule 1: NEDD8

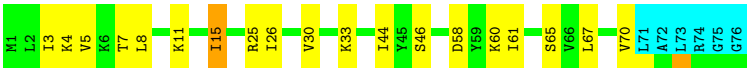
Chain A: 74% 17% • 8%



4.2.13 Score per residue for model 13

- Molecule 1: NEDD8

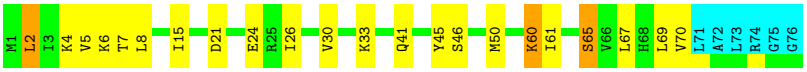
Chain A: 67% 24% • 8%



4.2.14 Score per residue for model 14

- Molecule 1: NEDD8

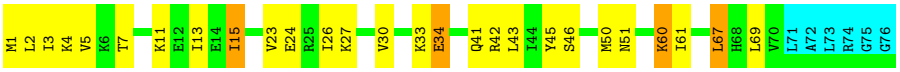
Chain A: 63% 25% • 8%



4.2.15 Score per residue for model 15

- Molecule 1: NEDD8

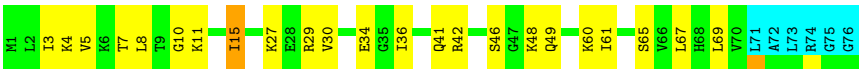
Chain A: 57% 30% 5% 8%



4.2.16 Score per residue for model 16

- Molecule 1: NEDD8

Chain A: 62% 29% • 8%



4.2.17 Score per residue for model 17

- Molecule 1: NEDD8

Chain A: 61% 30% • 8%

4.2.18 Score per residue for model 18

- Molecule 1: NEDD8

Chain A: 70% 21% • 8%

M1 L2 I3 K4 V5 K6 T7 L8 K11 I15 D16 I17 D21 R29 V30 E31 S46 A56 A57 D58 Y59 K60 I61 S65 V70 L71 A72 L73 R74 G75 G76

4.2.19 Score per residue for model 19

- Molecule 1: NEDD8

Chain A: 46% 41% 5% 8%

M1 V5 K6 T7 L8 K11 I15 P19 K22 V23 E24 R25 I26 V30 K33 Q39 R42 L43 I44 Y45 S46 G47 K48 Q49 M50 T55 A56 A57 D58 Y59 K60 I61 L62 S65 V66 L67 H68 I69 V70 L71 A72 L73 R74 G75 G76

4.2.20 Score per residue for model 20

- Molecule 1: NEDD8

Chain A: 59% 30% • 8%

M1 L2 V5 K6 T7 L8 K11 I15 I26 K27 E28 R29 V30 Q41 R42 L43 I44 Y45 M50 K60 I61 L62 S65 V66 L67 H68 L69 V70 L71 A72 L73 R74 G75 G76

5 Refinement protocol and experimental data overview (i)

The models were refined using the following method: *simulated annealing*.

Of the 20 calculated structures, 20 were deposited, based on the following criterion: *structures with the lowest energy*.

The following table shows the software used for structure solution, optimisation and refinement.

Software name	Classification	Version
CNS	refinement	

No chemical shift data was provided.

6 Model quality (i)

6.1 Standard geometry (i)

There are no covalent bond-length or bond-angle outliers.

There are no bond-length outliers.

There are no bond-angle outliers.

There are no chirality outliers.

There are no planarity outliers.

6.2 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 each 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 averaged over the ensemble.

Mol	Chain	Non-H	H(model)	H(added)	Clashes
1	A	559	593	592	11±3
All	All	11180	11860	11840	222

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 10.

All unique clashes are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:8:LEU:HD13	1:A:70:VAL:HG13	1.01	1.31	7	2
1:A:43:LEU:HD21	1:A:67:LEU:HD13	0.92	1.36	4	3
1:A:3:ILE:HD13	1:A:67:LEU:HD12	0.91	1.41	16	6
1:A:5:VAL:CG2	1:A:15:ILE:HD11	0.83	2.04	17	7
1:A:5:VAL:HG21	1:A:69:LEU:HD12	0.79	1.51	6	1
1:A:8:LEU:HD12	1:A:9:THR:N	0.75	1.97	12	1
1:A:43:LEU:O	1:A:44:ILE:HD13	0.74	1.81	8	10
1:A:5:VAL:HG23	1:A:15:ILE:HD11	0.73	1.60	17	3
1:A:5:VAL:HG21	1:A:15:ILE:HD11	0.73	1.61	5	6
1:A:17:ILE:HD13	1:A:26:ILE:CD1	0.71	2.16	2	1
1:A:14:GLU:O	1:A:15:ILE:HD13	0.70	1.86	3	1
1:A:23:VAL:HA	1:A:26:ILE:HD12	0.69	1.64	19	7
1:A:43:LEU:HD23	1:A:50:MET:SD	0.68	2.29	8	8
1:A:61:ILE:HD13	1:A:67:LEU:HD21	0.68	1.66	19	4

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:8:LEU:HD12	1:A:70:VAL:HG13	0.67	1.66	5	2
1:A:3:ILE:HD13	1:A:67:LEU:CD1	0.67	2.18	16	2
1:A:41:GLN:OE1	1:A:69:LEU:HD11	0.67	1.88	14	5
1:A:17:ILE:HD13	1:A:26:ILE:HG12	0.67	1.66	11	3
1:A:44:ILE:HD12	1:A:70:VAL:HG21	0.66	1.67	13	1
1:A:45:TYR:CD1	1:A:67:LEU:HD23	0.65	2.25	20	4
1:A:5:VAL:CG1	1:A:15:ILE:HD11	0.65	2.22	6	5
1:A:3:ILE:HD11	1:A:15:ILE:HD12	0.65	1.68	15	3
1:A:69:LEU:HD13	1:A:70:VAL:N	0.64	2.08	19	2
1:A:44:ILE:HD12	1:A:70:VAL:CG2	0.64	2.22	13	1
1:A:8:LEU:O	1:A:8:LEU:HD23	0.64	1.93	17	2
1:A:8:LEU:HD13	1:A:70:VAL:CG1	0.63	2.19	7	1
1:A:26:ILE:O	1:A:30:VAL:HG23	0.63	1.94	20	9
1:A:8:LEU:O	1:A:8:LEU:HD13	0.63	1.94	11	2
1:A:8:LEU:HD21	1:A:70:VAL:HG13	0.62	1.71	14	1
1:A:14:GLU:C	1:A:15:ILE:HD13	0.62	2.15	3	1
1:A:4:LYS:HD2	1:A:66:VAL:HG22	0.62	1.71	9	1
1:A:60:LYS:O	1:A:62:LEU:HD12	0.61	1.95	8	2
1:A:2:LEU:C	1:A:2:LEU:HD22	0.58	2.19	14	1
1:A:3:ILE:HD11	1:A:15:ILE:HB	0.58	1.73	3	1
1:A:43:LEU:HD23	1:A:50:MET:HG3	0.57	1.75	20	1
1:A:3:ILE:HD12	1:A:67:LEU:HD12	0.57	1.75	17	2
1:A:8:LEU:CD1	1:A:70:VAL:HG13	0.56	2.29	20	3
1:A:19:PRO:HA	1:A:56:ALA:HB3	0.56	1.77	19	2
1:A:60:LYS:O	1:A:62:LEU:HD23	0.56	2.00	3	1
1:A:5:VAL:HB	1:A:15:ILE:HD11	0.55	1.78	2	1
1:A:61:ILE:HG23	1:A:65:SER:CB	0.55	2.31	19	17
1:A:66:VAL:HG13	1:A:66:VAL:O	0.55	2.02	19	1
1:A:2:LEU:HD13	1:A:15:ILE:O	0.55	2.02	20	1
1:A:61:ILE:HD13	1:A:67:LEU:CD2	0.55	2.32	15	3
1:A:45:TYR:CD2	1:A:67:LEU:HD23	0.53	2.38	8	2
1:A:2:LEU:HD23	1:A:3:ILE:N	0.53	2.18	9	1
1:A:17:ILE:HD12	1:A:17:ILE:O	0.53	2.03	6	2
1:A:56:ALA:HA	1:A:61:ILE:HD12	0.53	1.80	7	4
1:A:44:ILE:HD12	1:A:49:GLN:CD	0.53	2.24	8	1
1:A:42:ARG:HD2	1:A:44:ILE:HD11	0.53	1.80	5	1
1:A:30:VAL:HG11	1:A:41:GLN:OE1	0.52	2.05	2	1
1:A:3:ILE:CD1	1:A:67:LEU:HD12	0.52	2.35	7	1
1:A:43:LEU:HD11	1:A:67:LEU:HB3	0.52	1.82	1	2
1:A:42:ARG:HD3	1:A:44:ILE:HD11	0.51	1.82	19	1
1:A:5:VAL:HG11	1:A:15:ILE:HD11	0.51	1.81	6	2

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:8:LEU:HD22	1:A:70:VAL:HG23	0.51	1.82	18	1
1:A:17:ILE:HD13	1:A:21:ASP:OD1	0.51	2.06	18	1
1:A:3:ILE:HD12	1:A:67:LEU:CD1	0.50	2.37	2	2
1:A:23:VAL:HG13	1:A:43:LEU:HD23	0.50	1.83	19	1
1:A:17:ILE:HD13	1:A:26:ILE:HD11	0.50	1.84	2	1
1:A:17:ILE:HD13	1:A:26:ILE:CG1	0.49	2.37	11	2
1:A:22:LYS:CG	1:A:55:THR:HG22	0.49	2.38	6	6
1:A:15:ILE:HD13	1:A:30:VAL:HG22	0.48	1.84	10	1
1:A:62:LEU:HD13	1:A:62:LEU:H	0.48	1.67	20	1
1:A:15:ILE:HG23	1:A:33:LYS:HE2	0.47	1.87	7	1
1:A:50:MET:CE	1:A:61:ILE:HD11	0.47	2.40	2	2
1:A:50:MET:HE3	1:A:59:TYR:CD1	0.47	2.45	5	1
1:A:5:VAL:HG21	1:A:15:ILE:CD1	0.47	2.40	16	1
1:A:13:ILE:HD13	1:A:34:GLU:OE2	0.46	2.11	15	1
1:A:5:VAL:HG13	1:A:5:VAL:O	0.46	2.11	7	7
1:A:42:ARG:HB3	1:A:70:VAL:HG23	0.45	1.88	1	1
1:A:5:VAL:HG22	1:A:67:LEU:HD12	0.45	1.89	5	1
1:A:69:LEU:O	1:A:69:LEU:HD23	0.45	2.11	15	1
1:A:5:VAL:HG21	1:A:15:ILE:HD12	0.44	1.89	8	1
1:A:50:MET:CE	1:A:59:TYR:CD1	0.44	3.00	5	2
1:A:15:ILE:CD1	1:A:30:VAL:HG22	0.44	2.43	16	2
1:A:50:MET:CE	1:A:59:TYR:CD2	0.44	3.00	19	1
1:A:3:ILE:HD11	1:A:15:ILE:CD1	0.44	2.41	18	1
1:A:3:ILE:HD12	1:A:3:ILE:C	0.43	2.33	16	1
1:A:50:MET:CE	1:A:59:TYR:CG	0.43	3.01	2	1
1:A:61:ILE:HG23	1:A:65:SER:HB3	0.43	1.90	5	2
1:A:61:ILE:HG23	1:A:65:SER:HB2	0.42	1.91	11	3
1:A:61:ILE:CG2	1:A:67:LEU:HD21	0.42	2.44	15	1
1:A:8:LEU:HD12	1:A:8:LEU:C	0.42	2.35	12	1
1:A:50:MET:HE3	1:A:59:TYR:CD2	0.42	2.50	19	1
1:A:50:MET:HE3	1:A:61:ILE:HD11	0.42	1.91	14	2
1:A:22:LYS:HG2	1:A:55:THR:HG22	0.41	1.92	17	3
1:A:50:MET:HE3	1:A:59:TYR:CG	0.41	2.50	2	1
1:A:61:ILE:HG21	1:A:67:LEU:HD21	0.41	1.93	15	1
1:A:41:GLN:HB3	1:A:69:LEU:HD11	0.41	1.91	16	1
1:A:44:ILE:HD12	1:A:49:GLN:OE1	0.41	2.15	8	1
1:A:8:LEU:HD23	1:A:70:VAL:HA	0.41	1.92	11	1
1:A:45:TYR:CD2	1:A:67:LEU:CD2	0.41	3.04	8	1
1:A:8:LEU:HD13	1:A:70:VAL:HG23	0.41	1.93	18	1
1:A:8:LEU:CD2	1:A:70:VAL:HG13	0.40	2.44	14	1
1:A:3:ILE:HD12	1:A:3:ILE:O	0.40	2.17	16	1

6.3 Torsion angles (i)

6.3.1 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 PDB entries followed by that with respect to all NMR entries. 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	69/76 (91%)	64±2 (93±3%)	4±2 (6±3%)	0±0 (1±1%)	26 73
All	All	1380/1520 (91%)	1281 (93%)	89 (6%)	10 (1%)	26 73

All 2 unique Ramachandran outliers are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type	Models (Total)
1	A	60	LYS	8
1	A	10	GLY	2

6.3.2 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 PDB entries followed by that with respect to all NMR entries. 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	63/66 (95%)	51±2 (81±4%)	12±2 (19±4%)	4 35
All	All	1260/1320 (95%)	1018 (81%)	242 (19%)	4 35

All 38 unique residues with a non-rotameric sidechain are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type	Models (Total)
1	A	7	THR	20
1	A	15	ILE	20
1	A	60	LYS	20
1	A	11	LYS	15
1	A	27	LYS	13
1	A	1	MET	11
1	A	29	ARG	11
1	A	42	ARG	10

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Mol	Chain	Res	Type	Models (Total)
1	A	46	SER	10
1	A	33	LYS	8
1	A	25	ARG	8
1	A	49	GLN	7
1	A	2	LEU	6
1	A	58	ASP	6
1	A	4	LYS	6
1	A	8	LEU	6
1	A	62	LEU	6
1	A	48	LYS	6
1	A	6	LYS	6
1	A	34	GLU	5
1	A	65	SER	5
1	A	24	GLU	5
1	A	9	THR	4
1	A	12	GLU	3
1	A	31	GLU	3
1	A	21	ASP	3
1	A	69	LEU	3
1	A	39	GLN	2
1	A	70	VAL	2
1	A	54	LYS	2
1	A	68	HIS	2
1	A	51	ASN	2
1	A	14	GLU	1
1	A	18	GLU	1
1	A	50	MET	1
1	A	52	ASP	1
1	A	16	ASP	1
1	A	67	LEU	1

6.3.3 RNA (i)

There are no RNA molecules in this entry.

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

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

6.5 Carbohydrates (i)

There are no monosaccharides in this entry.

6.6 Ligand geometry (i)

There are no ligands in this entry.

6.7 Other polymers (i)

There are no such molecules in this entry.

6.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

7 Chemical shift validation (i)

No chemical shift data were provided