Full wwPDB NMR Structure Validation Report (i)

Aug 10, 2023 – 07:40 PM EDT

PDB ID	:	7U8K
BMRB ID	:	30877
Title	:	Magic Angle Spinning NMR Structure of Human Cofilin-2 Assembled on Actin Filaments
Authors	:	Kraus, J.; Russell, R.; Kudryashova, E.; Xu, C.; Katyal, N.; Kudryashov, D.; Perilla, J.R.; Polenova, T.
Deposited on	:	2022-03-08

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 types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

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

Cyrange	:	FAILED
NmrClust	:	FAILED
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
wwPDB-RCI	:	FAILED
PANAV	:	FAILED
wwPDB-ShiftChecker	:	FAILED
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.35

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
SOLID-STATE NMR

The overall completeness of chemical shifts assignment was not calculated.

There are no overall percentile quality scores available for this entry.

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	377	100%
1	B	377	100%
1	C	377	100%
1	D	377	100%
1	E	377	100%
1	F	377	100%
1	G	377	100%
1	H	377	100%
1	I	377	100%
1	J	377	100%
2	K	168	100%
2	L	168	100%
2	M	168	100%
2	N	168	100%
2	O	168	100%
2	P	168	100%
2	Q	168	100%

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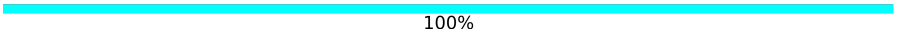
Mol	Chain	Length	Quality of chain
2	R	168	

2 Ensemble composition and analysis (i)

This entry contains 4 models. The atoms present in the NMR models are not consistent. Some calculations may have failed as a result. All residues are included in the validation scores.

Cyrange was unable to find well-defined residues.

Error message: Cyrange did not run

NmrClust was unable to cluster the ensemble.

Error message: NmrClust did not run

3 Entry composition (i)

There are 2 unique types of molecules in this entry. The entry contains 79778 atoms, of which 39858 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called Actin, alpha skeletal muscle.

Mol	Chain	Residues	Atoms						Trace
1	A	377	Total	C	H	N	O	S	1
			5833	1856	2897	494	565	21	
1	B	377	Total	C	H	N	O	S	1
			5833	1856	2897	494	565	21	
1	C	377	Total	C	H	N	O	S	1
			5833	1856	2897	494	565	21	
1	D	377	Total	C	H	N	O	S	1
			5833	1856	2897	494	565	21	
1	E	377	Total	C	H	N	O	S	1
			5833	1856	2897	494	565	21	
1	F	377	Total	C	H	N	O	S	1
			5833	1856	2897	494	565	21	
1	G	377	Total	C	H	N	O	S	1
			5833	1856	2897	494	565	21	
1	H	377	Total	C	H	N	O	S	1
			5833	1856	2897	494	565	21	
1	I	377	Total	C	H	N	O	S	1
			5833	1856	2897	494	565	21	
1	J	377	Total	C	H	N	O	S	1
			5833	1856	2897	494	565	21	

There are 20 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	0	ACE	-	acetylation	UNP P68135
A	376	NH2	-	amidation	UNP P68135
B	0	ACE	-	acetylation	UNP P68135
B	376	NH2	-	amidation	UNP P68135
C	0	ACE	-	acetylation	UNP P68135
C	376	NH2	-	amidation	UNP P68135
D	0	ACE	-	acetylation	UNP P68135
D	376	NH2	-	amidation	UNP P68135
E	0	ACE	-	acetylation	UNP P68135
E	376	NH2	-	amidation	UNP P68135
F	0	ACE	-	acetylation	UNP P68135
F	376	NH2	-	amidation	UNP P68135
G	0	ACE	-	acetylation	UNP P68135

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Chain	Residue	Modelled	Actual	Comment	Reference
G	376	NH2	-	amidation	UNP P68135
H	0	ACE	-	acetylation	UNP P68135
H	376	NH2	-	amidation	UNP P68135
I	0	ACE	-	acetylation	UNP P68135
I	376	NH2	-	amidation	UNP P68135
J	0	ACE	-	acetylation	UNP P68135
J	376	NH2	-	amidation	UNP P68135

- Molecule 2 is a protein called Cofilin-2.

Mol	Chain	Residues	Atoms						Trace
2	K	168	Total	C	H	N	O	S	1
			2681	842	1361	218	255	5	
2	L	168	Total	C	H	N	O	S	1
			2681	842	1361	218	255	5	
2	M	168	Total	C	H	N	O	S	1
			2681	842	1361	218	255	5	
2	N	168	Total	C	H	N	O	S	1
			2681	842	1361	218	255	5	
2	O	168	Total	C	H	N	O	S	1
			2681	842	1361	218	255	5	
2	P	168	Total	C	H	N	O	S	1
			2681	842	1361	218	255	5	
2	Q	168	Total	C	H	N	O	S	1
			2681	842	1361	218	255	5	
2	R	168	Total	C	H	N	O	S	1
			2681	842	1361	218	255	5	

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
K	0	ACE	-	acetylation	UNP Q9Y281
K	167	NH2	-	amidation	UNP Q9Y281
L	0	ACE	-	acetylation	UNP Q9Y281
L	167	NH2	-	amidation	UNP Q9Y281
M	0	ACE	-	acetylation	UNP Q9Y281
M	167	NH2	-	amidation	UNP Q9Y281
N	0	ACE	-	acetylation	UNP Q9Y281
N	167	NH2	-	amidation	UNP Q9Y281
O	0	ACE	-	acetylation	UNP Q9Y281
O	167	NH2	-	amidation	UNP Q9Y281
P	0	ACE	-	acetylation	UNP Q9Y281

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Chain	Residue	Modelled	Actual	Comment	Reference
P	167	NH2	-	amidation	UNP Q9Y281
Q	0	ACE	-	acetylation	UNP Q9Y281
Q	167	NH2	-	amidation	UNP Q9Y281
R	0	ACE	-	acetylation	UNP Q9Y281
R	167	NH2	-	amidation	UNP Q9Y281

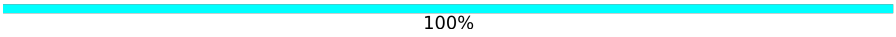
4 Residue-property plots

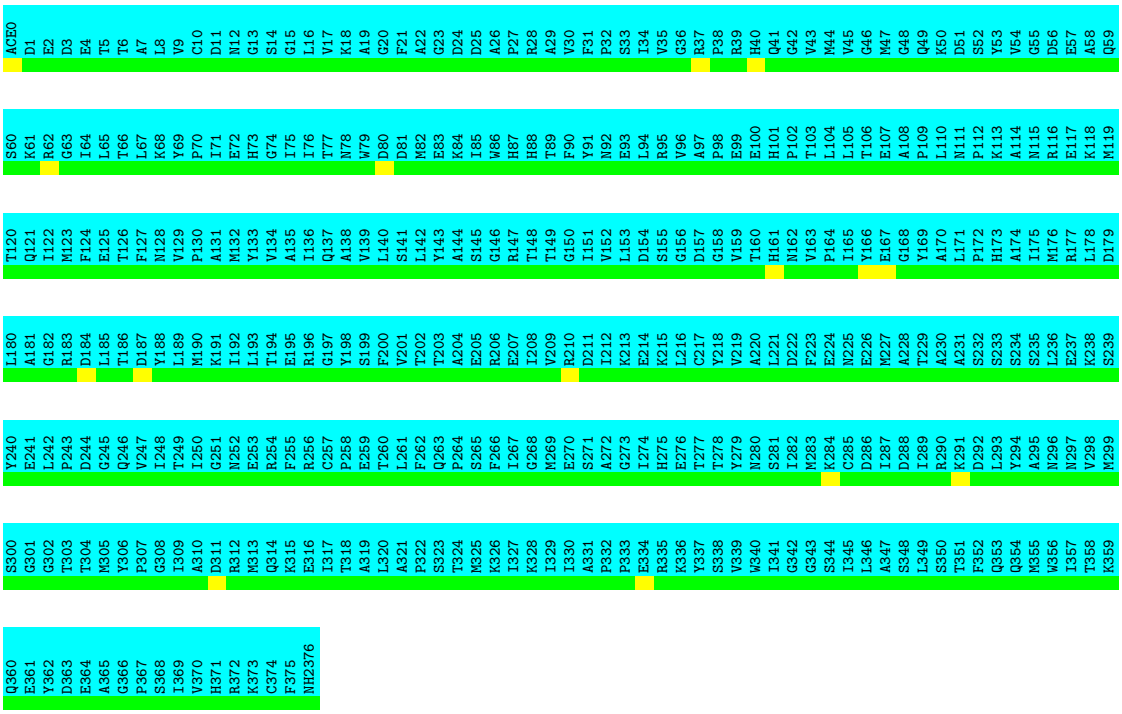
4.1 Average score per residue in the NMR ensemble

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: Actin, alpha skeletal muscle

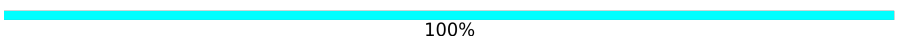
Chain A:

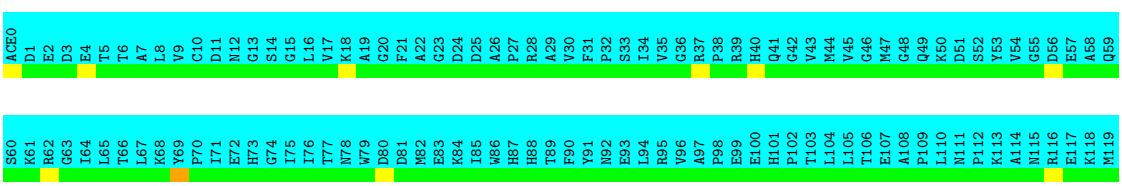


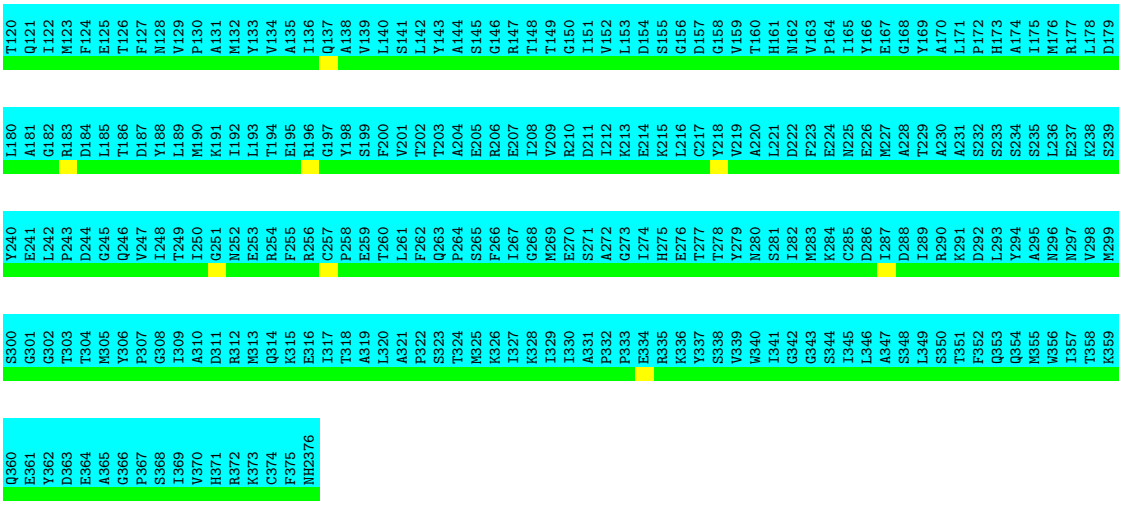


• Molecule 1: Actin, alpha skeletal muscle

Chain B:

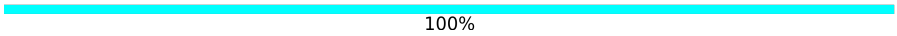


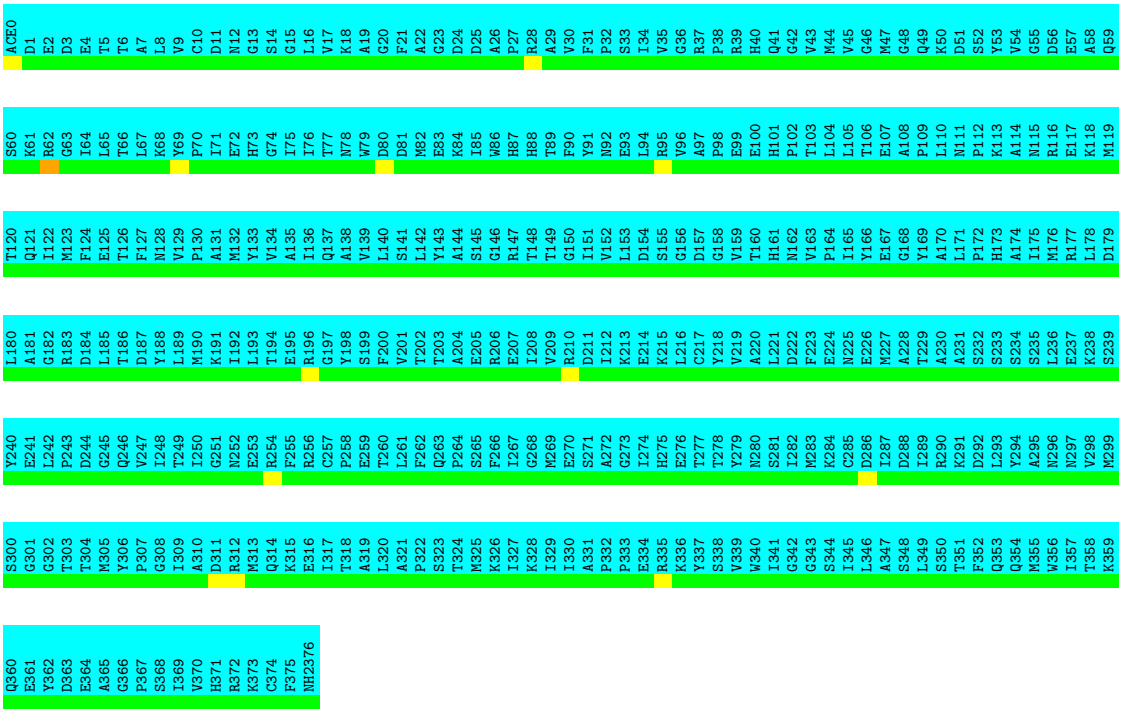




• Molecule 1: Actin, alpha skeletal muscle

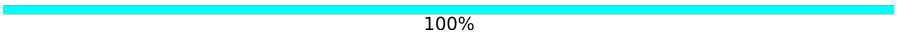
Chain C:

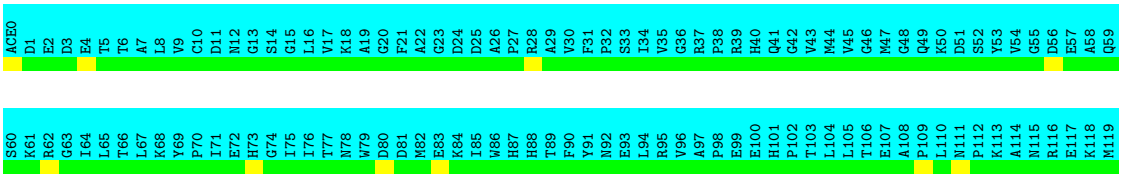


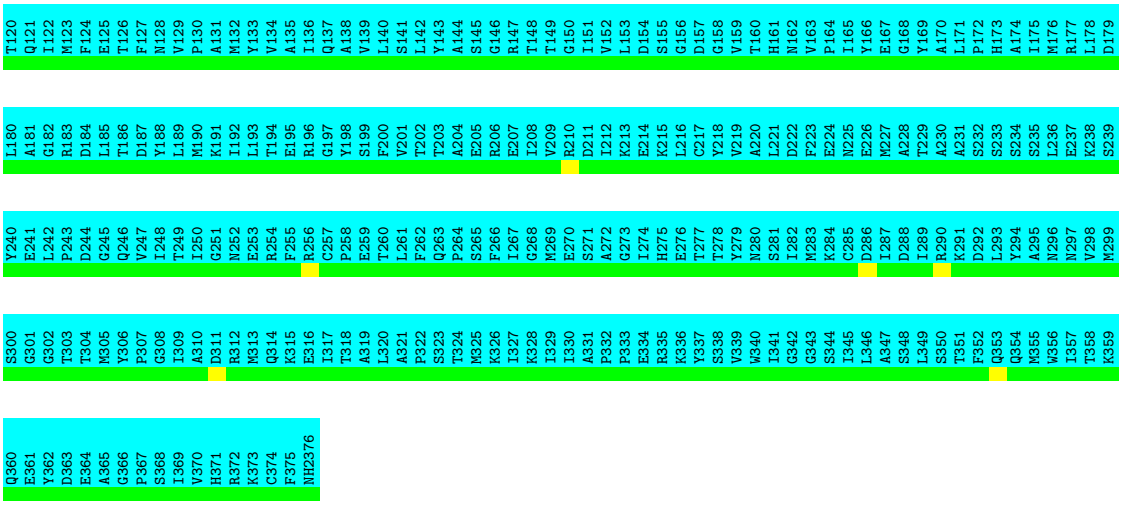


• Molecule 1: Actin, alpha skeletal muscle

Chain D:

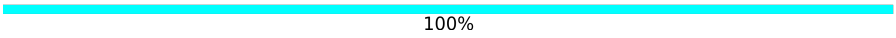


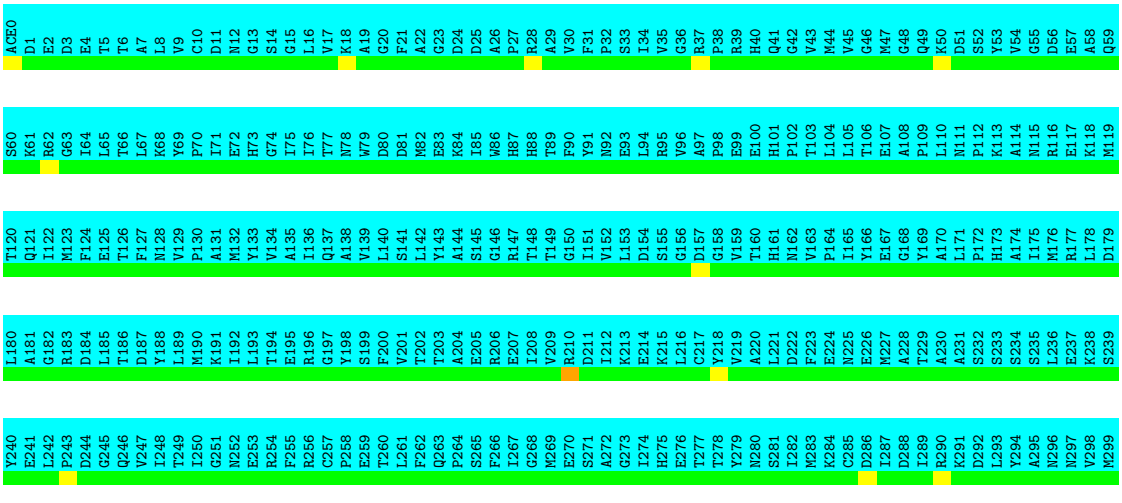




• Molecule 1: Actin, alpha skeletal muscle

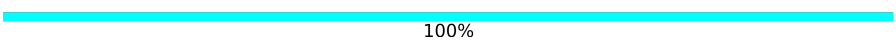
Chain E:

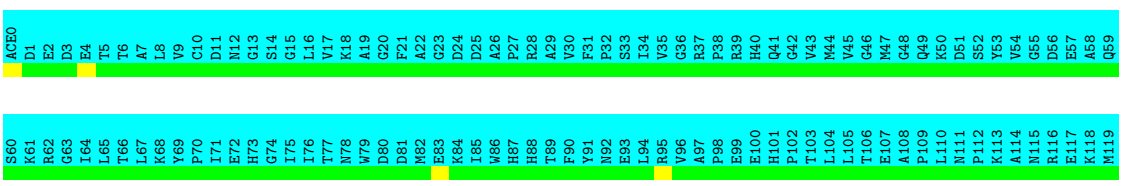


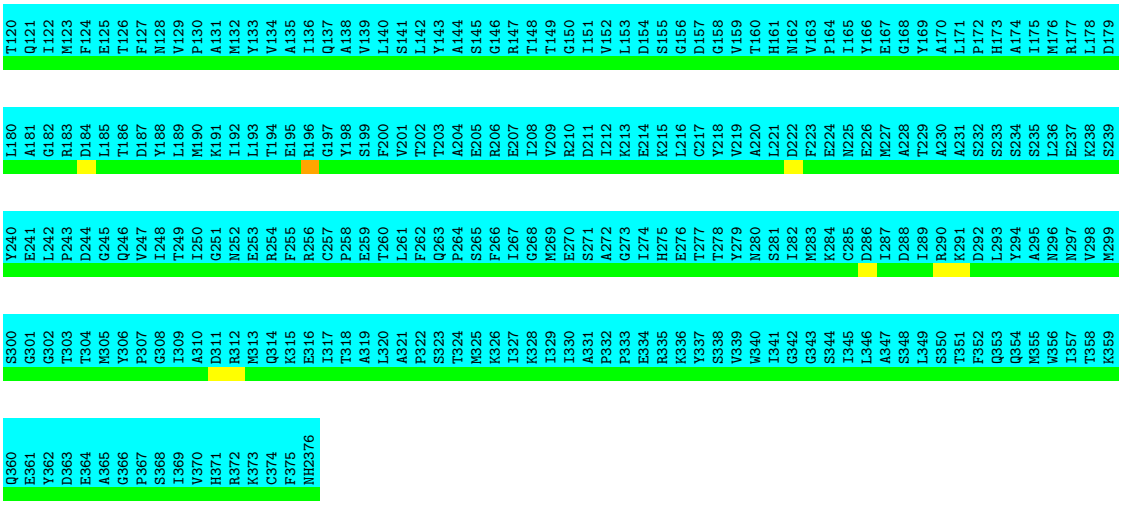


• Molecule 1: Actin, alpha skeletal muscle

Chain F:

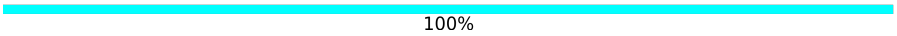


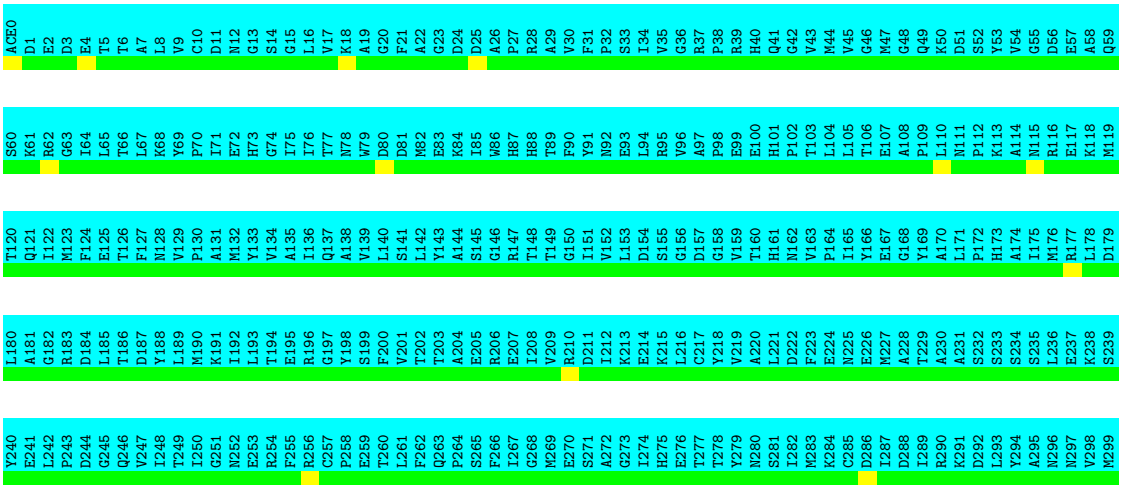




• Molecule 1: Actin, alpha skeletal muscle

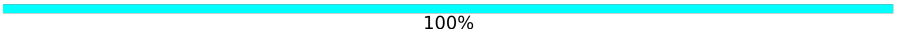
Chain G:

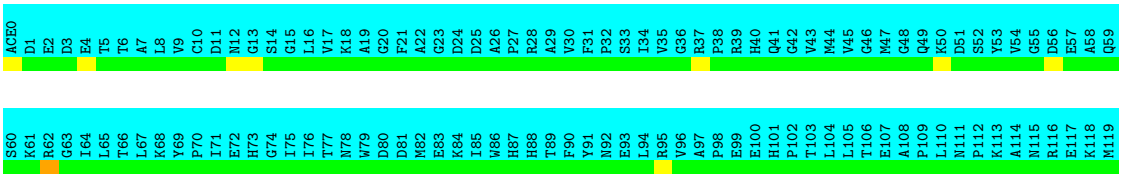


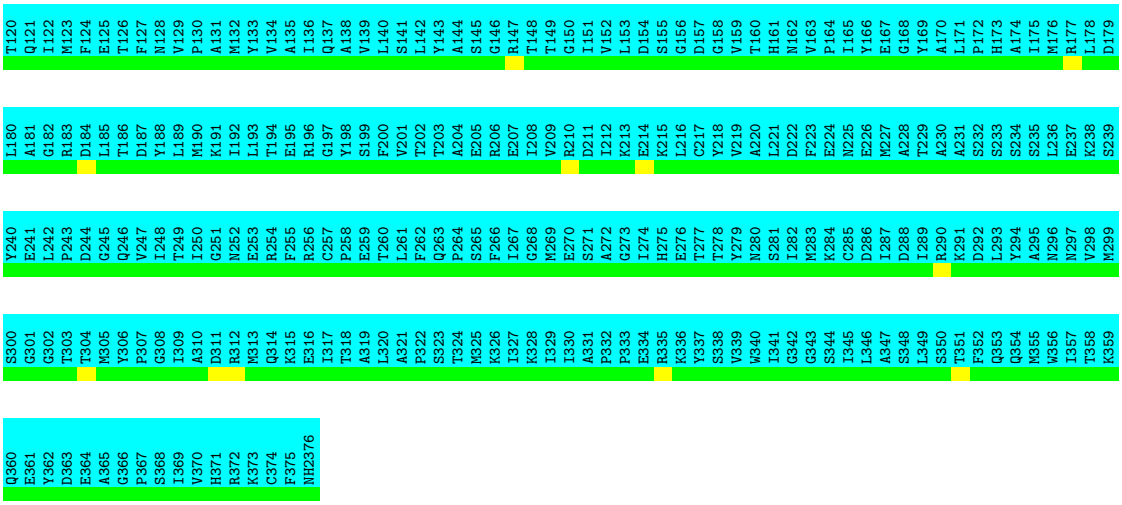


• Molecule 1: Actin, alpha skeletal muscle

Chain H:

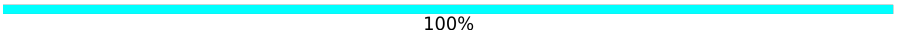


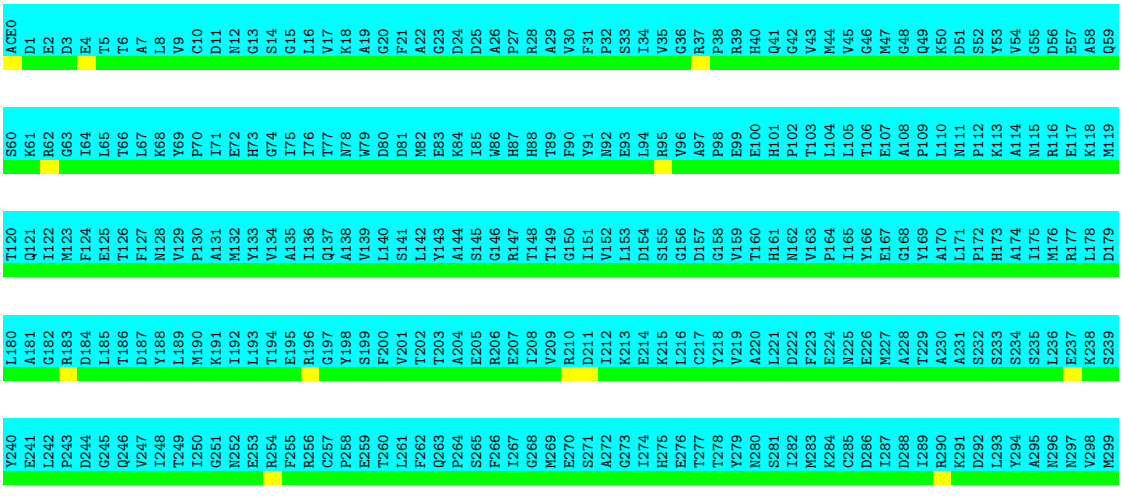




• Molecule 1: Actin, alpha skeletal muscle

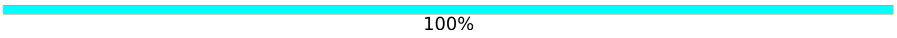
Chain I:

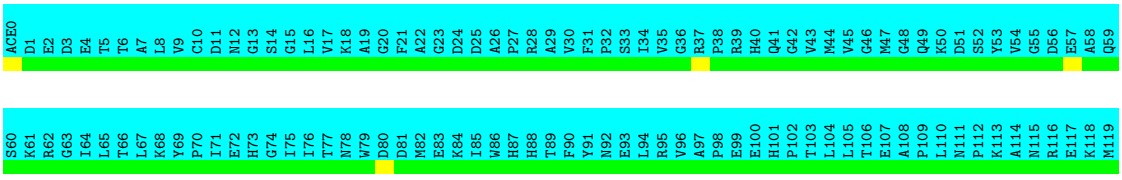


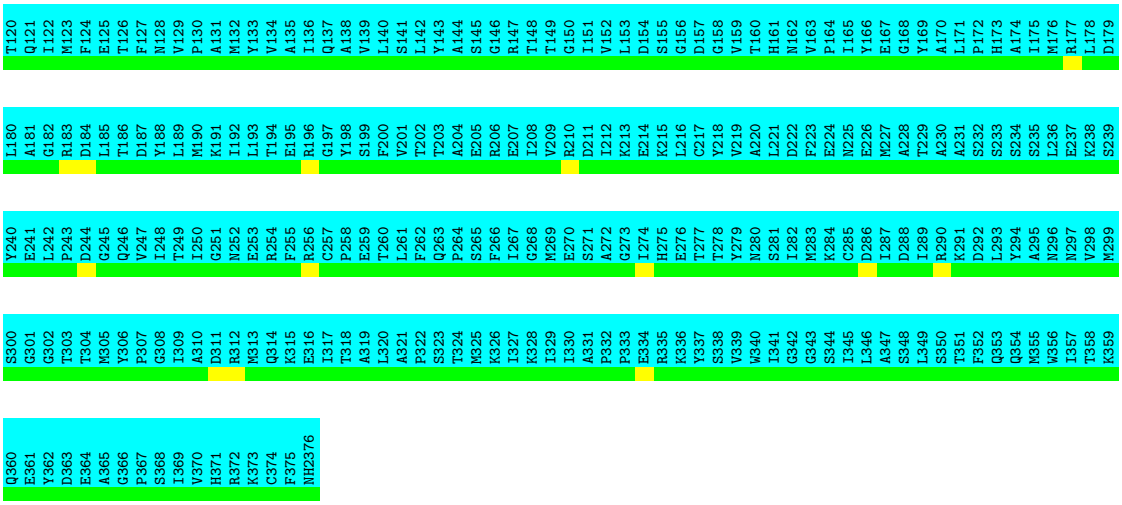


• Molecule 1: Actin, alpha skeletal muscle

Chain J:

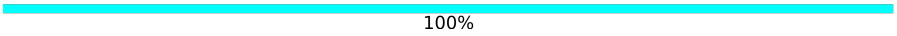


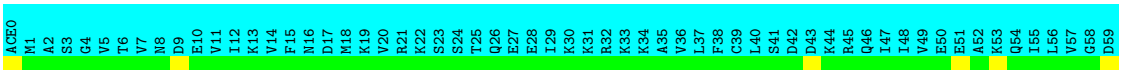


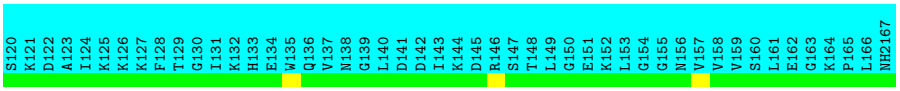


• Molecule 2: Cofilin-2

Chain K:

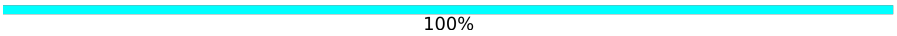


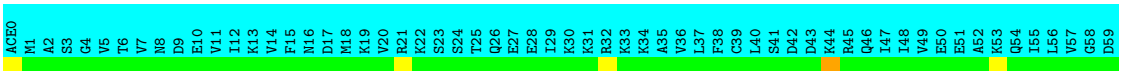


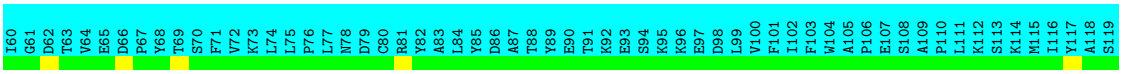


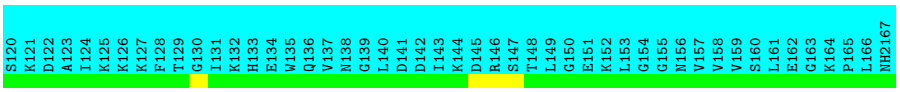
• Molecule 2: Cofilin-2

Chain L:



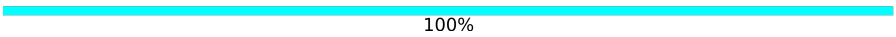


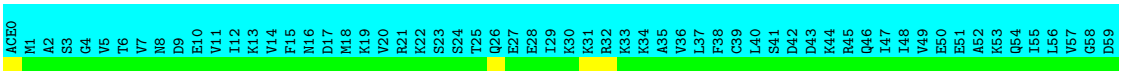


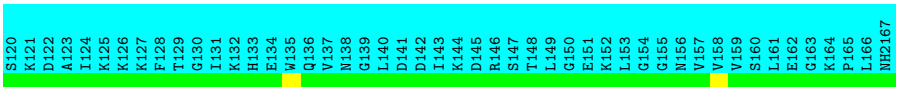


• Molecule 2: Cofilin-2

Chain M:

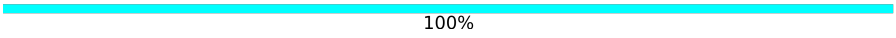


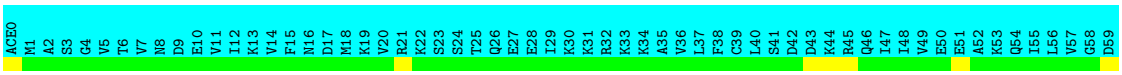


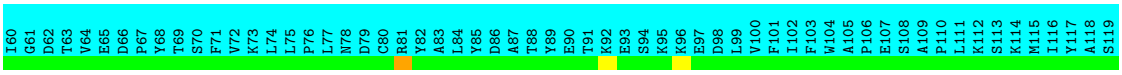


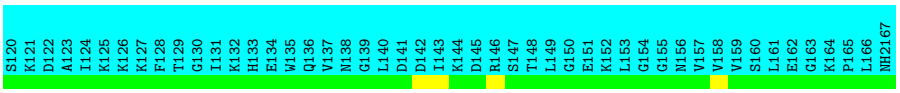
• Molecule 2: Cofilin-2

Chain N:



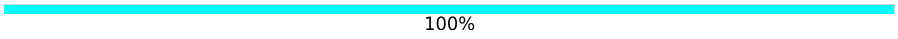


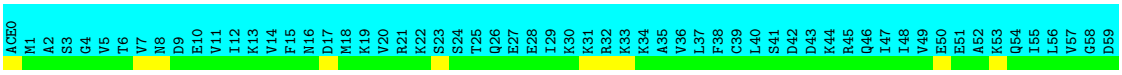


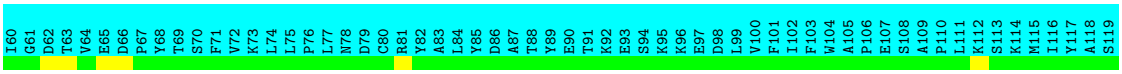


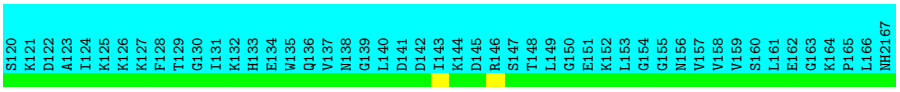
• Molecule 2: Cofilin-2

Chain O:



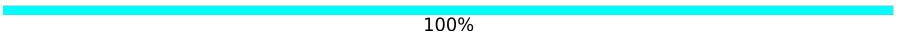


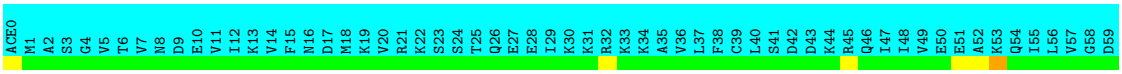


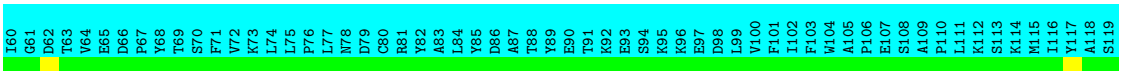


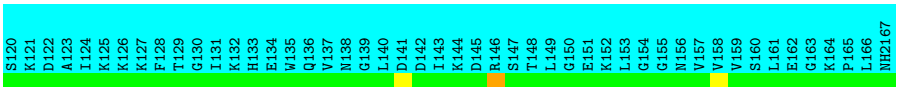
• Molecule 2: Cofilin-2

Chain P:



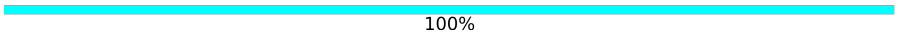


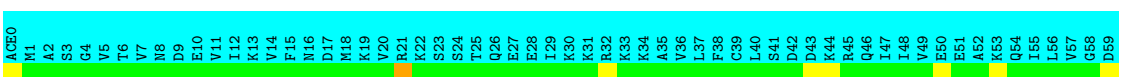


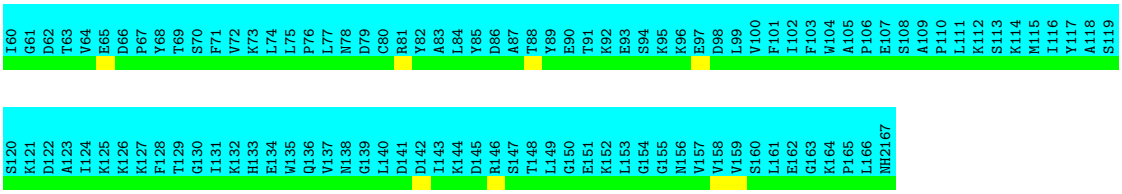


• Molecule 2: Cofilin-2

Chain Q:

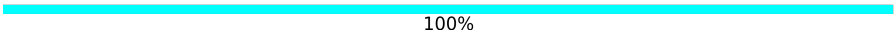


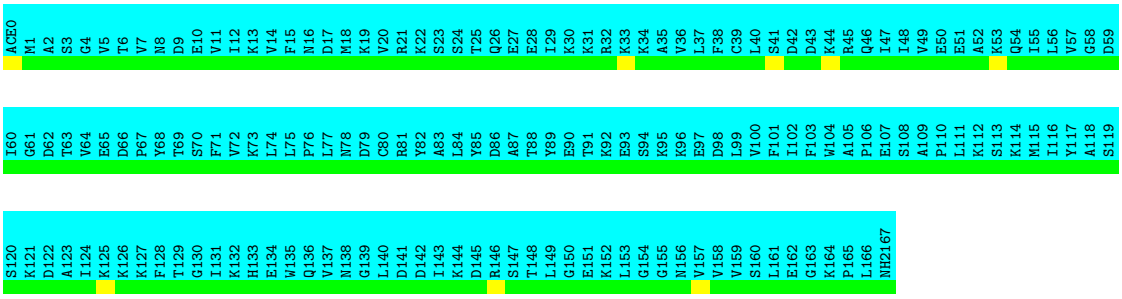




- Molecule 2: Cofilin-2

Chain R:





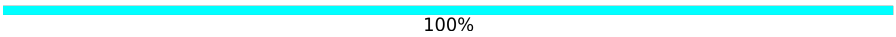
4.2 Scores per residue for each member of the ensemble

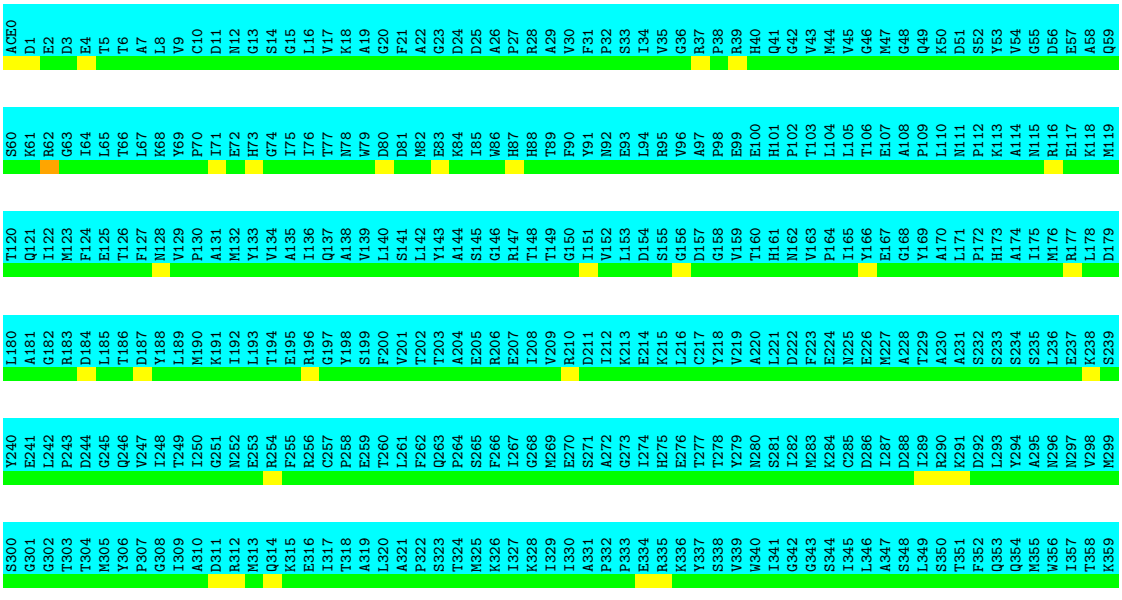
Colouring as in section 4.1 above.

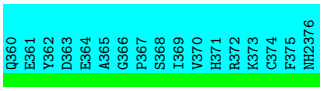
4.2.1 Score per residue for model 1

- Molecule 1: Actin, alpha skeletal muscle

Chain A:

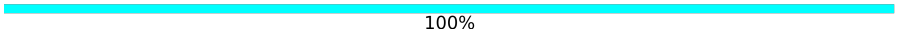


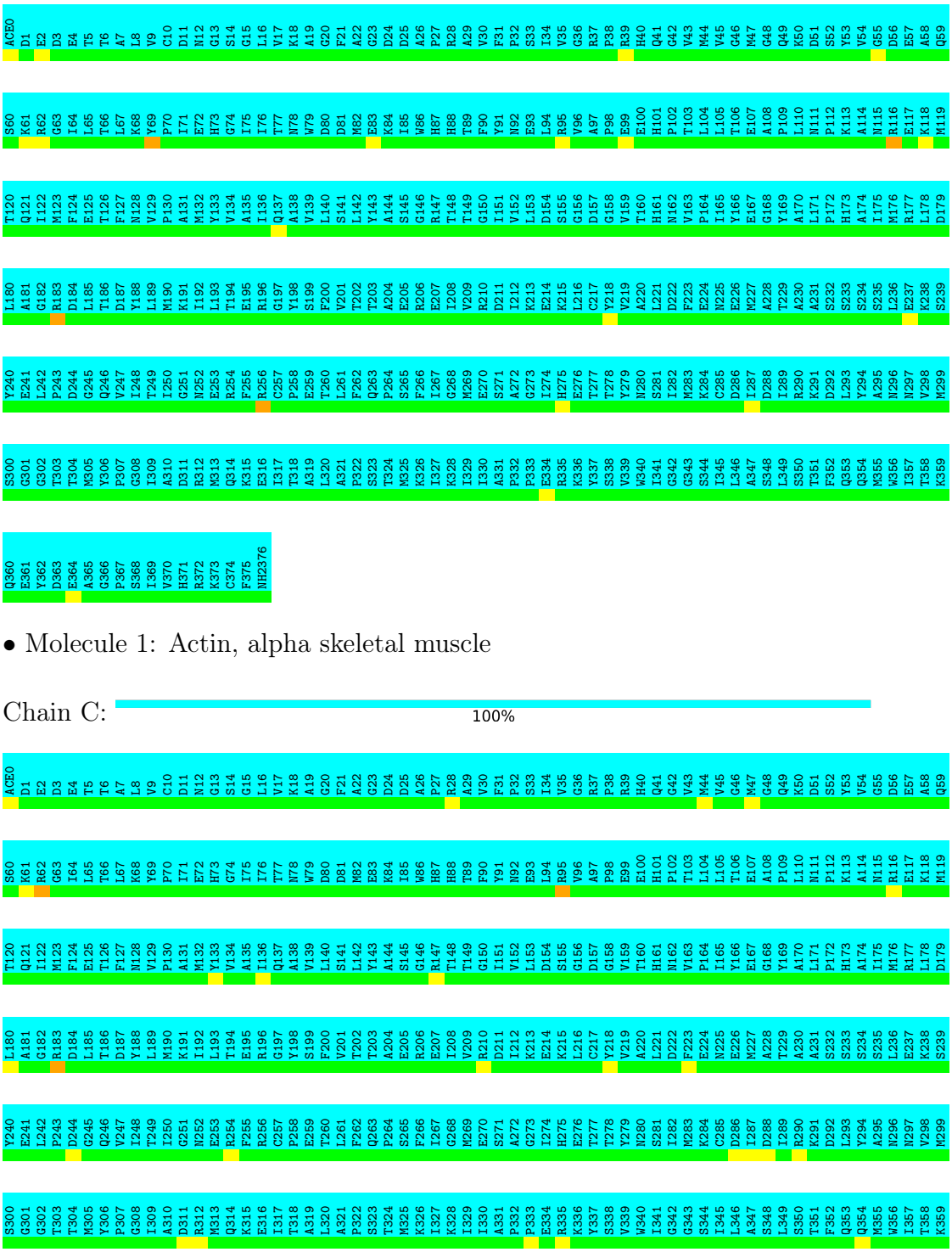




• Molecule 1: Actin, alpha skeletal muscle

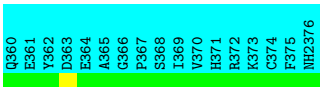
Chain B:





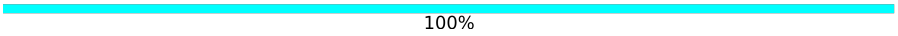
• Molecule 1: Actin, alpha skeletal muscle

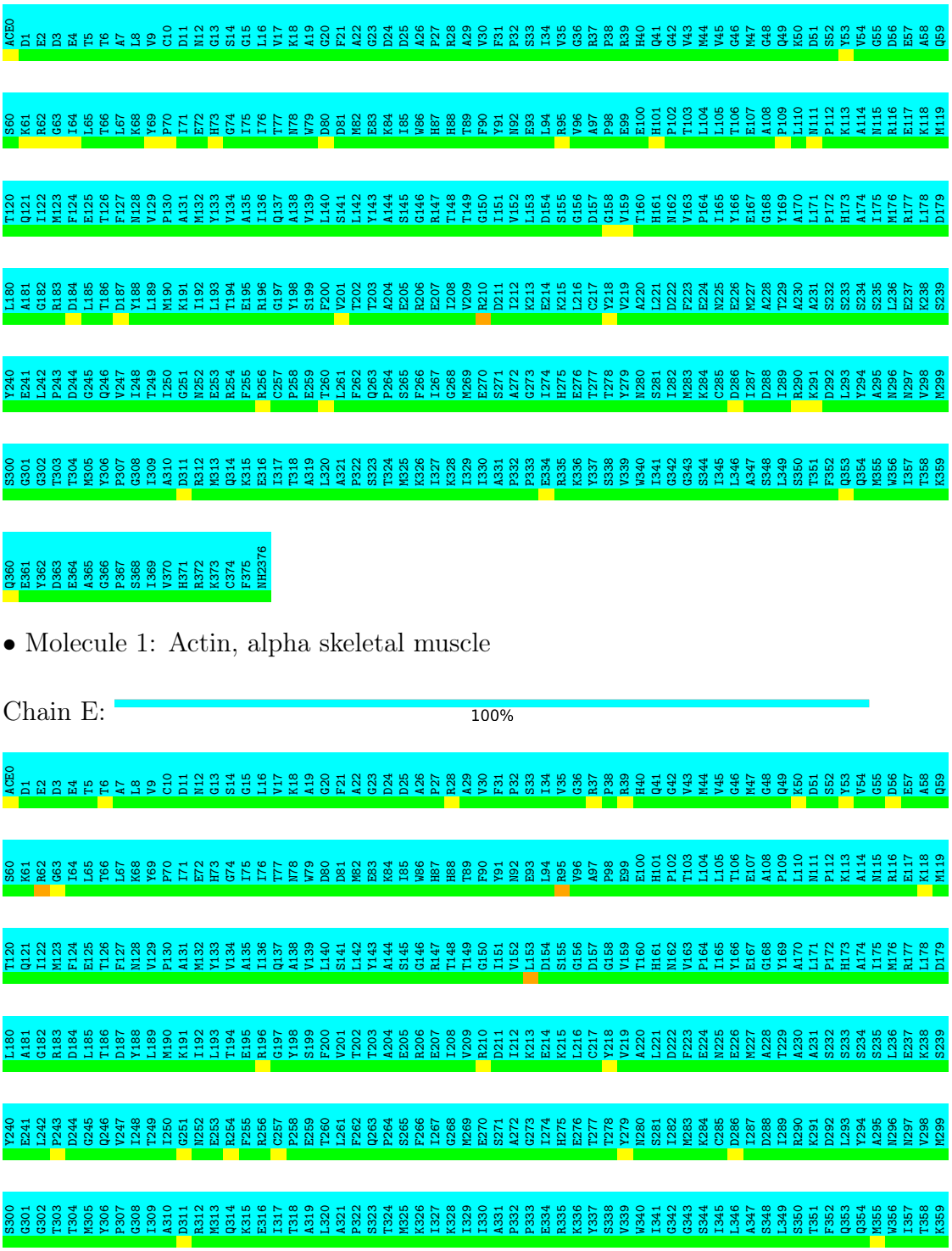
Chain C:



• Molecule 1: Actin, alpha skeletal muscle

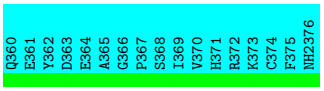
Chain D:





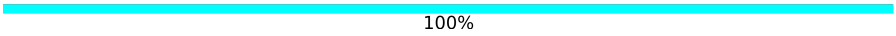
• Molecule 1: Actin, alpha skeletal muscle

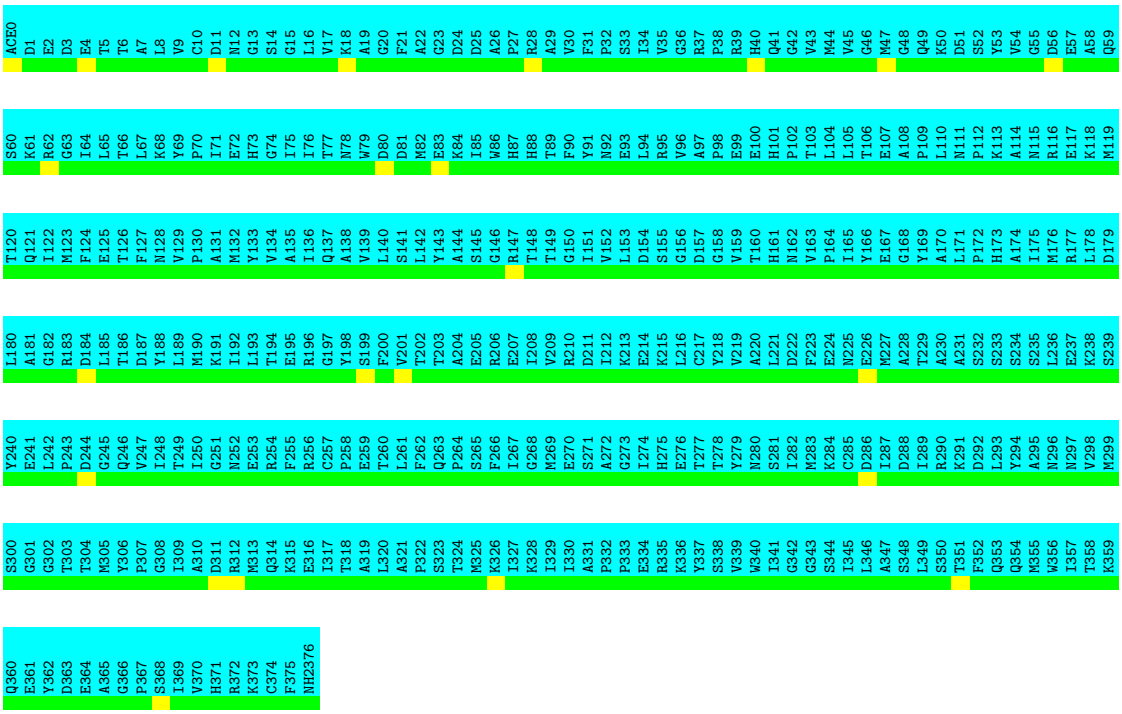
Chain E:



• Molecule 1: Actin, alpha skeletal muscle

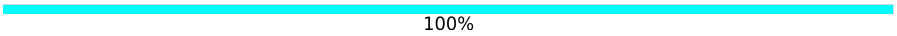
Chain F:

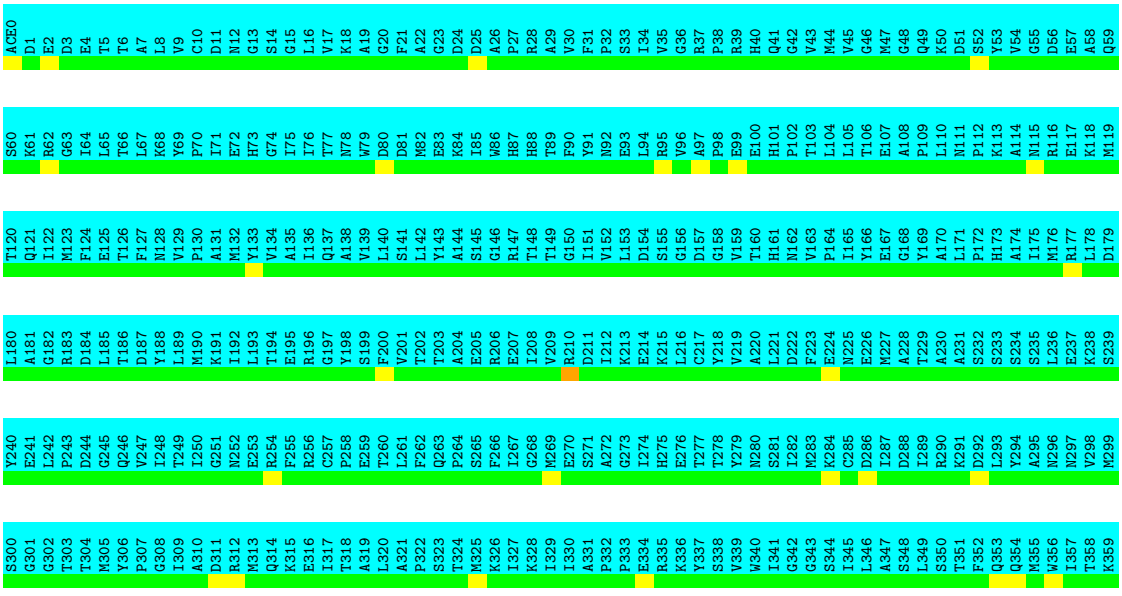


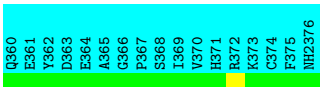


• Molecule 1: Actin, alpha skeletal muscle

Chain G:

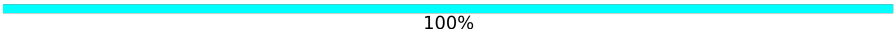






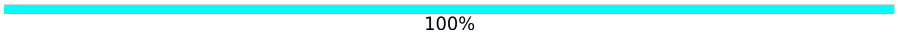
• Molecule 1: Actin, alpha skeletal muscle

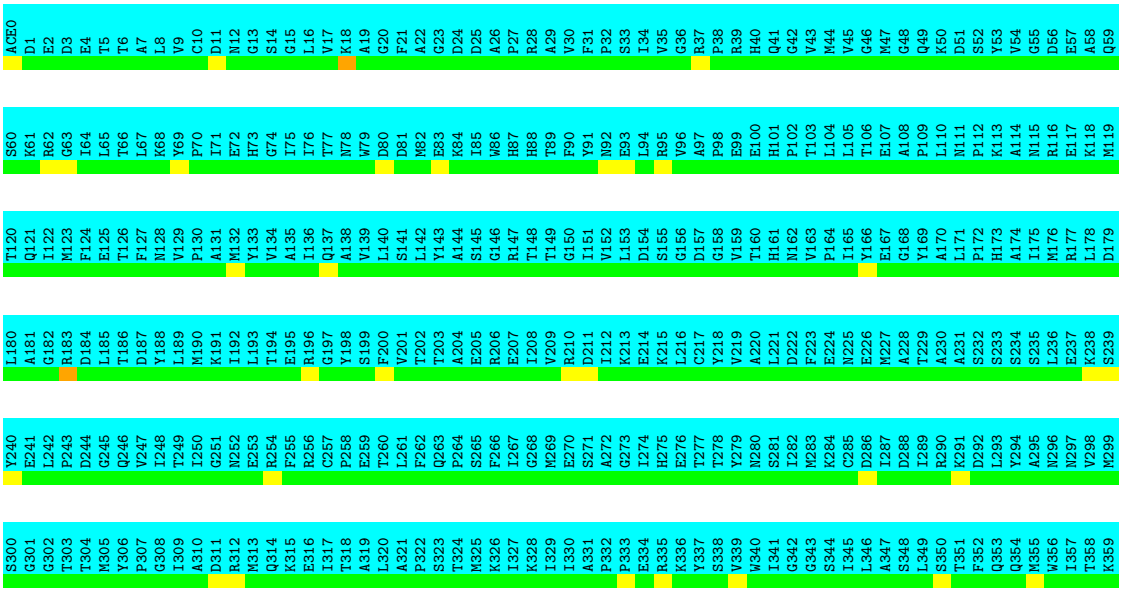
Chain H:

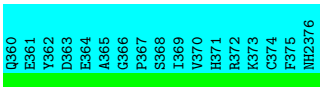


• Molecule 1: Actin, alpha skeletal muscle

Chain I:

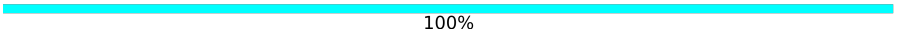


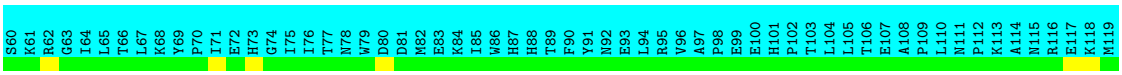


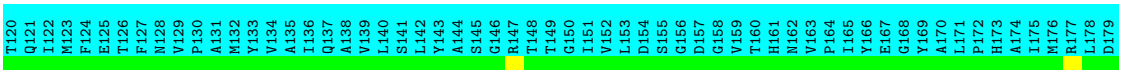


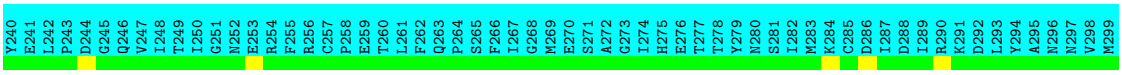
• Molecule 1: Actin, alpha skeletal muscle

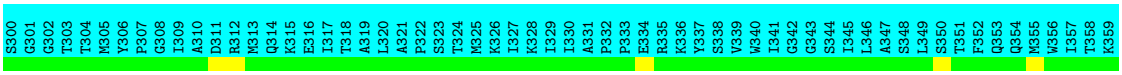
Chain J:

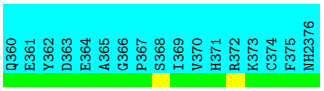






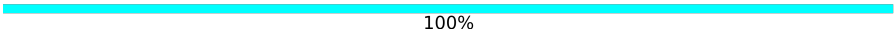


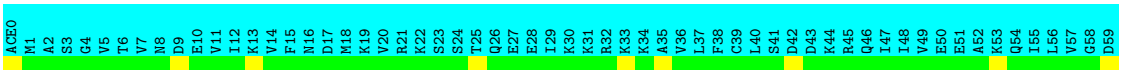


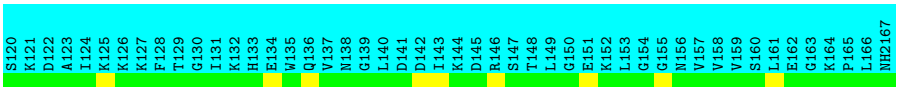


• Molecule 2: Cofilin-2

Chain K:

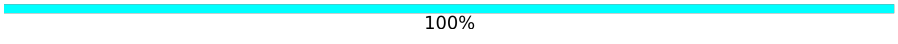


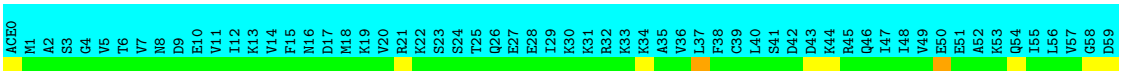


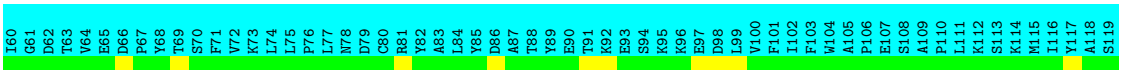


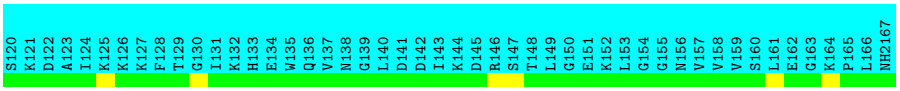
• Molecule 2: Cofilin-2

Chain L:



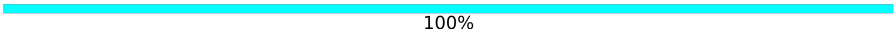


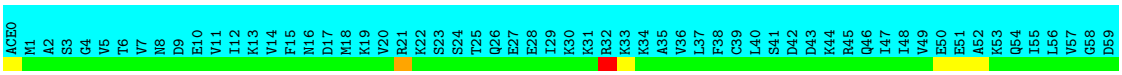


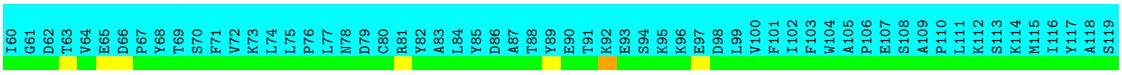


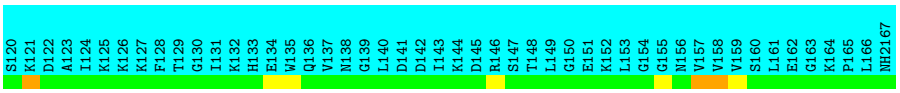
• Molecule 2: Cofilin-2

Chain M:



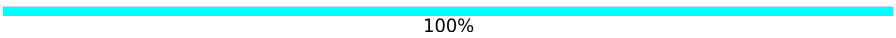


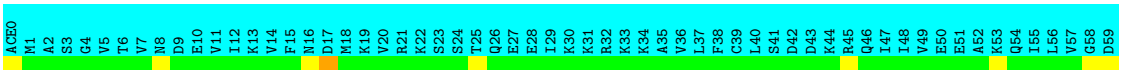


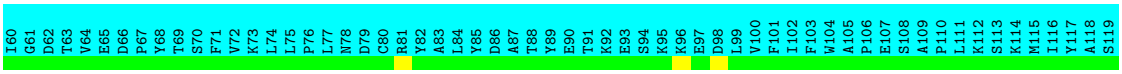


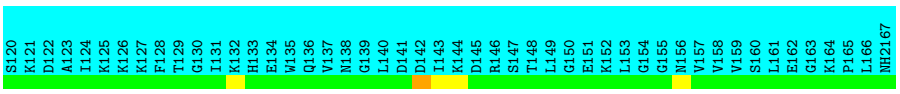
• Molecule 2: Cofilin-2

Chain N:



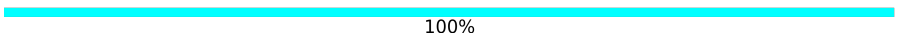


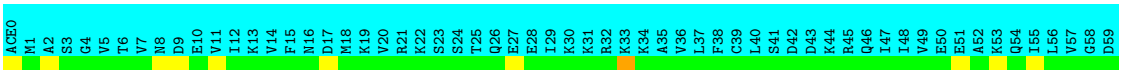


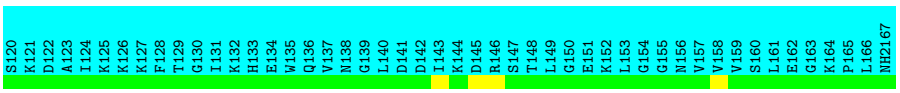


• Molecule 2: Cofilin-2

Chain O:

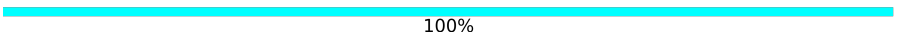


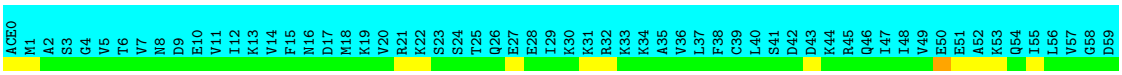


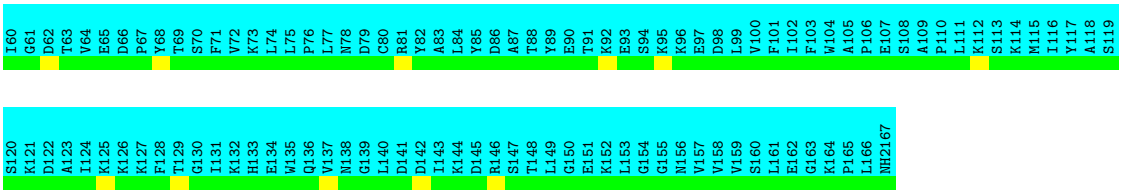


• Molecule 2: Cofilin-2

Chain P:

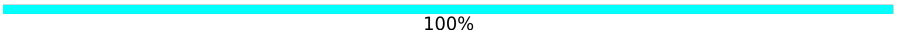


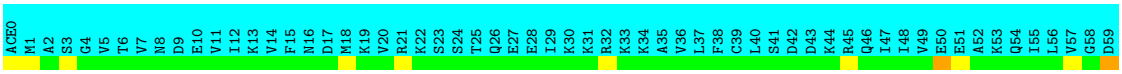


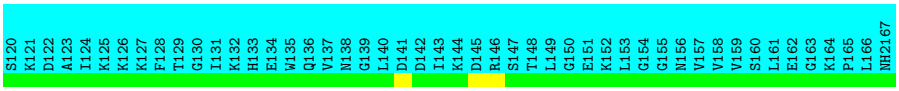


• Molecule 2: Cofilin-2

Chain Q:

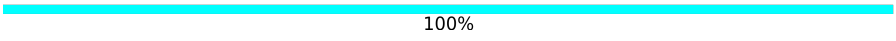


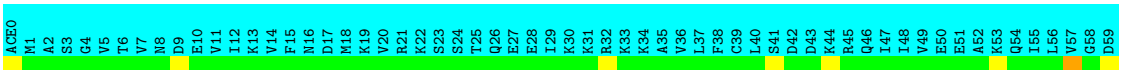


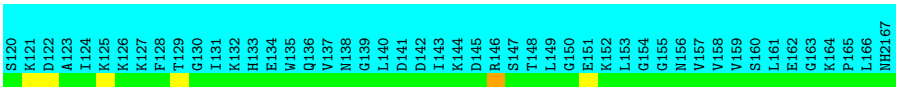


• Molecule 2: Cofilin-2

Chain R:



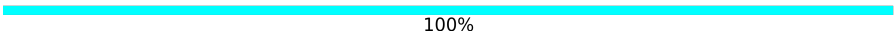


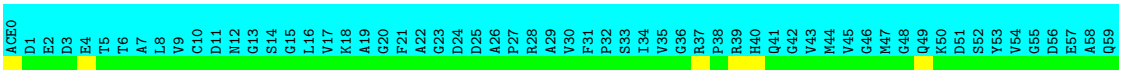


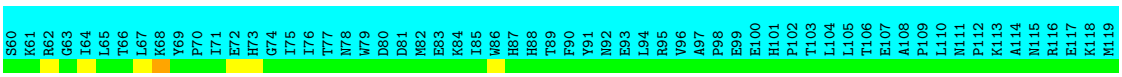
4.2.2 Score per residue for model 2

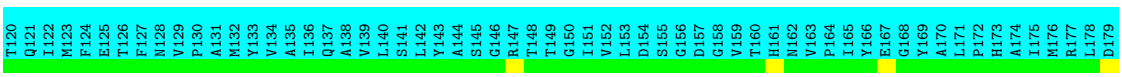
• Molecule 1: Actin, alpha skeletal muscle

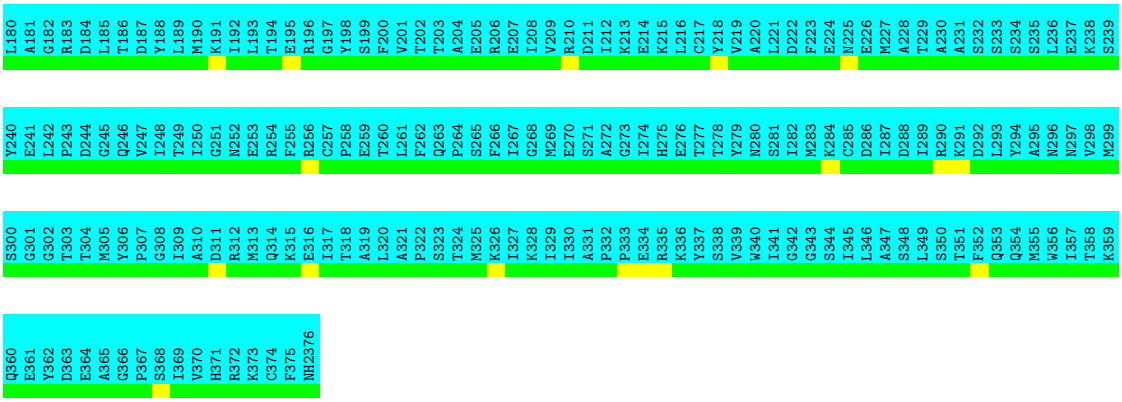
Chain A:





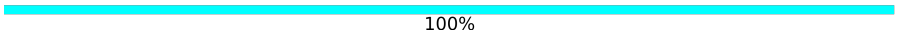


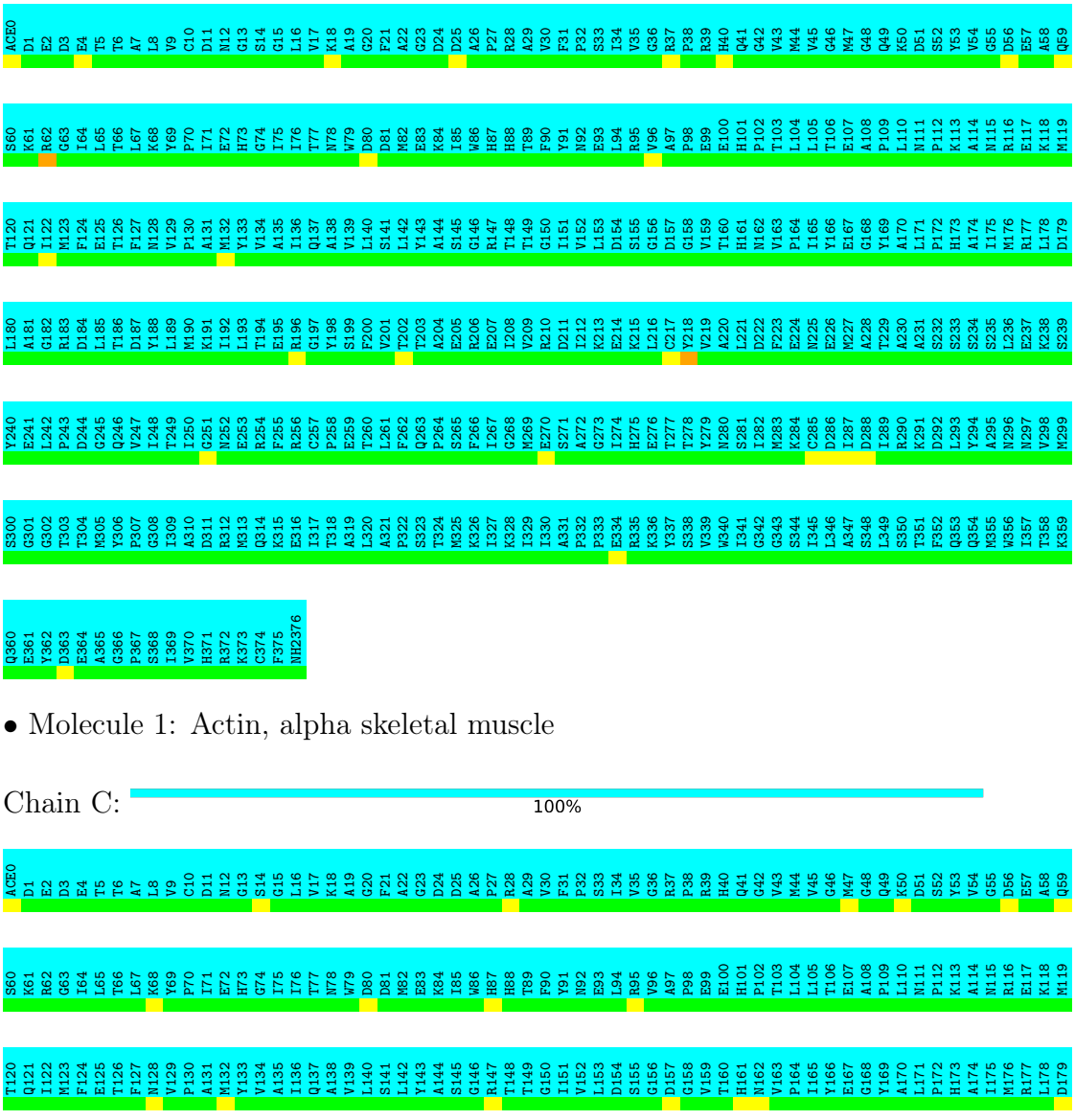




• Molecule 1: Actin, alpha skeletal muscle

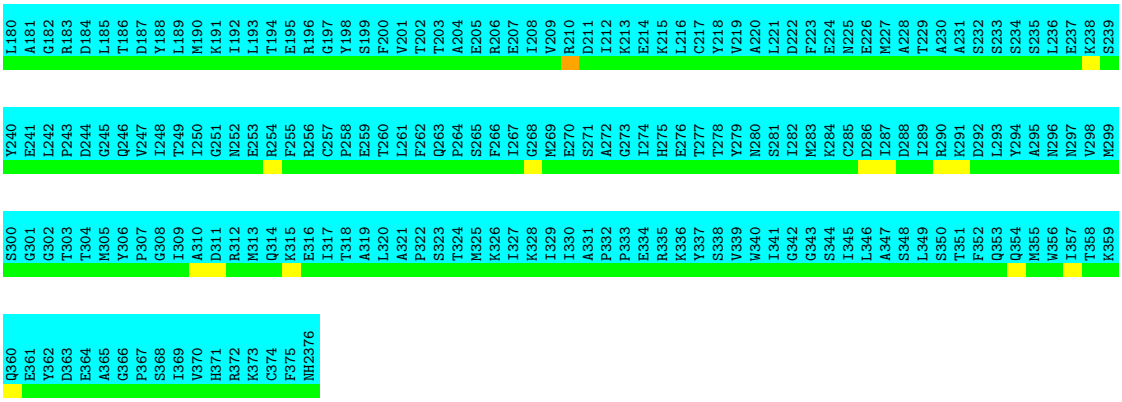
Chain B:





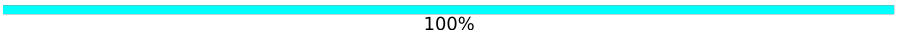
• Molecule 1: Actin, alpha skeletal muscle

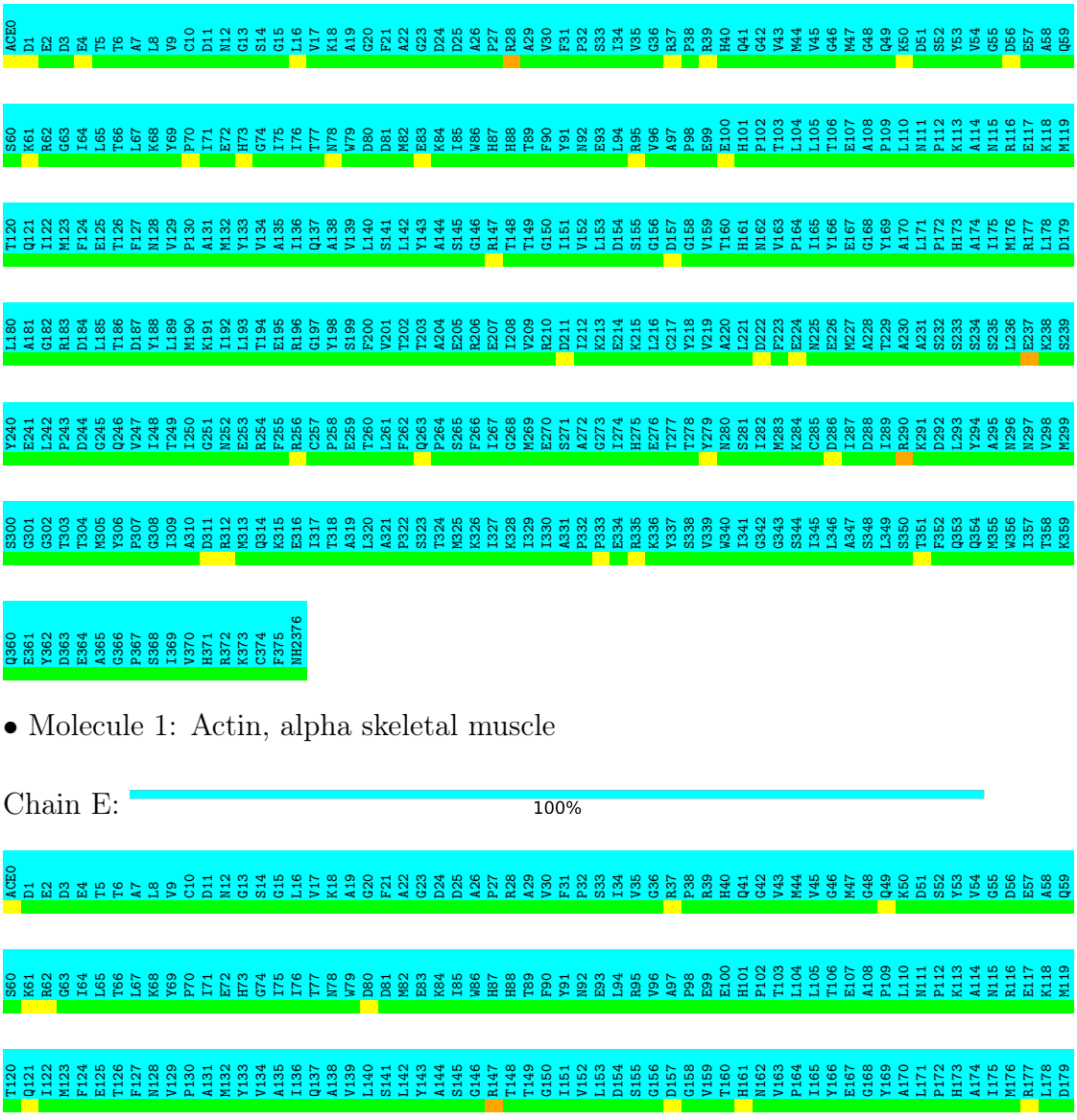
Chain C:



• Molecule 1: Actin, alpha skeletal muscle

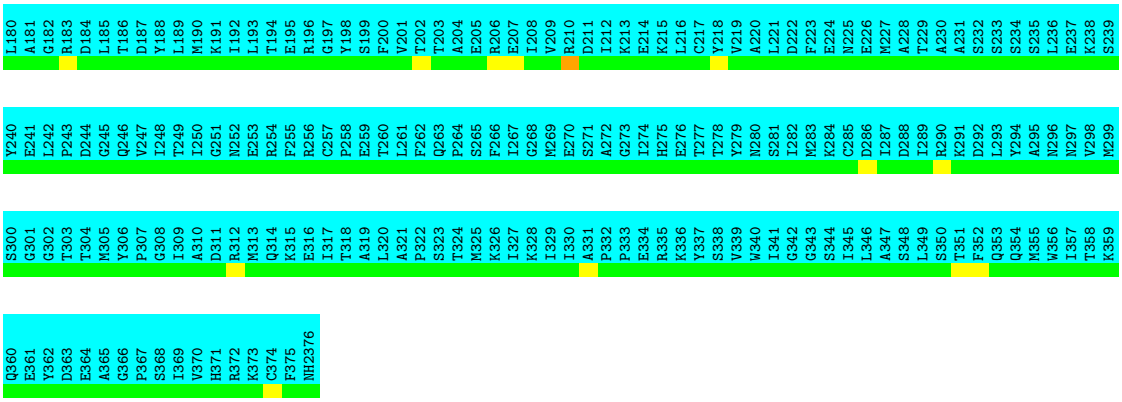
Chain D:





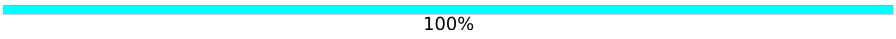
• Molecule 1: Actin, alpha skeletal muscle

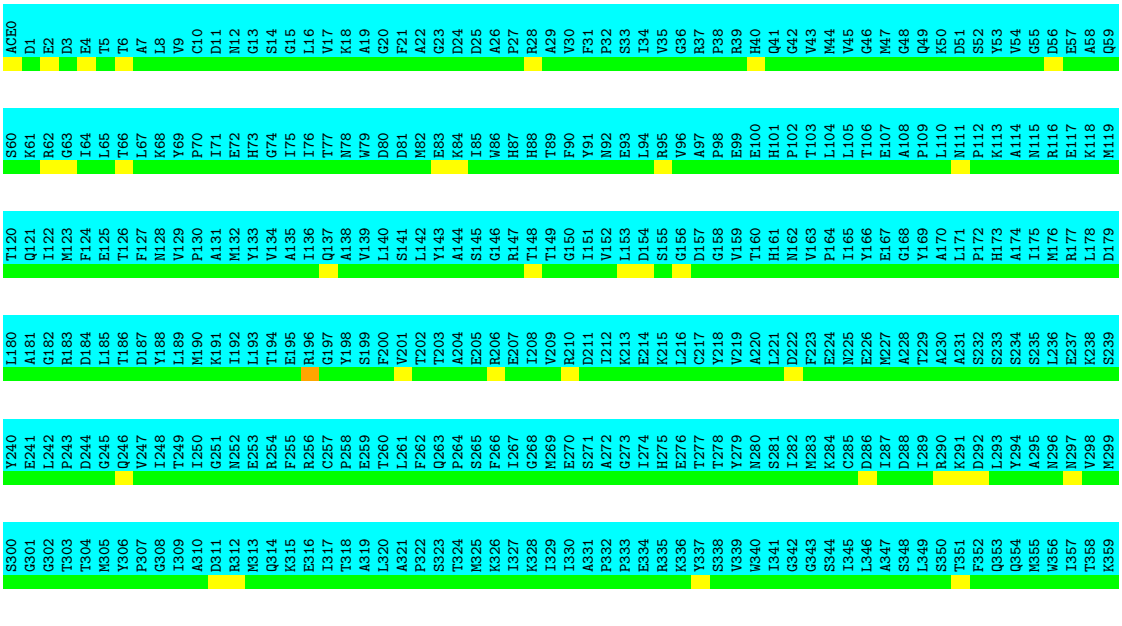
Chain E:



• Molecule 1: Actin, alpha skeletal muscle

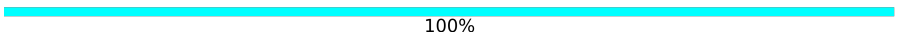
Chain F:

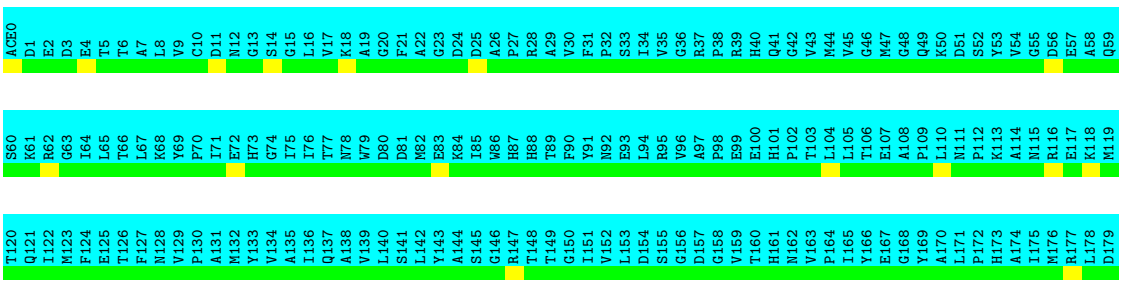


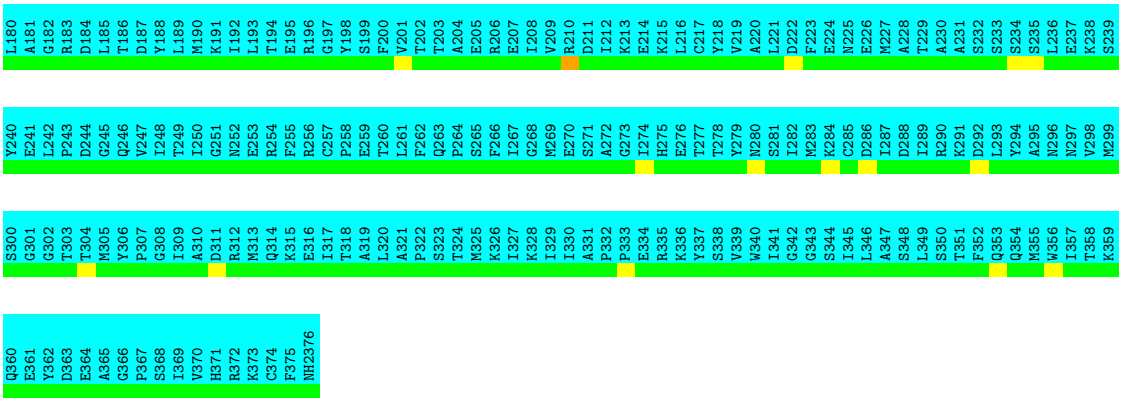


• Molecule 1: Actin, alpha skeletal muscle

Chain G:

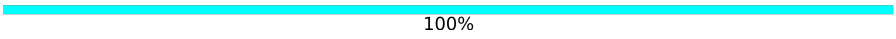


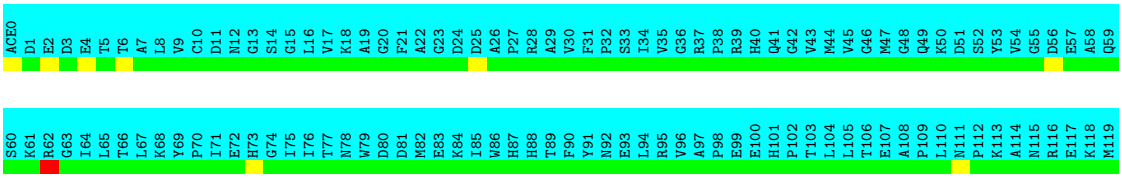




• Molecule 1: Actin, alpha skeletal muscle

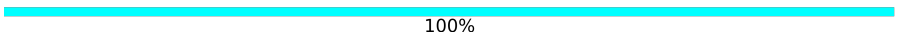
Chain H:

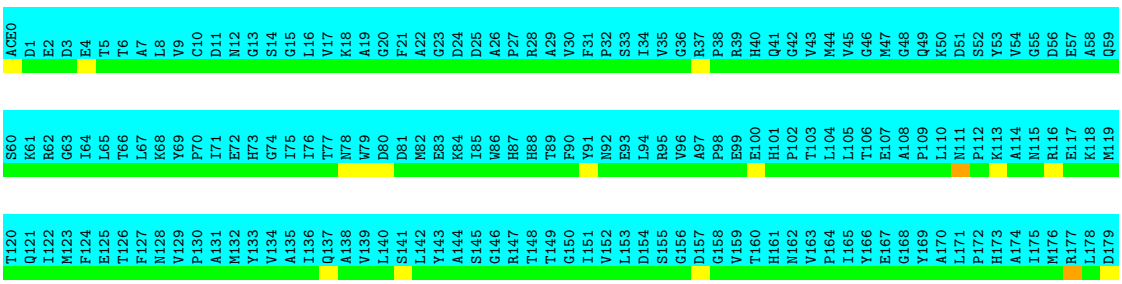


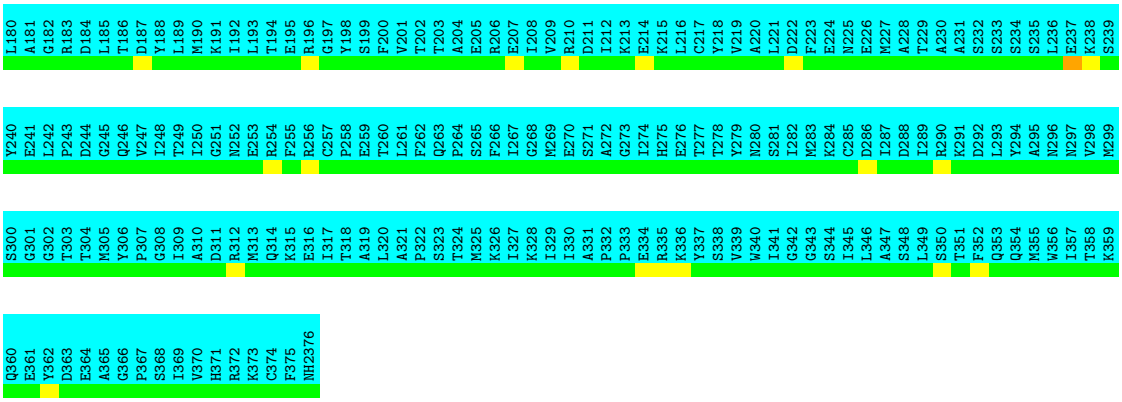


• Molecule 1: Actin, alpha skeletal muscle

Chain I:

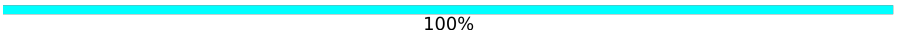


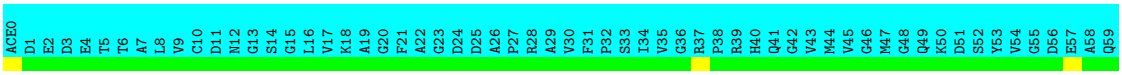


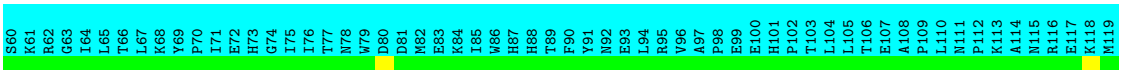


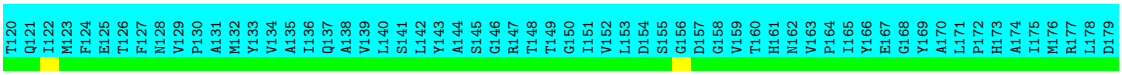
• Molecule 1: Actin, alpha skeletal muscle

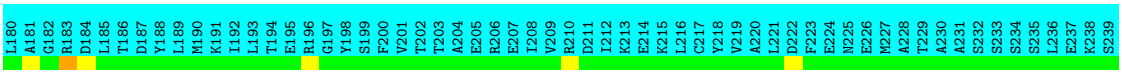
Chain J:

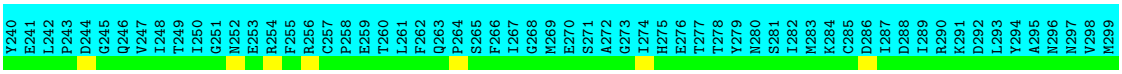


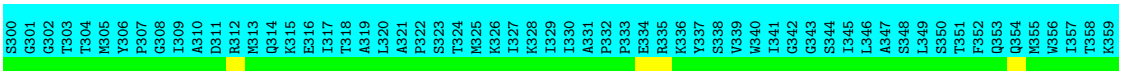






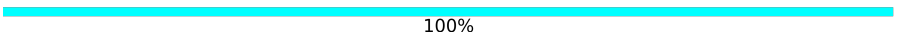


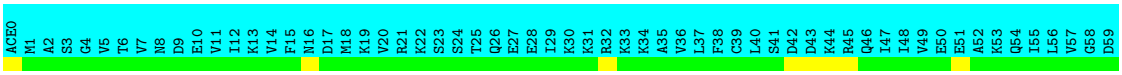


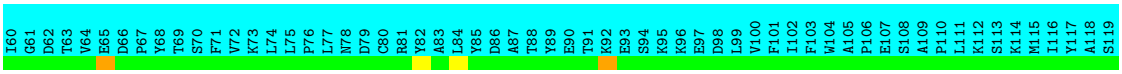


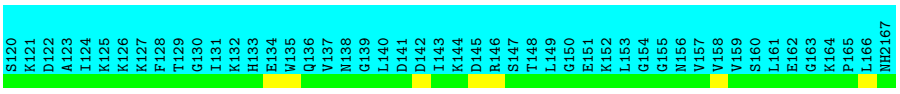
• Molecule 2: Cofilin-2

Chain K:



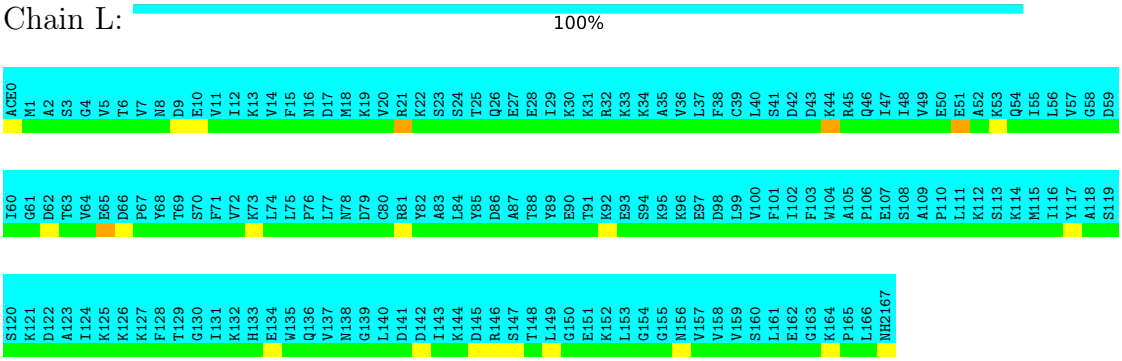






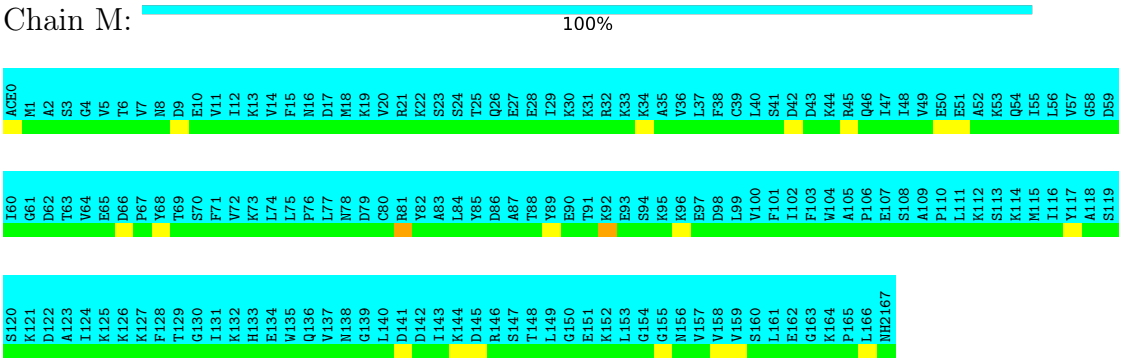
• Molecule 2: Cofilin-2

Chain L:



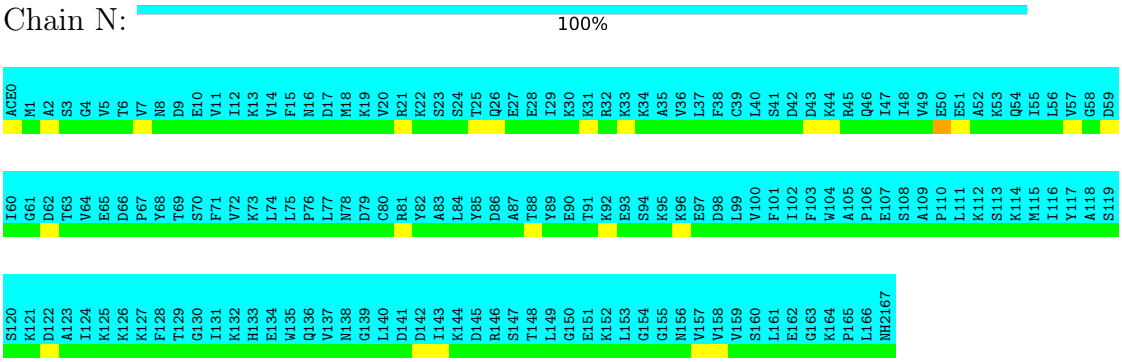
• Molecule 2: Cofilin-2

Chain M:



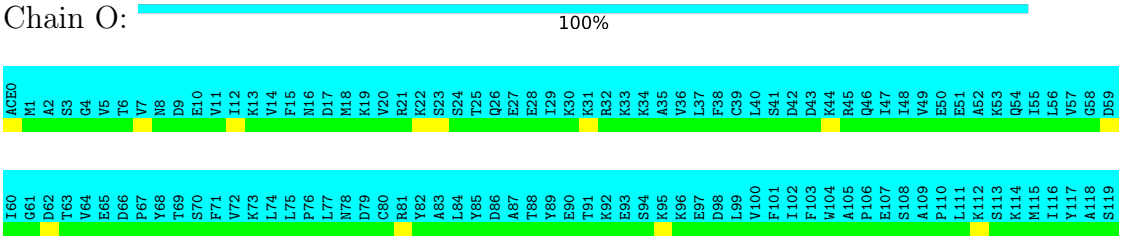
• Molecule 2: Cofilin-2

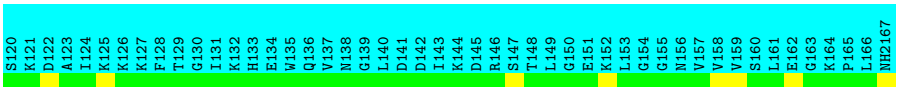
Chain N:



• Molecule 2: Cofilin-2

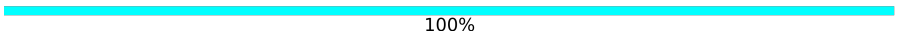
Chain O:

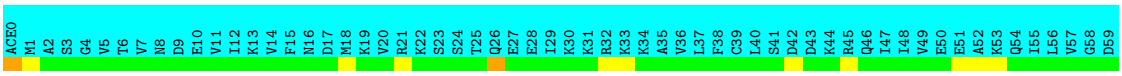


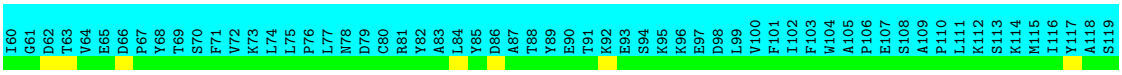


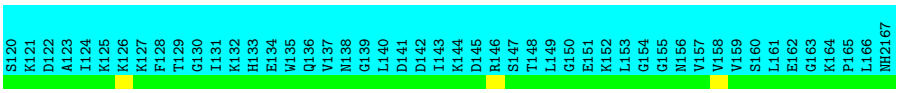
• Molecule 2: Cofilin-2

Chain P:



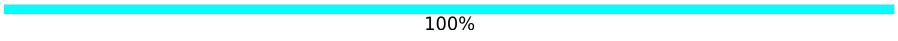


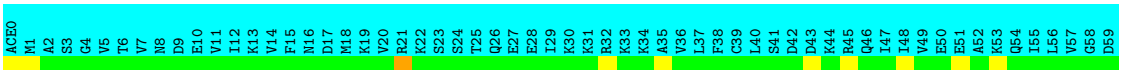


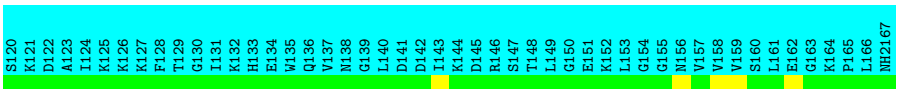


• Molecule 2: Cofilin-2

Chain Q:

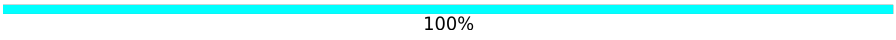


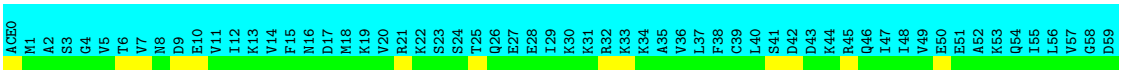


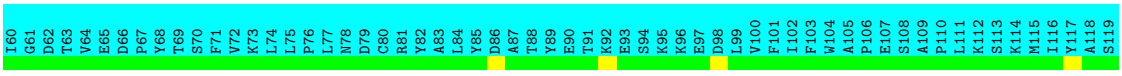


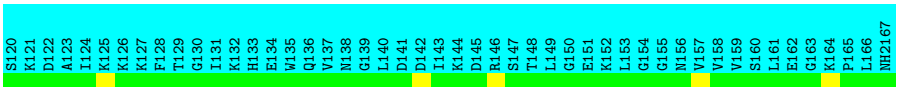
• Molecule 2: Cofilin-2

Chain R:





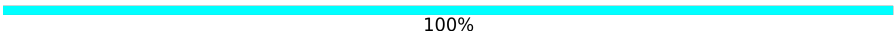


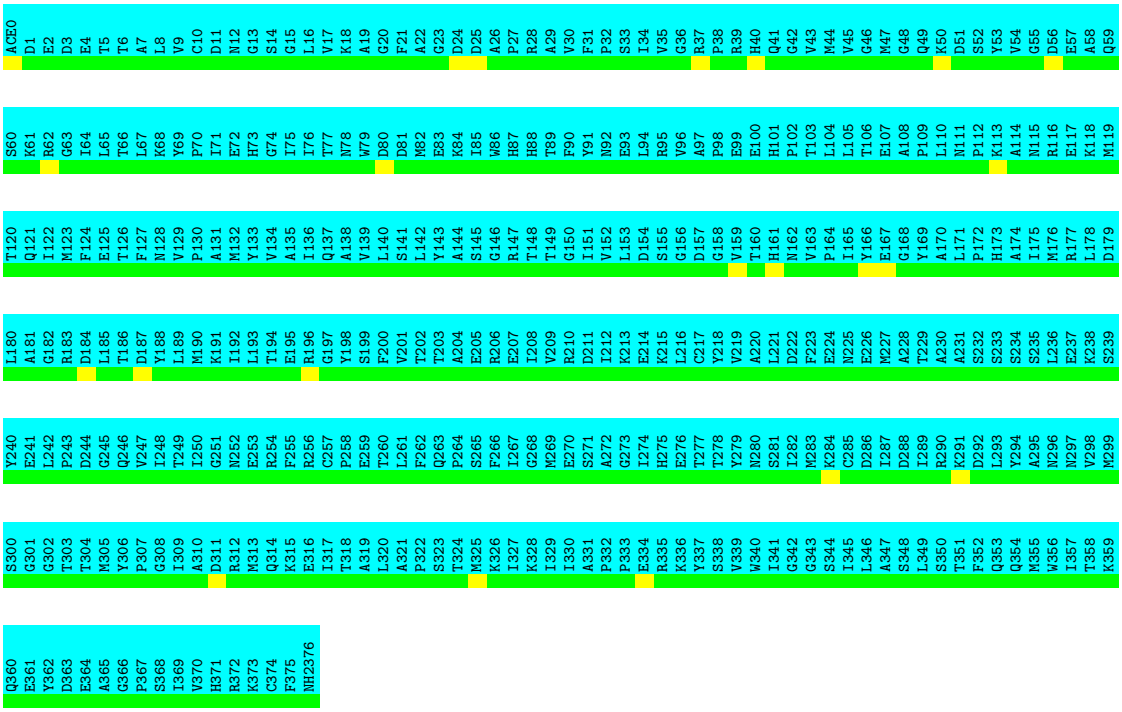


4.2.3 Score per residue for model 3

• Molecule 1: Actin, alpha skeletal muscle

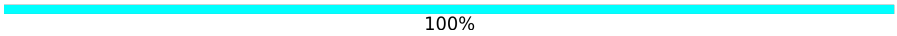
Chain A:

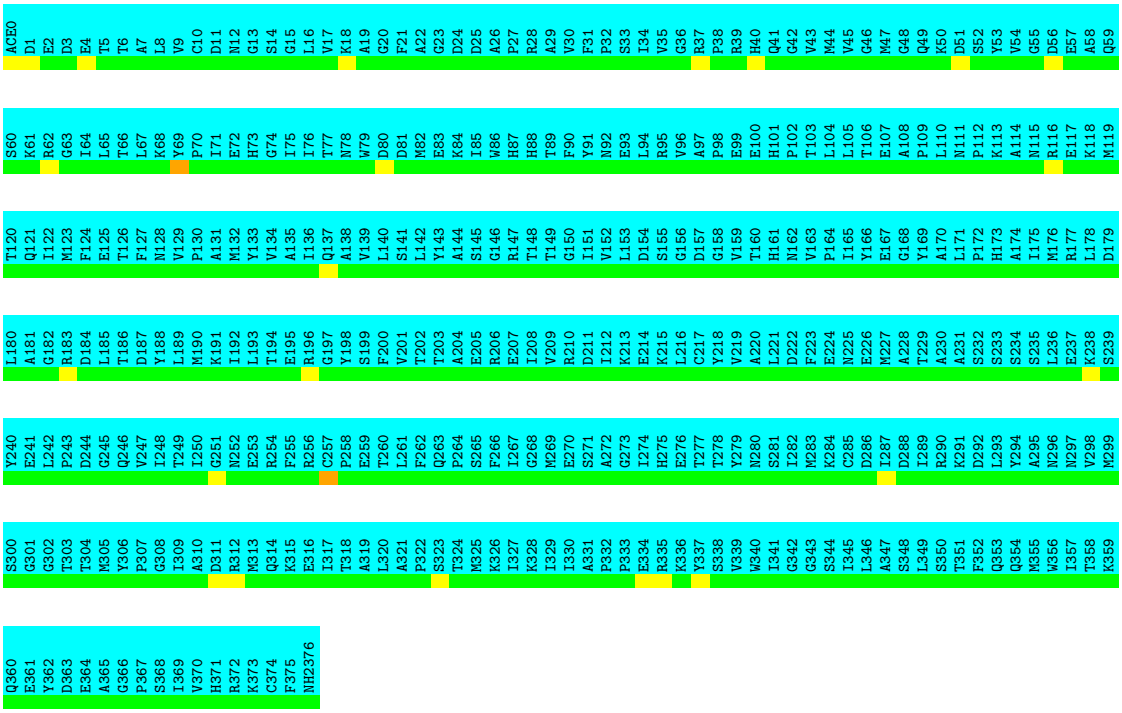




• Molecule 1: Actin, alpha skeletal muscle

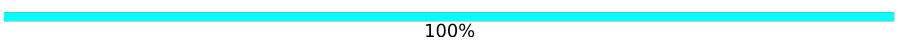
Chain B:

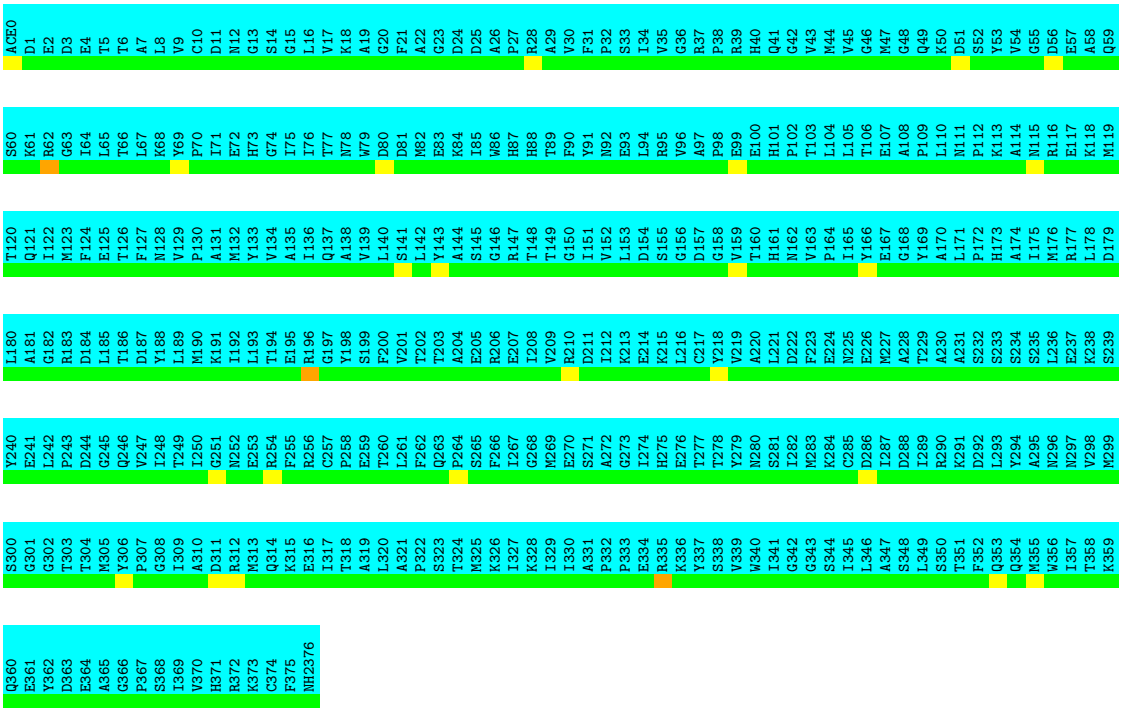




• Molecule 1: Actin, alpha skeletal muscle

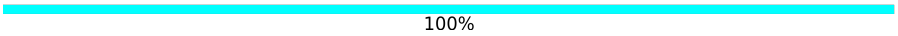
Chain C:

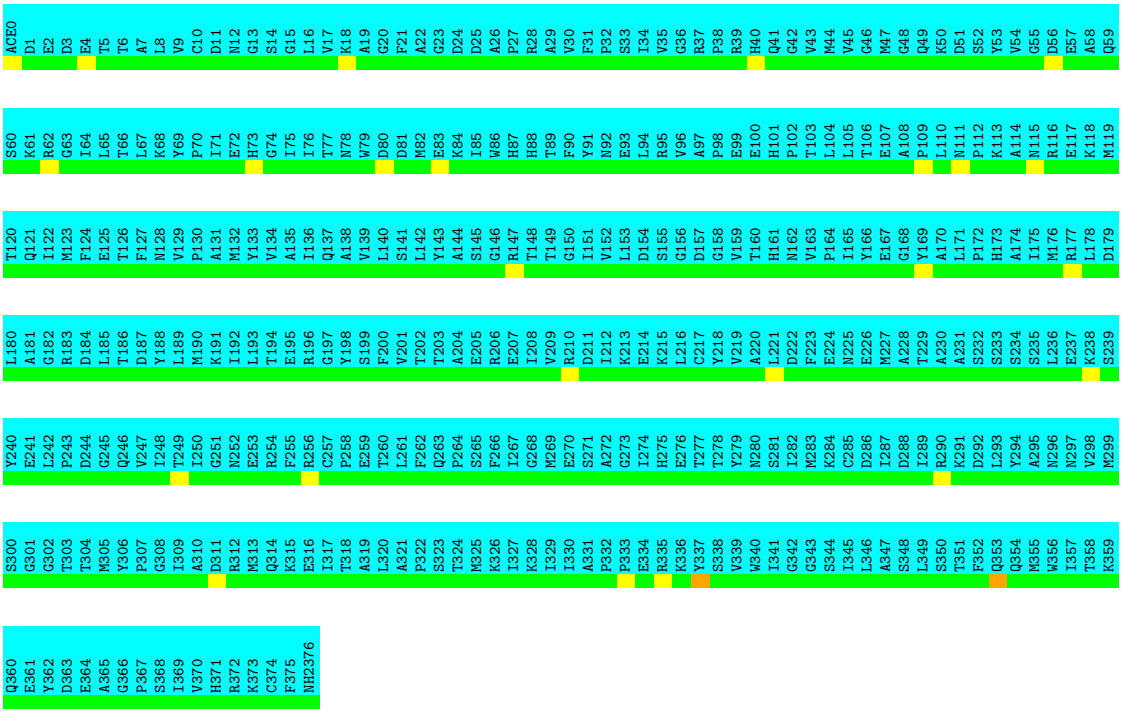




• Molecule 1: Actin, alpha skeletal muscle

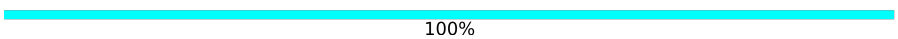
Chain D:

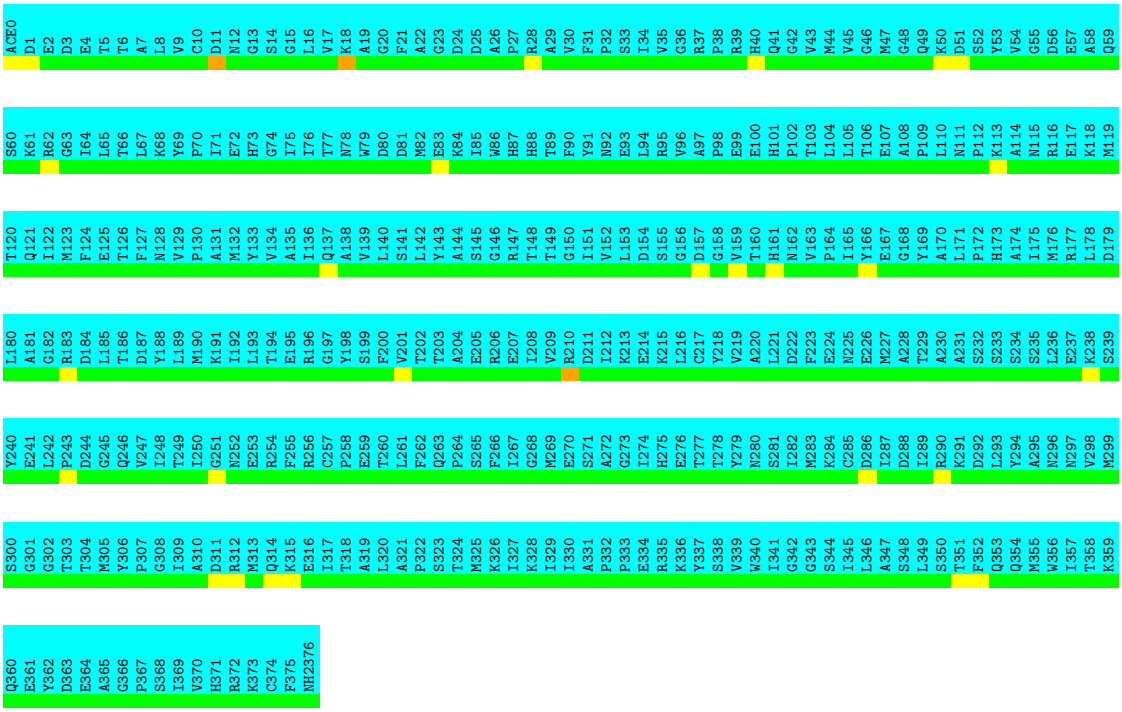




• Molecule 1: Actin, alpha skeletal muscle

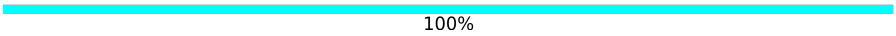
Chain E:

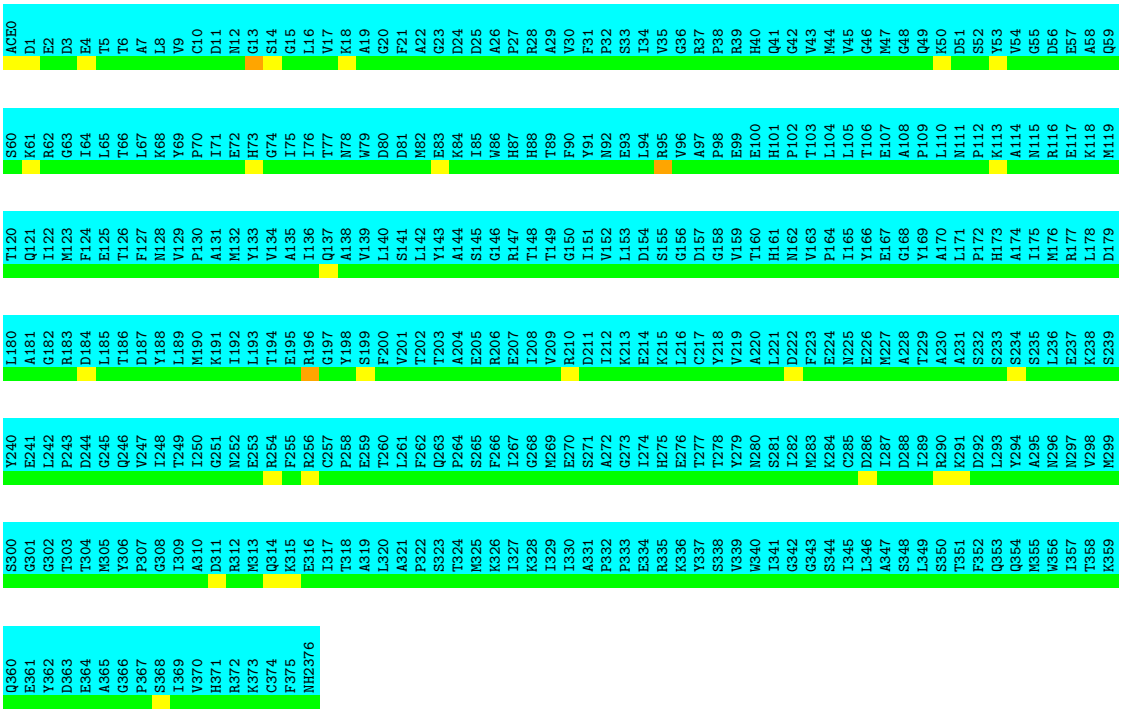




• Molecule 1: Actin, alpha skeletal muscle

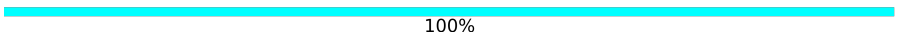
Chain F:

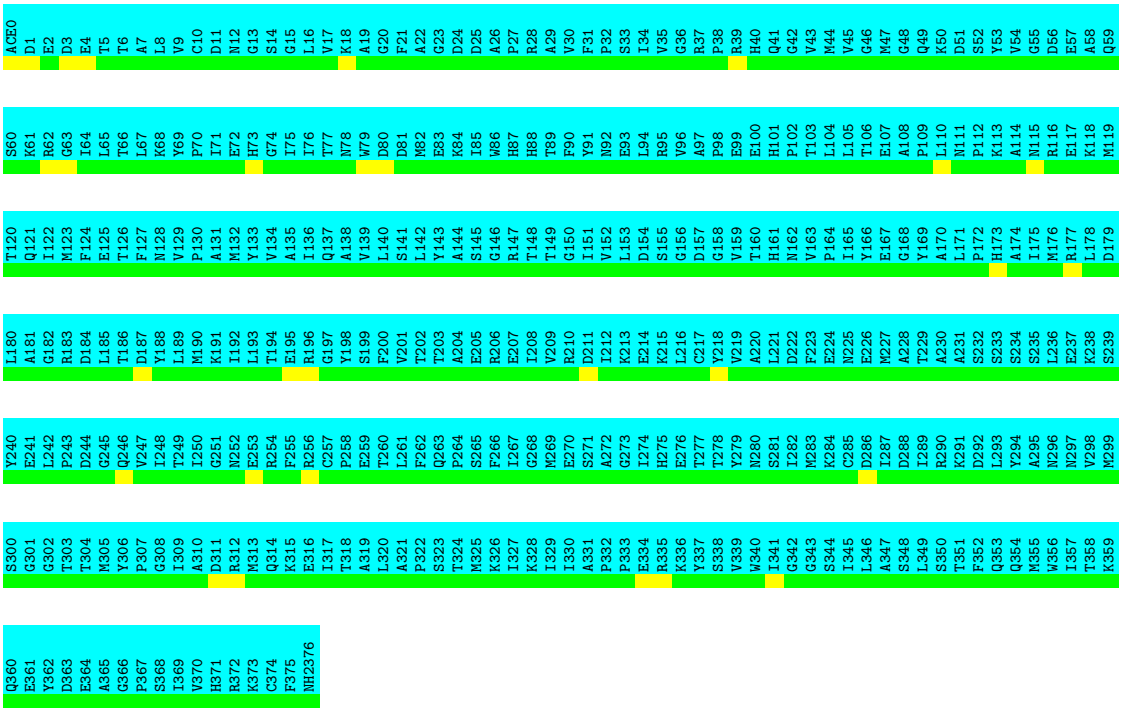




• Molecule 1: Actin, alpha skeletal muscle

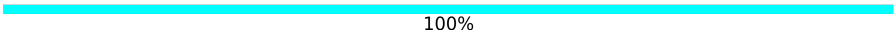
Chain G:

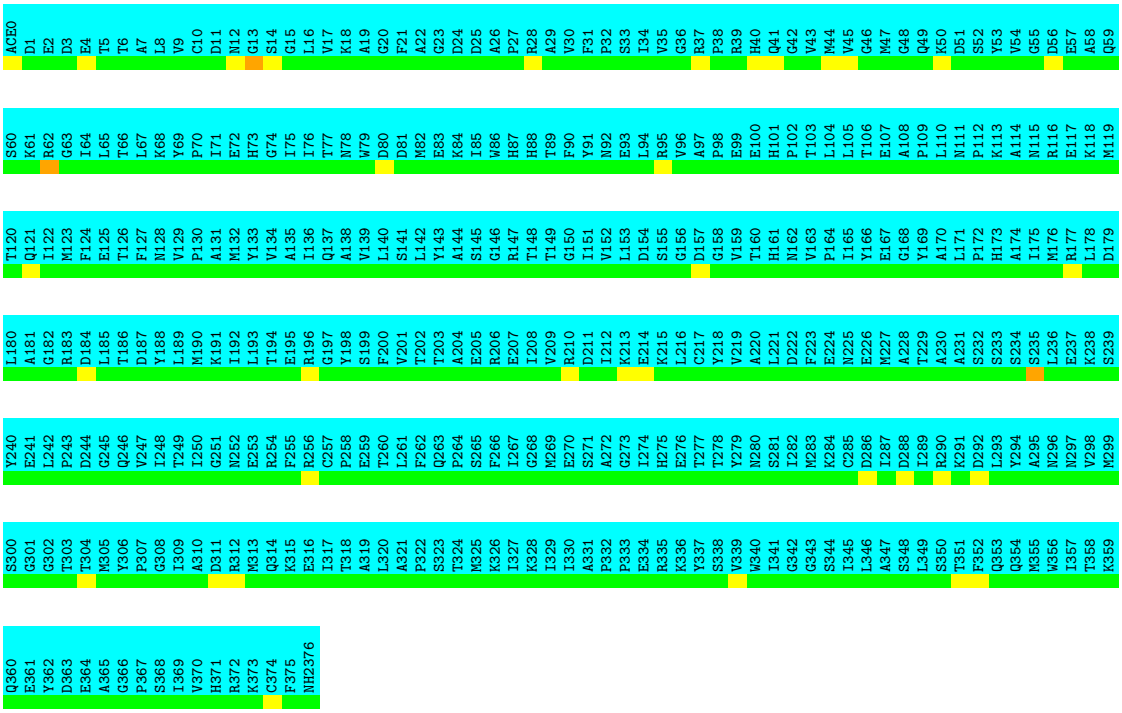




• Molecule 1: Actin, alpha skeletal muscle

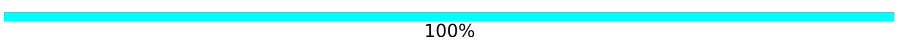
Chain H:

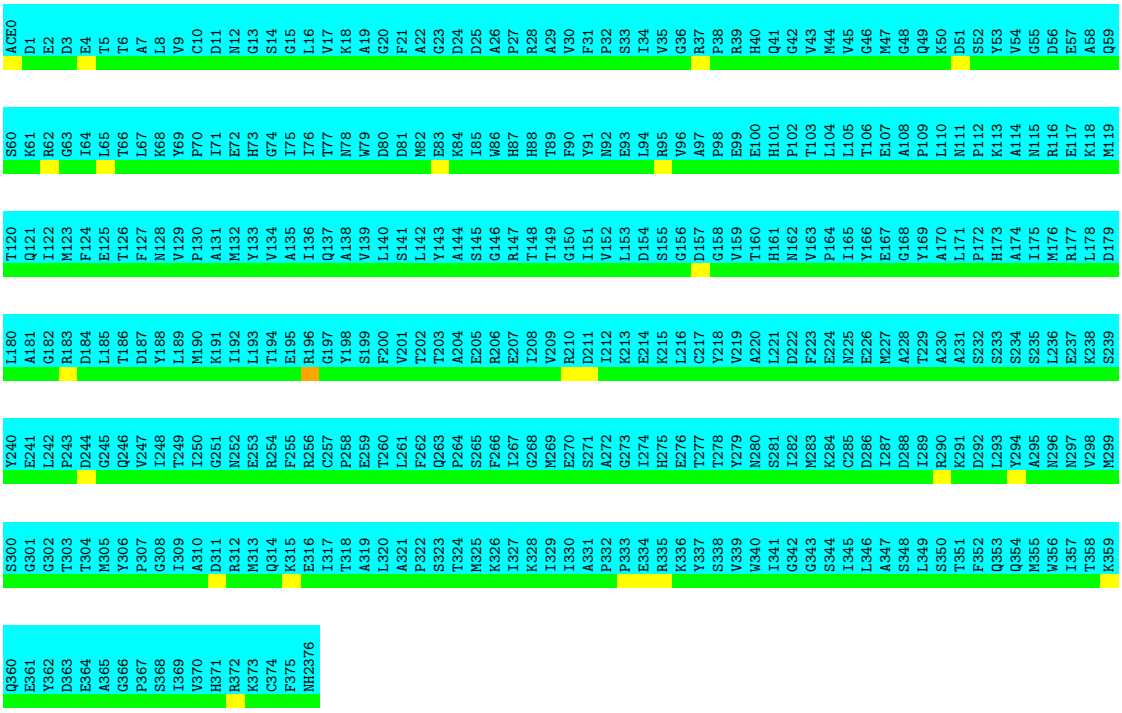




• Molecule 1: Actin, alpha skeletal muscle

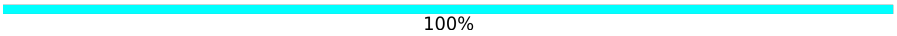
Chain I:

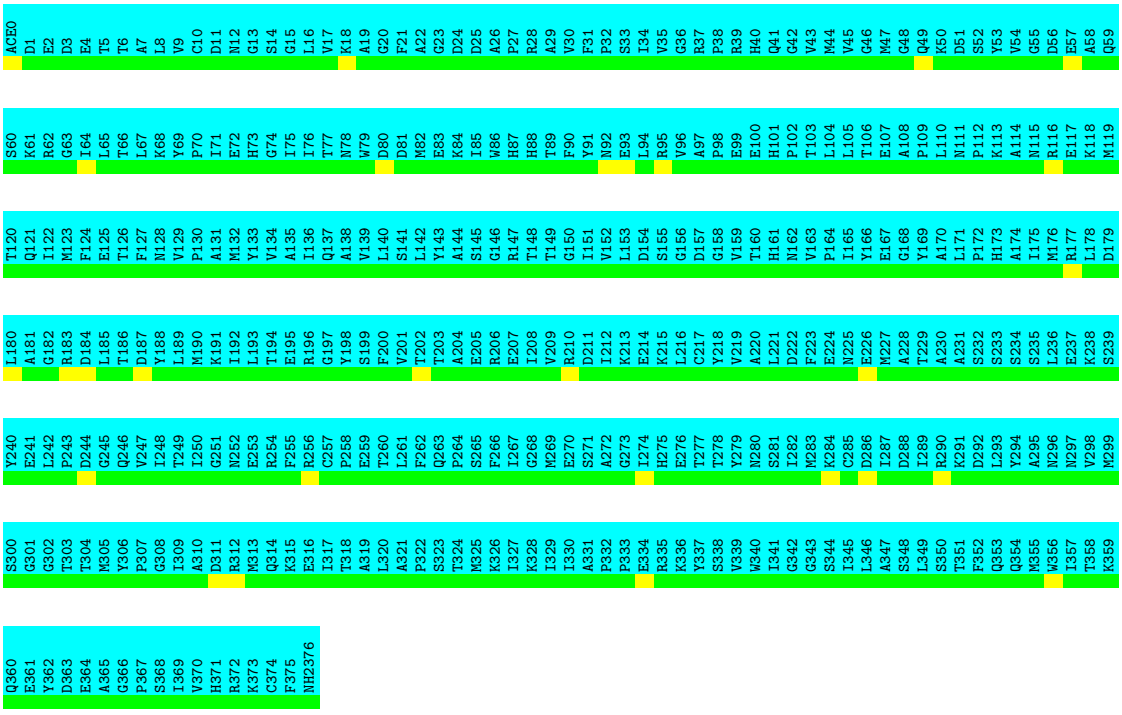




• Molecule 1: Actin, alpha skeletal muscle

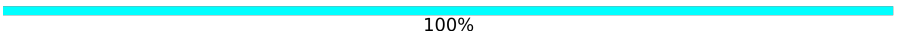
Chain J:

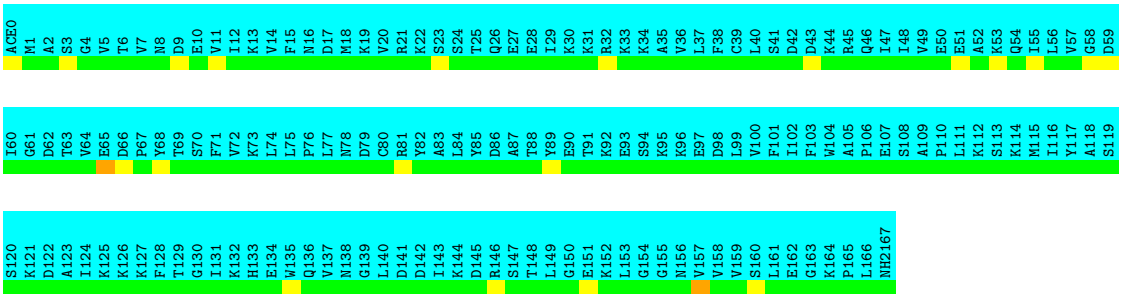




• Molecule 2: Cofilin-2

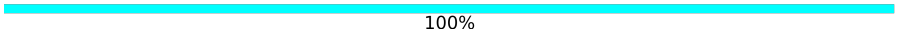
Chain K:

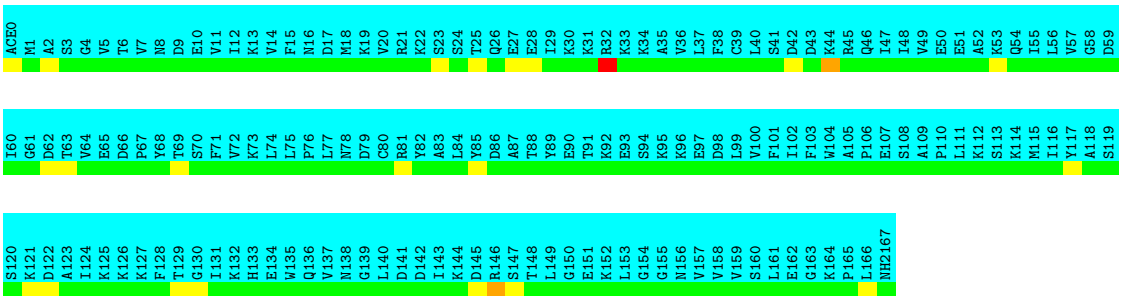




• Molecule 2: Cofilin-2

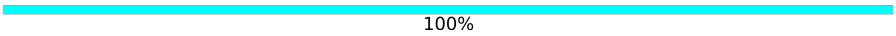
Chain L:

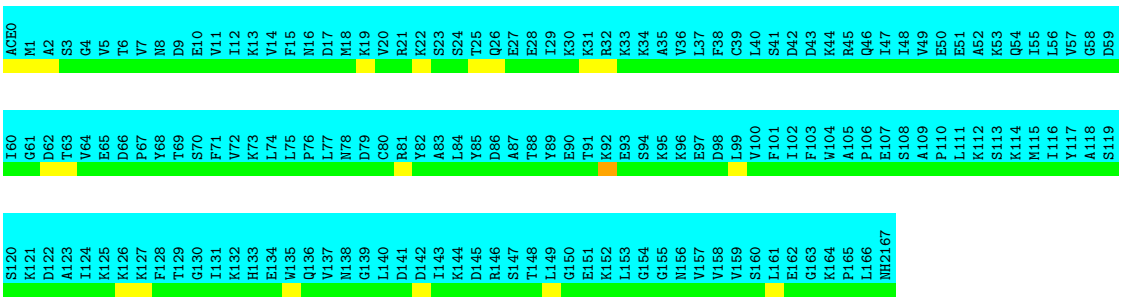




• Molecule 2: Cofilin-2

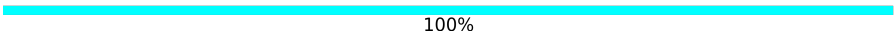
Chain M:

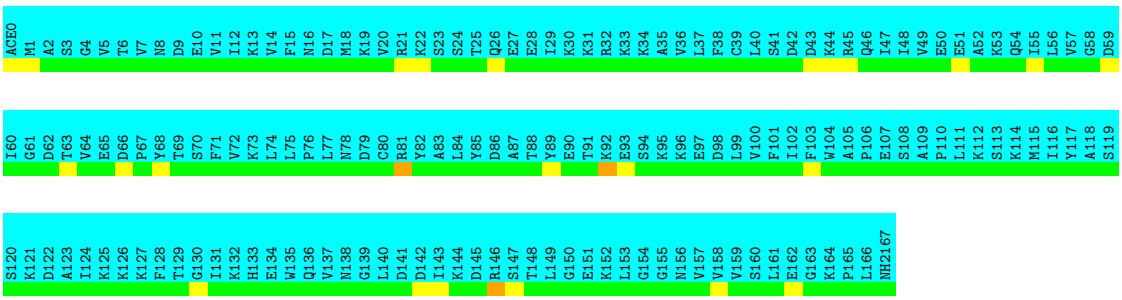




• Molecule 2: Cofilin-2

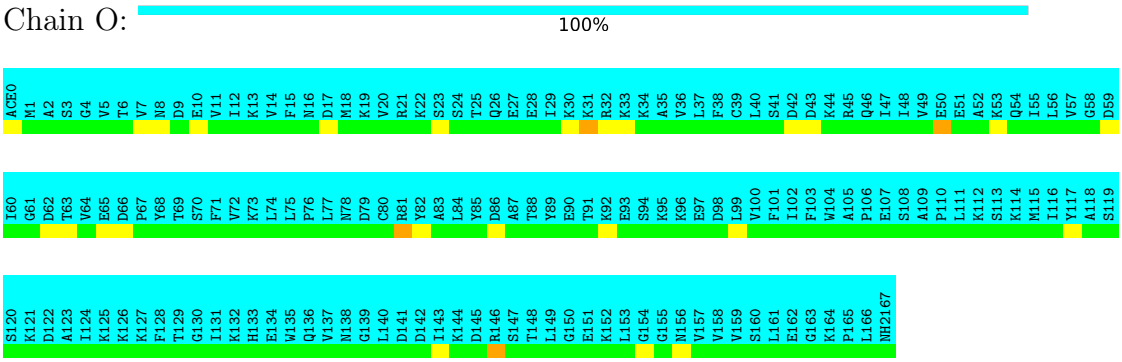
Chain N:





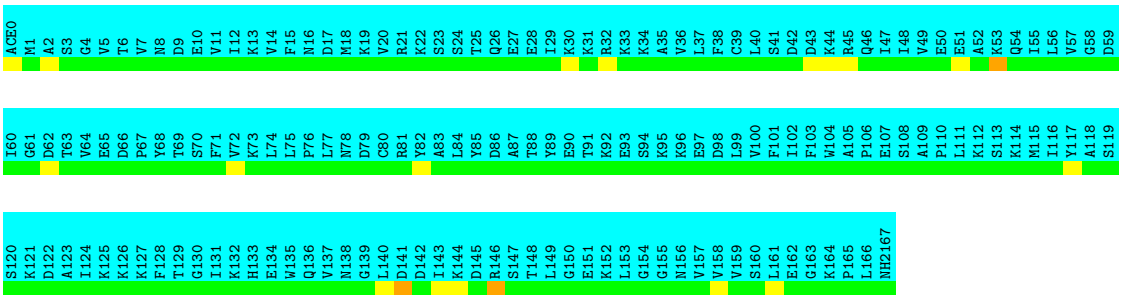
• Molecule 2: Cofilin-2

Chain O:



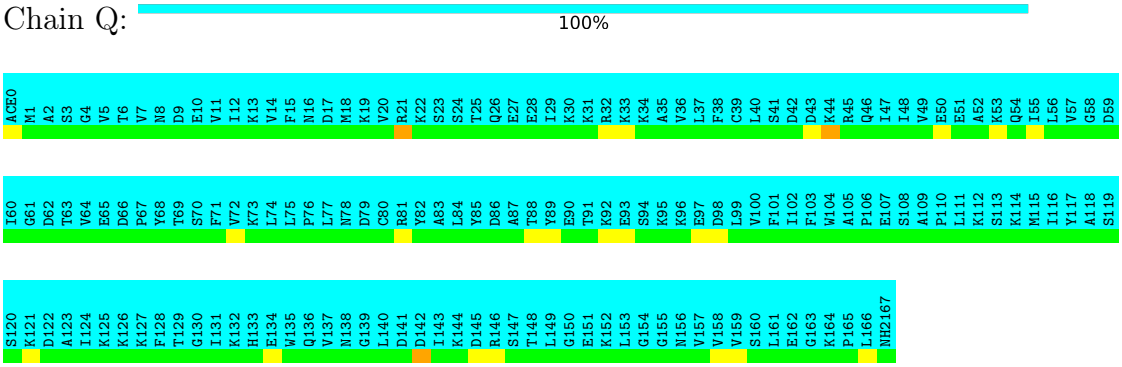
• Molecule 2: Cofilin-2

Chain P:



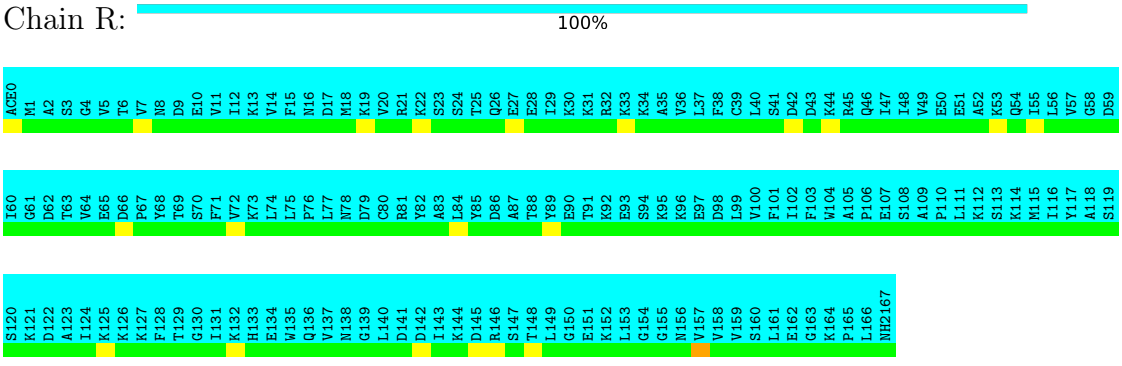
• Molecule 2: Cofilin-2

Chain Q:



• Molecule 2: Cofilin-2

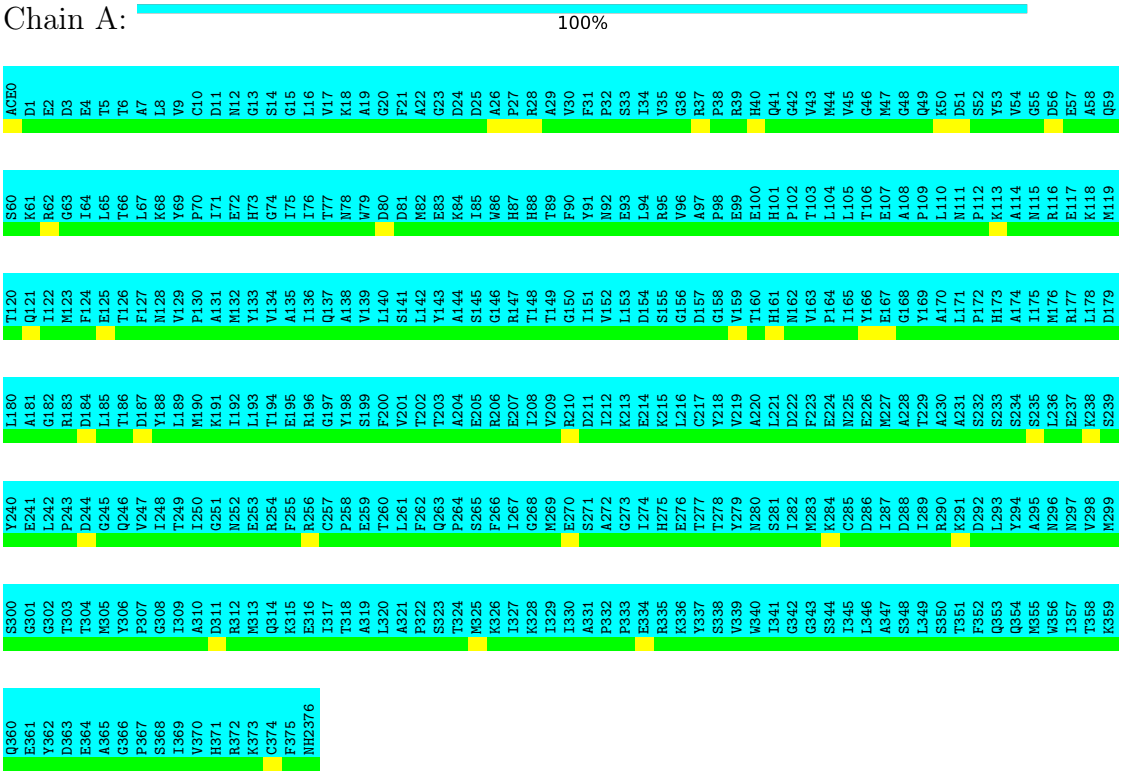
Chain R:



4.2.4 Score per residue for model 4

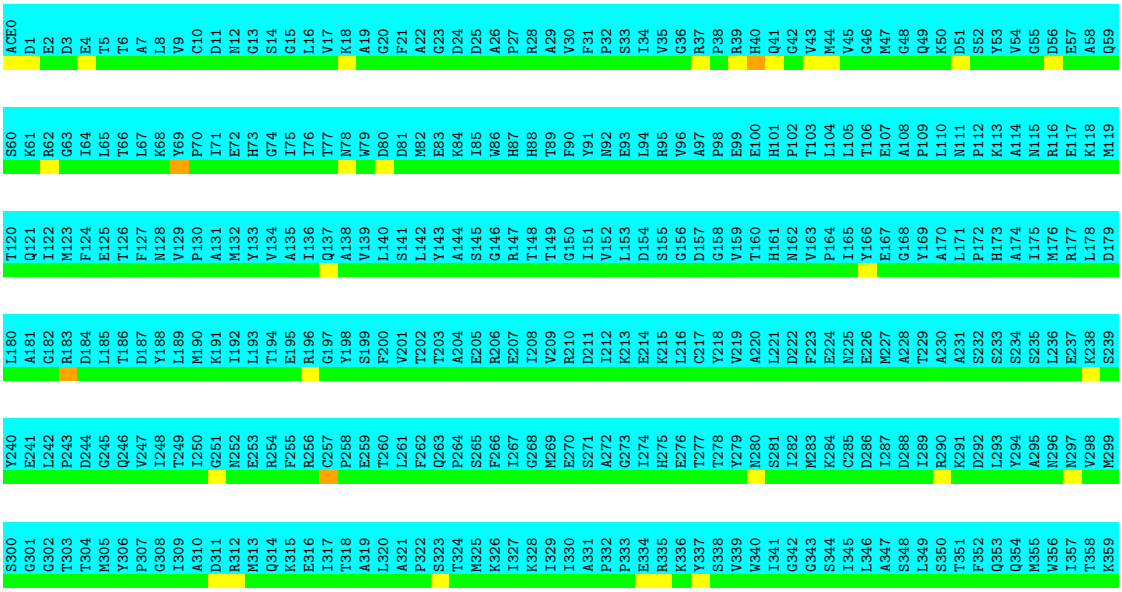
• Molecule 1: Actin, alpha skeletal muscle

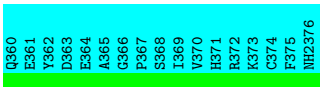
Chain A:



• Molecule 1: Actin, alpha skeletal muscle

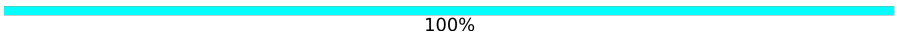
Chain B:

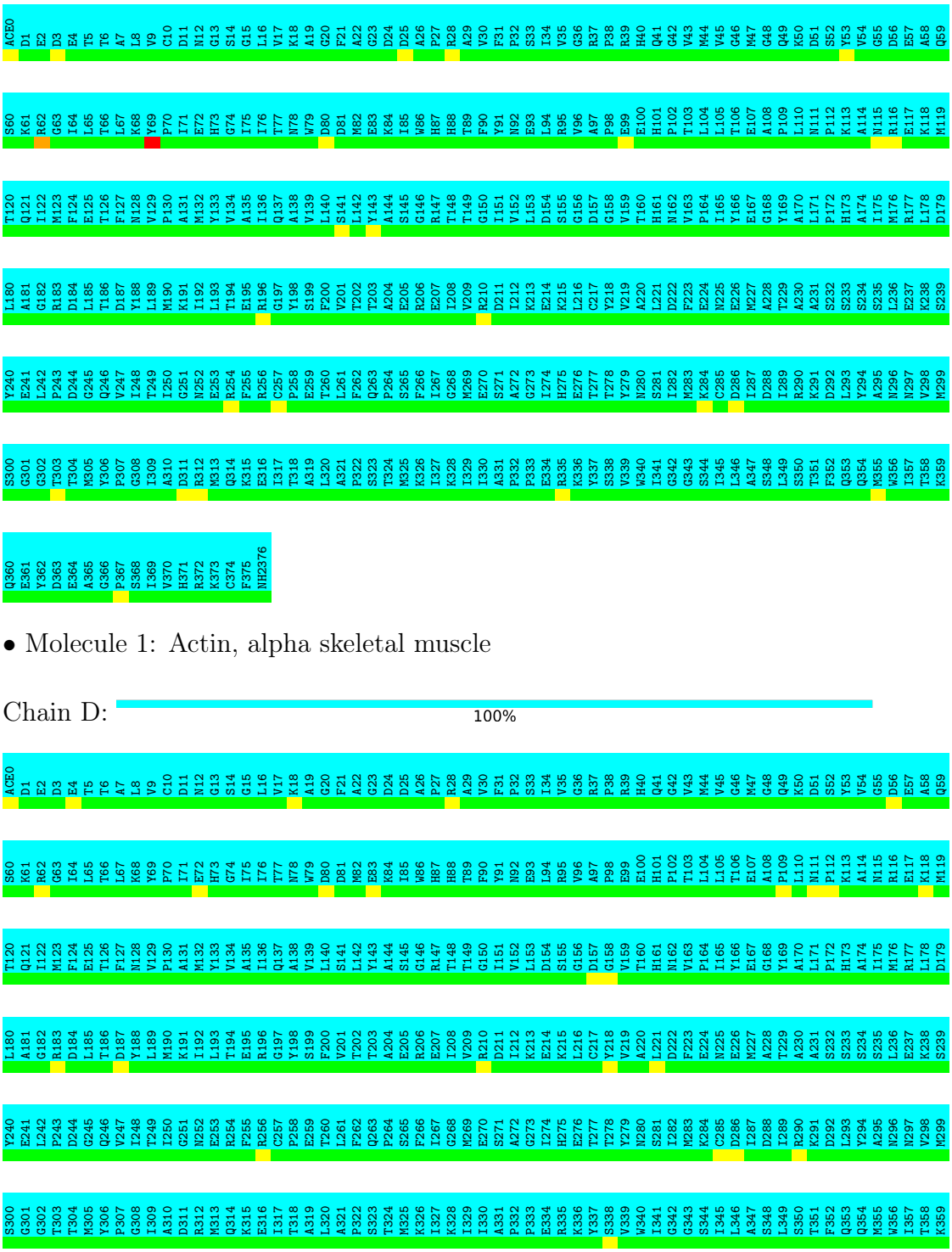




• Molecule 1: Actin, alpha skeletal muscle

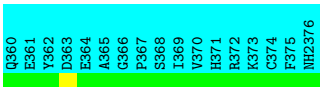
Chain C:





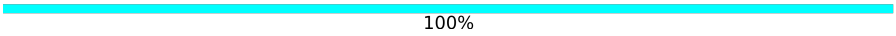
• Molecule 1: Actin, alpha skeletal muscle

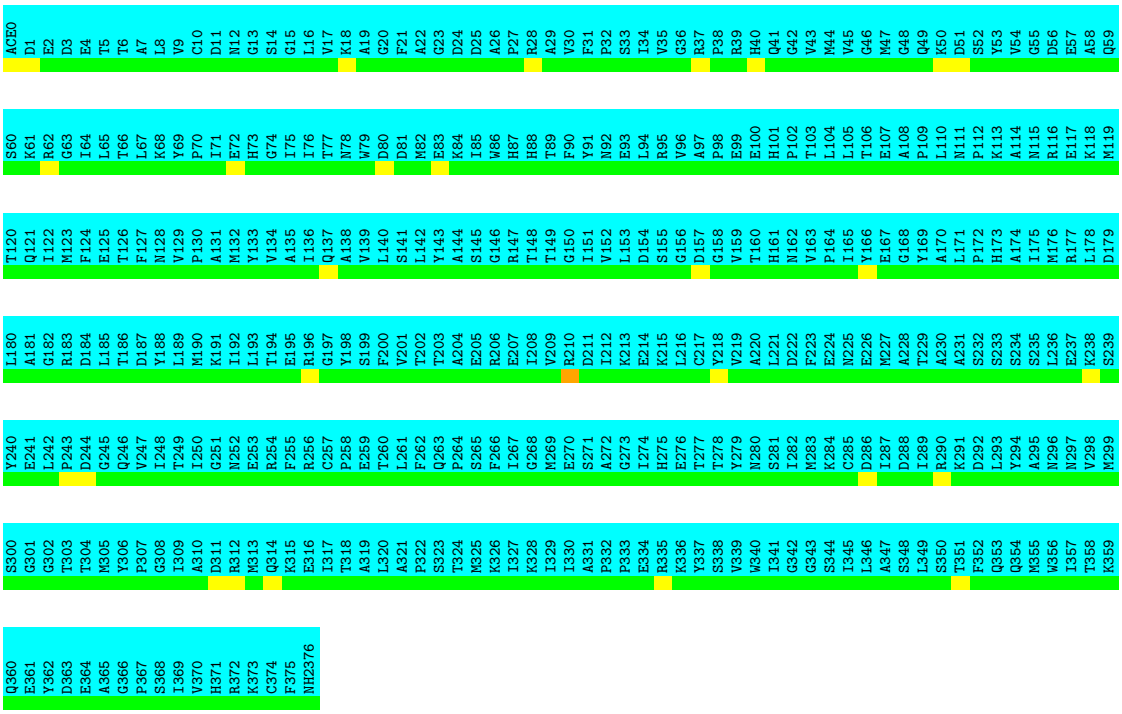
Chain D:



• Molecule 1: Actin, alpha skeletal muscle

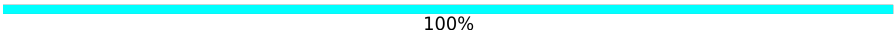
Chain E:

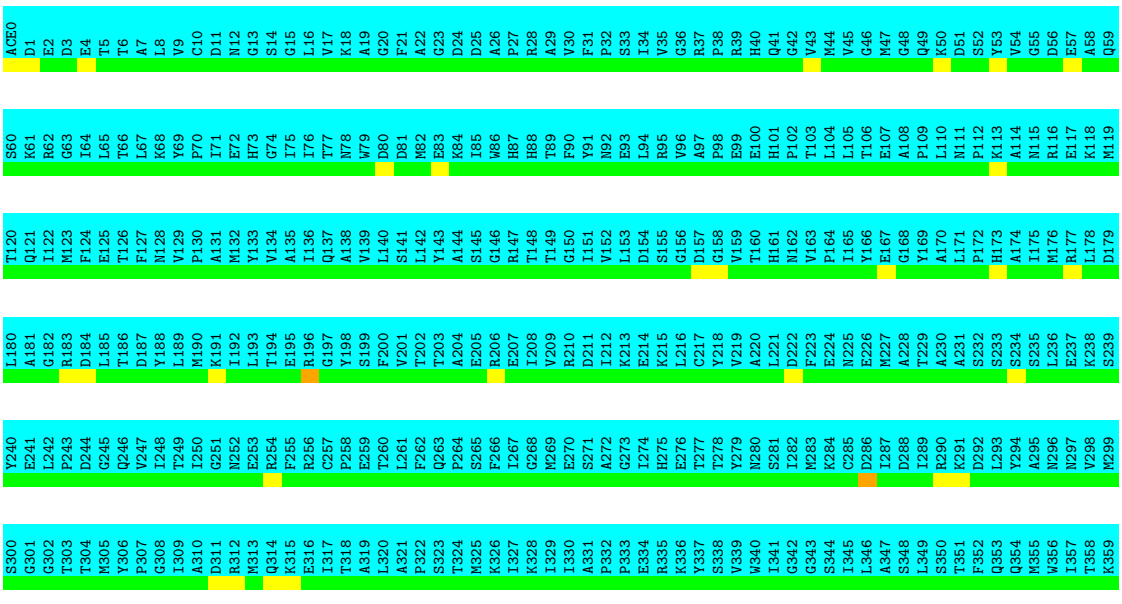


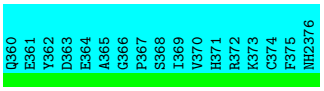


• Molecule 1: Actin, alpha skeletal muscle

Chain F:

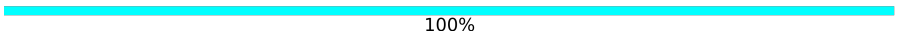


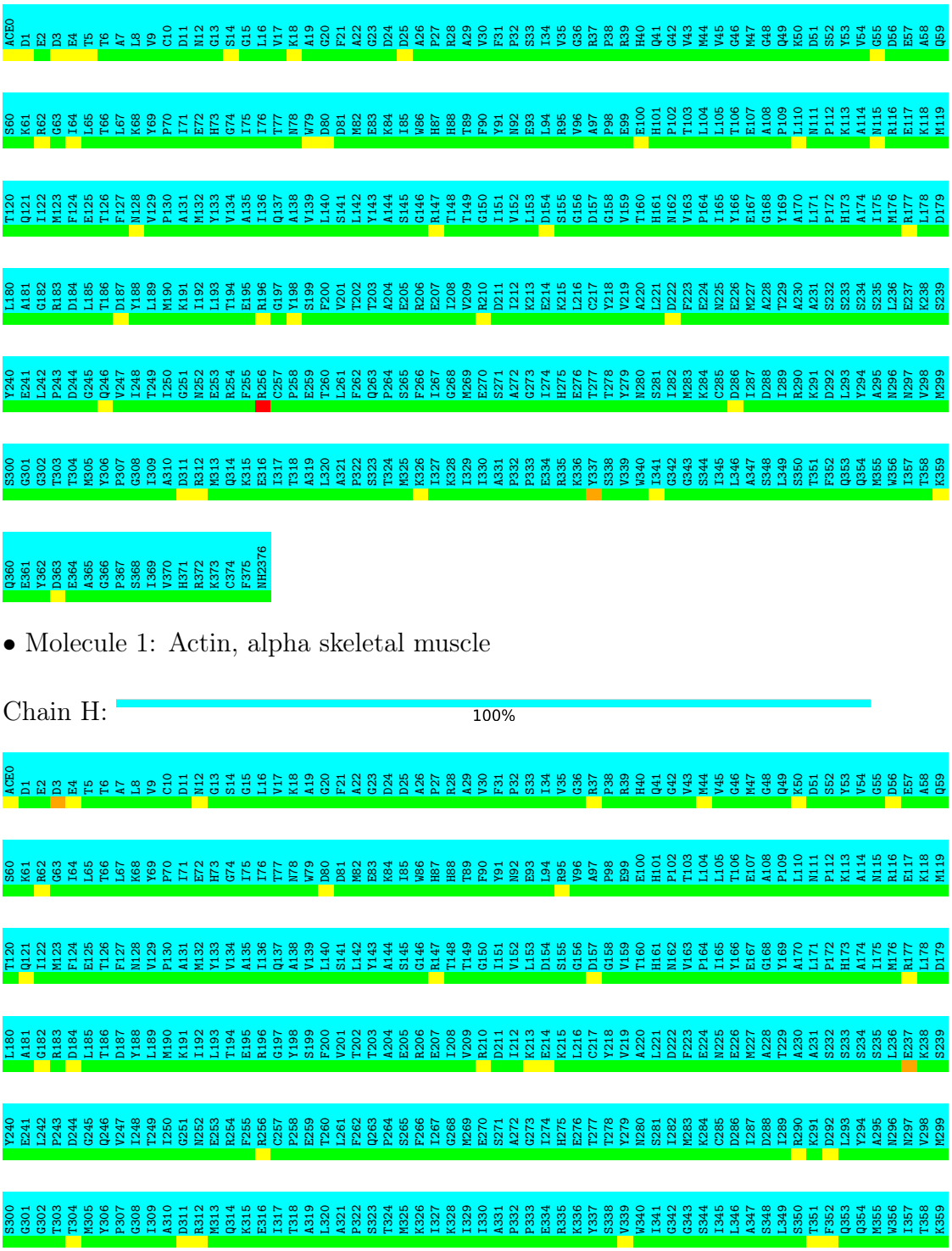




• Molecule 1: Actin, alpha skeletal muscle

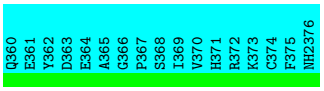
Chain G:





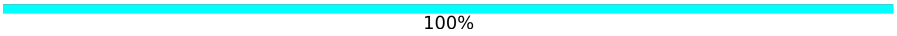
• Molecule 1: Actin, alpha skeletal muscle

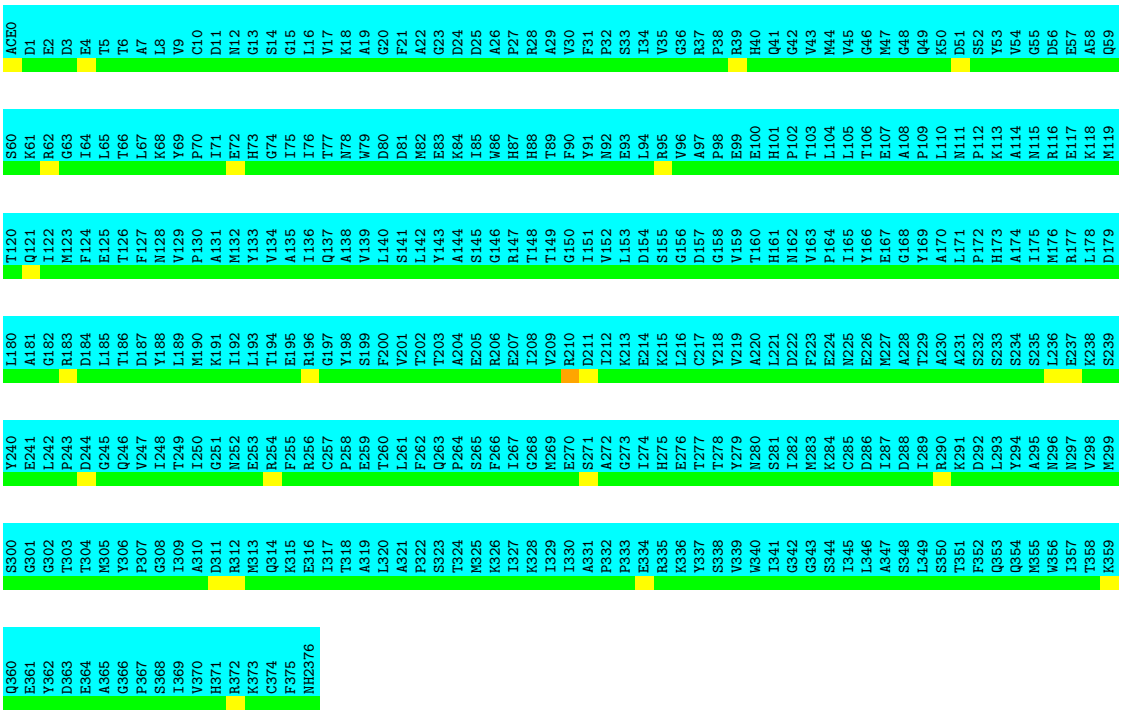
Chain H:



• Molecule 1: Actin, alpha skeletal muscle

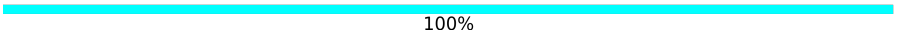
Chain I:

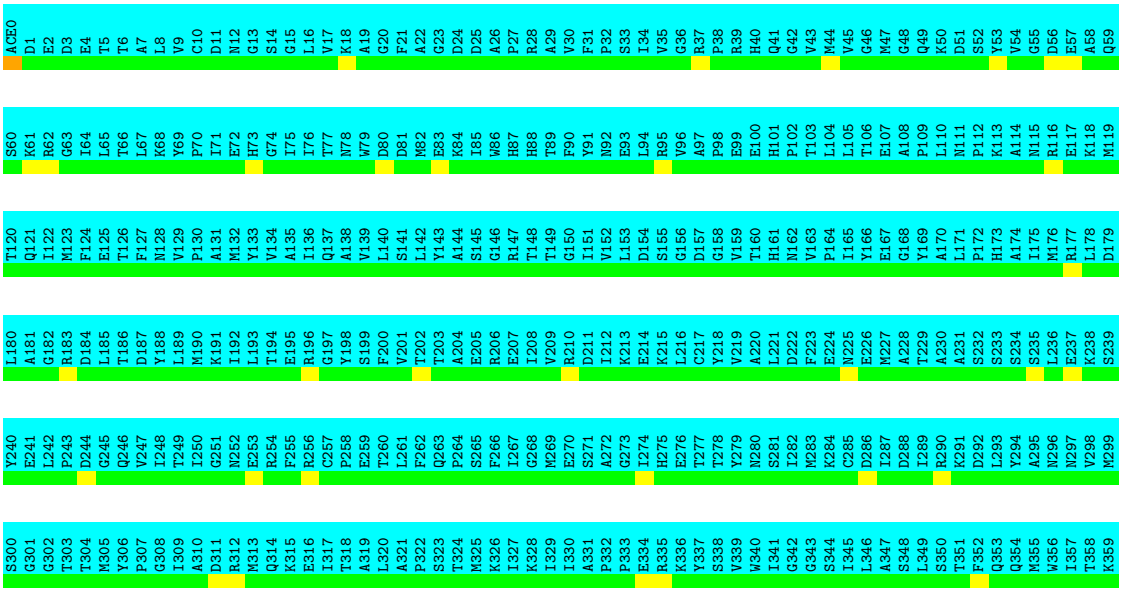


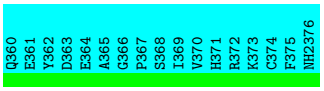


• Molecule 1: Actin, alpha skeletal muscle

Chain J:

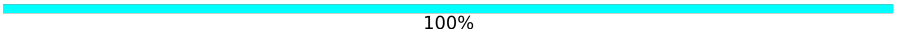


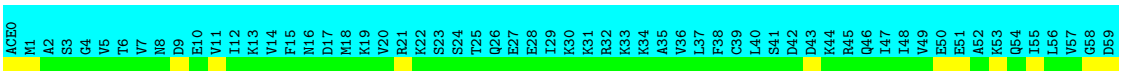


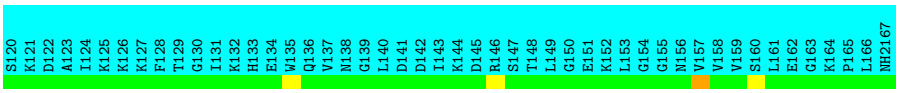


• Molecule 2: Cofilin-2

Chain K:

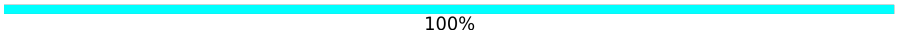


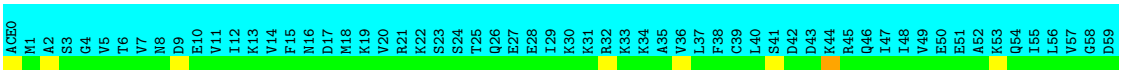


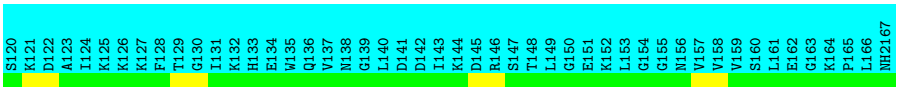


• Molecule 2: Cofilin-2

Chain L:

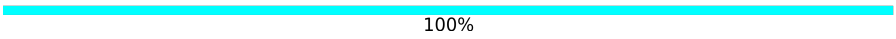


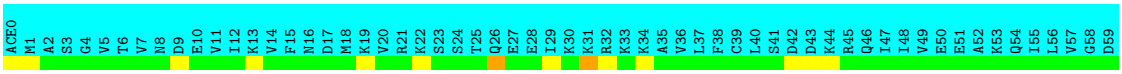


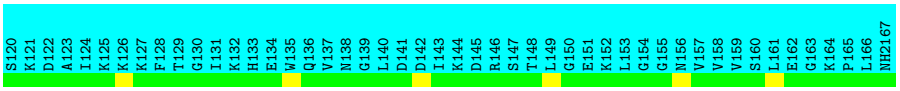


• Molecule 2: Cofilin-2

Chain M:

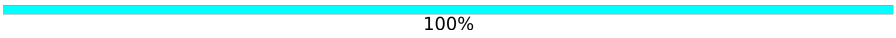


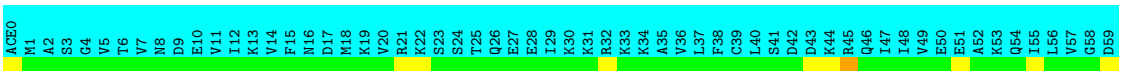


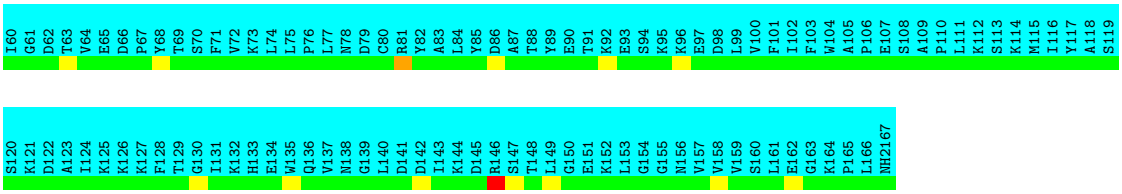


• Molecule 2: Cofilin-2

Chain N:

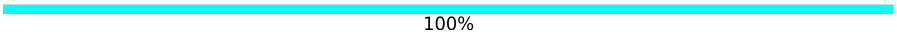


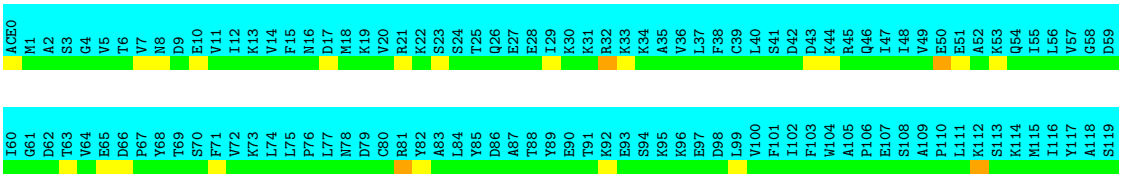




• Molecule 2: Cofilin-2

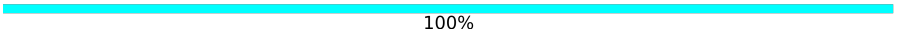
Chain O:

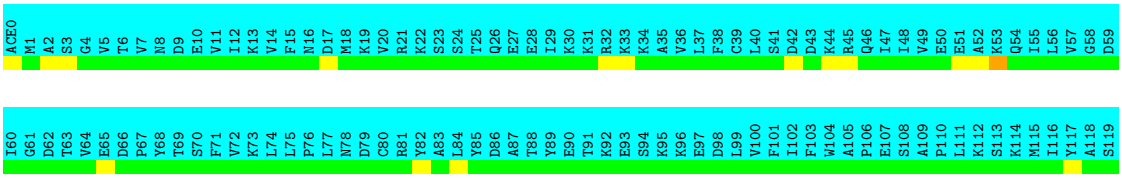




• Molecule 2: Cofilin-2

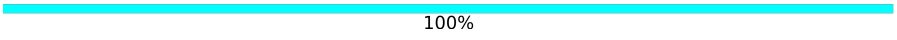
Chain P:

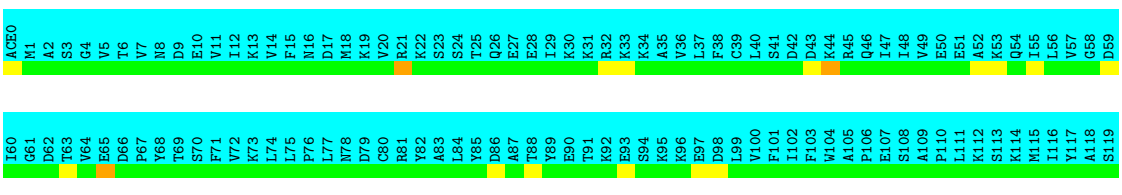




• Molecule 2: Cofilin-2

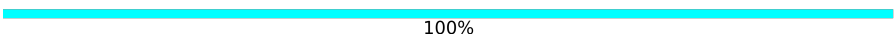
Chain Q:

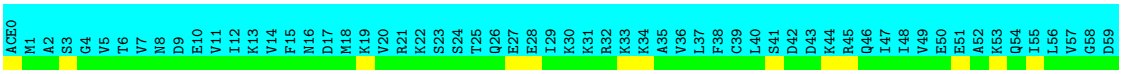




• Molecule 2: Cofilin-2

Chain R:

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A2
S3
G4
V5
T6
V7
N8
D9
E10
V11
I12
K13
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N16
D17
M18
K19
V20
R21
K22
S23
S24
T25
Q26
E27
E28
I29
K30
K31
R32
K33
K34
A35
V36
L37
F38
C39
L40
S41
D42
D43
K44
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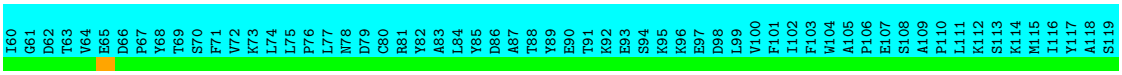
K53
Q54
I55
L56
V57
G58
D59


I60
G61
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T63
V64
E65
D66
P67
Y68
T69
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F71
V72
K73
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P76
L77
N78
D79
C80
R81
Y82
A83
L84
Y85
D86
A87
T88
Y89
E90
T91
K92
E93
S94
K95
K96
E97
D98
L99
V100
F101
I102
F103
W104
A105
P106
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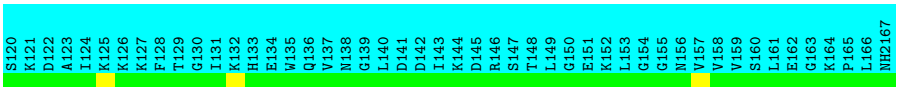
S108
A109
P110
L111
K112
S113
K114
M115
I116
Y117
A118
S119


S120
K121
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A123
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K126
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F128
T129
G130
I131
K132
H133
E134
W135
Q136
V137
N138
G139
L140
D141
D142
I143
K144
D145
R146
S147
T148
L149
G150
E151
K152
L153
G154
G155
N156
V157
V158
V159
S160
L161
E162
G163
K164
P165
L166
NH2167

5 Refinement protocol and experimental data overview

The models were refined using the following method: *molecular dynamics*.

Of the 4 calculated structures, 4 were deposited, based on the following criterion: *all calculated structures submitted*.

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

Software name	Classification	Version
TALOS-N	structure calculation	
X-PLOR NIH	structure calculation	
X-PLOR NIH	refinement	
NAMD	refinement	

No chemical shift data was provided. Note: This is a solid-state NMR structure, where hydrogen atoms are typically not assigned a chemical shift value, which may lead to lower completeness of assignment measure.

6 Model quality

6.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: NH2, ACE

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

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	C	0	0	0	0±0
1	G	0	0	0	0±0
1	H	0	0	0	0±0
1	I	0	0	0	0±0
1	J	0	0	0	0±0
1	A	0	0	0	0±0
1	D	0	0	0	0±0
1	E	0	0	0	0±0
1	F	0	0	0	0±0
1	B	0	0	0	0±0
2	K	0	0	0	0±0
2	M	0	0	0	0±0
2	O	0	0	0	0±0
2	P	0	0	0	0±0
2	Q	0	0	0	0±0
2	L	0	0	0	0±0
2	N	0	0	0	0±0
2	R	0	0	0	0±0
All	All	0	0	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 -.

There are no clashes.

6.3 Torsion angles

6.3.1 Protein backbone

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all 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	0	-	-	-	-
1	B	0	-	-	-	-
1	C	0	-	-	-	-
1	D	0	-	-	-	-
1	E	0	-	-	-	-
1	F	0	-	-	-	-
1	G	0	-	-	-	-
1	H	0	-	-	-	-
1	I	0	-	-	-	-
1	J	0	-	-	-	-
2	K	0	-	-	-	-
2	L	0	-	-	-	-
2	M	0	-	-	-	-
2	N	0	-	-	-	-
2	O	0	-	-	-	-
2	P	0	-	-	-	-
2	Q	0	-	-	-	-
2	R	0	-	-	-	-
All	All	0	-	-	-	-

There are no Ramachandran outliers.

6.3.2 Protein sidechains

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all 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	0	-	-	-
1	B	0	-	-	-
1	C	0	-	-	-
1	D	0	-	-	-
1	E	0	-	-	-
1	F	0	-	-	-
1	G	0	-	-	-
1	H	0	-	-	-
1	I	0	-	-	-
1	J	0	-	-	-
2	K	0	-	-	-
2	L	0	-	-	-
2	M	0	-	-	-
2	N	0	-	-	-
2	O	0	-	-	-
2	P	0	-	-	-
2	Q	0	-	-	-
2	R	0	-	-	-
All	All	0	-	-	-

There are no protein residues with a non-rotameric sidechain to report.

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.