Identification of inorganic improvised explosive devices by analysis of post-blast residues using portable capillary electrophoresis instrumentation and indirect photometric detection with a light-emitting diode

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Figure captions:

Figure S- 1 Analysis of anions extracted from post-blast residue resulting from a commercial Ammonium Nitrate/Fuel Oil (ANFO) explosive device.

Conditions: The post-blast residue aqueous sample was injected without dilution. The capillary electrophoresis method used is outlined in Figure 2.

Figure S- 2 Analysis of cations extracted from post-blast residue resulting from a commercial Ammonium Nitrate/Fuel Oil (ANFO) explosive device.

Conditions: The post-blast residue aqueous sample was injected without dilution. The capillary electrophoresis method used is outlined in Figure 3.

Figure S- 3 Analysis of anions extracted from post-blast residues resulting from commercial and improvised Black Powder explosive devices. Black Powder explosive devices typically consist of potassium nitrate, sulphur and charcoal.

Conditions: The post-blast residue aqueous samples were injected without dilution. The capillary electrophoresis method used is outlined in Figure 2.

Figure S- 4 Analysis of cations extracted from post-blast residues resulting from commercial and improvised Black Powder explosive devices.

Conditions: The post-blast residue aqueous samples were injected without dilution. The capillary electrophoresis method used is outlined in Figure 3.

Figure S- 5 Analysis of anions extracted from post-blast residues resulting from an improvised explosive mixture containing chlorate, perchlorate and sugar. Specifically, the inorganic salts used in the composition of the explosive were potassium chlorate/potassium perchlorate.

Conditions: The post-blast residue aqueous sample was injected without dilution. The capillary electrophoresis method used is outlined in Figure 2.

Figure S- 6 Analysis of cations extracted from post-blast residues resulting from an improvised explosive mixture containing chlorate, perchlorate and sugar.

Conditions: The post-blast residue aqueous sample was injected without dilution. The capillary electrophoresis method used is outlined in Figure 3.

Figure S- 7 Analysis of anions extracted from post-blast residues resulting from an improvised explosive mixture containing sodium chlorate and sugar.

Conditions: The post-blast residue aqueous sample was injected without dilution. The capillary electrophoresis method used is outlined in Figure 2.

Figure S- 8 Analysis of cations extracted from post-blast residues resulting from an improvised explosive mixture containing sodium chlorate and sugar.

Conditions: The post-blast residue aqueous sample was injected without dilution. The capillary electrophoresis method used is outlined in Figure 3.

Figure S- 9 Determination of cations in ANFO post-blast residues performed immediately after detonation of the explosive device by the Australian Bomb Data Centre. The portable instrumentation was set up in a mobile laboratory on the munition range and was powered using a diesel generator.

Conditions: The post-blast residue, dissolved in 3 mL Milli-Q, was spiked into methanol (1:20 dilution) before injection. The capillary electrophoresis method used is outlined in Figure 3. The ambient temperature was 7 ^{O}C.

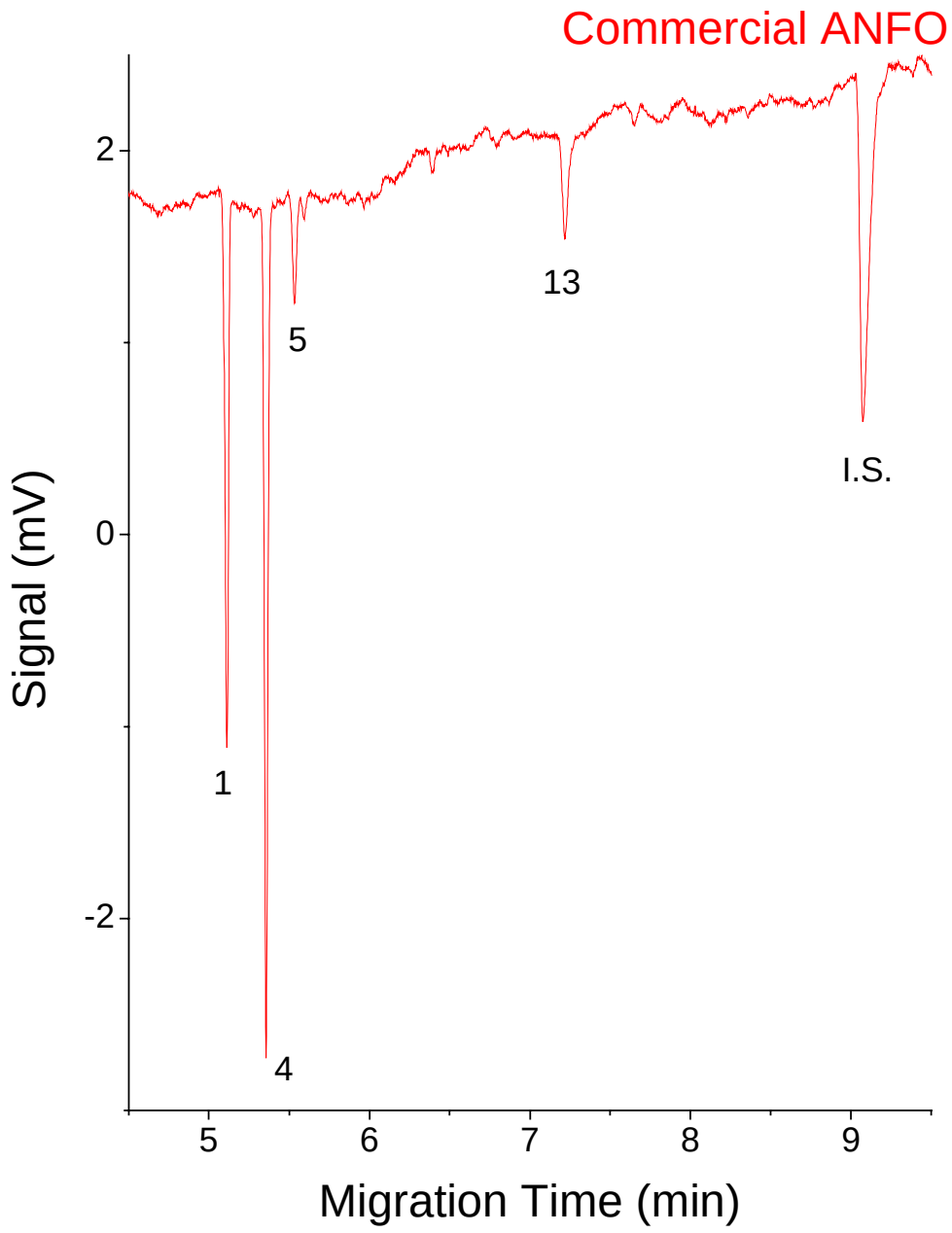
Commercial ANFO
Signal (mV)
2
0
-2
1
4
5
13
I.S.
5
6
7
8
9
Migration Time (min)

Figure S- 1

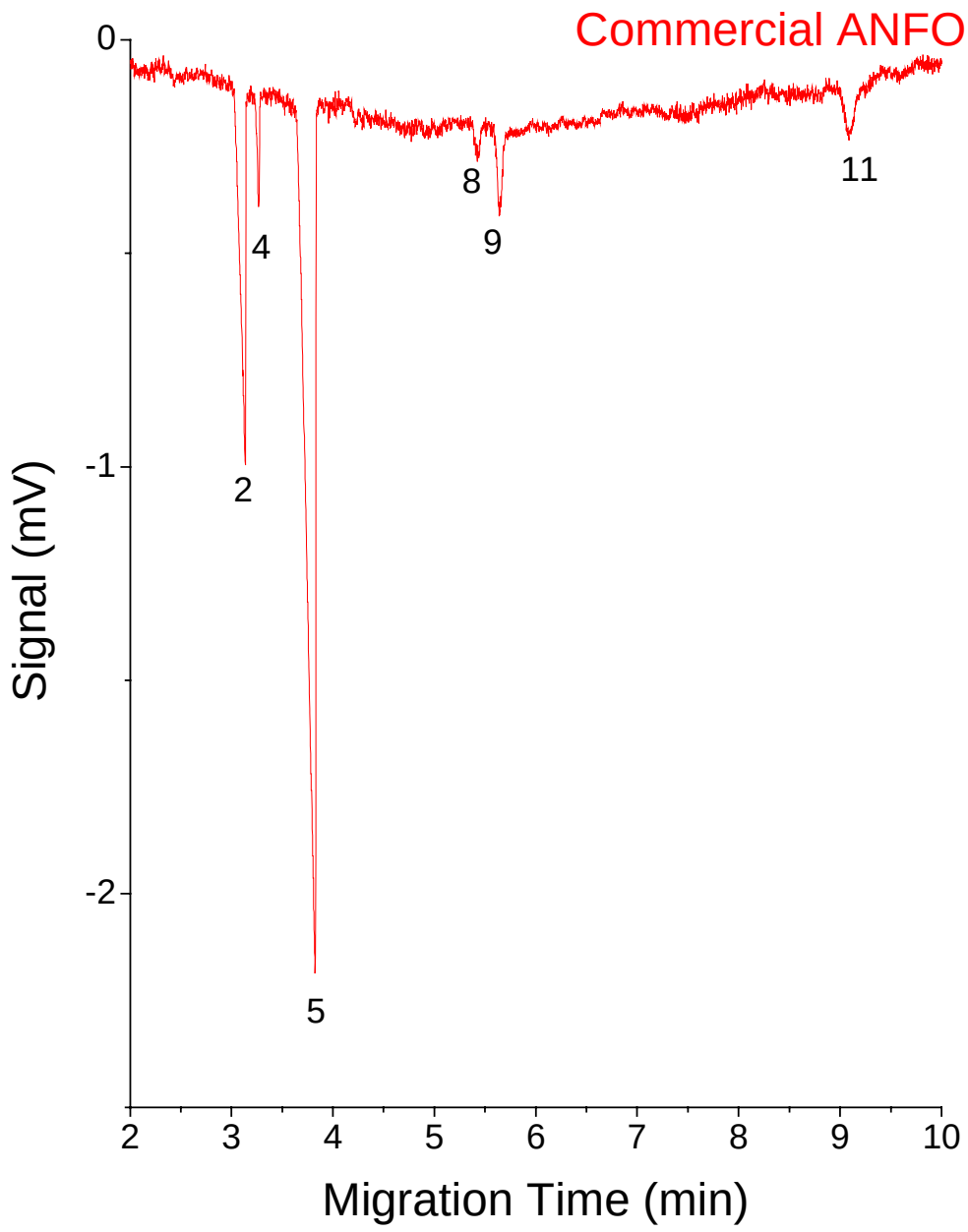
Commercial ANFO
0
-1
-2
Signal (mV)
2
4
5
8
9
11
2
3
4
5
6
7
8
9
10
Migration Time (min)

Figure S- 2

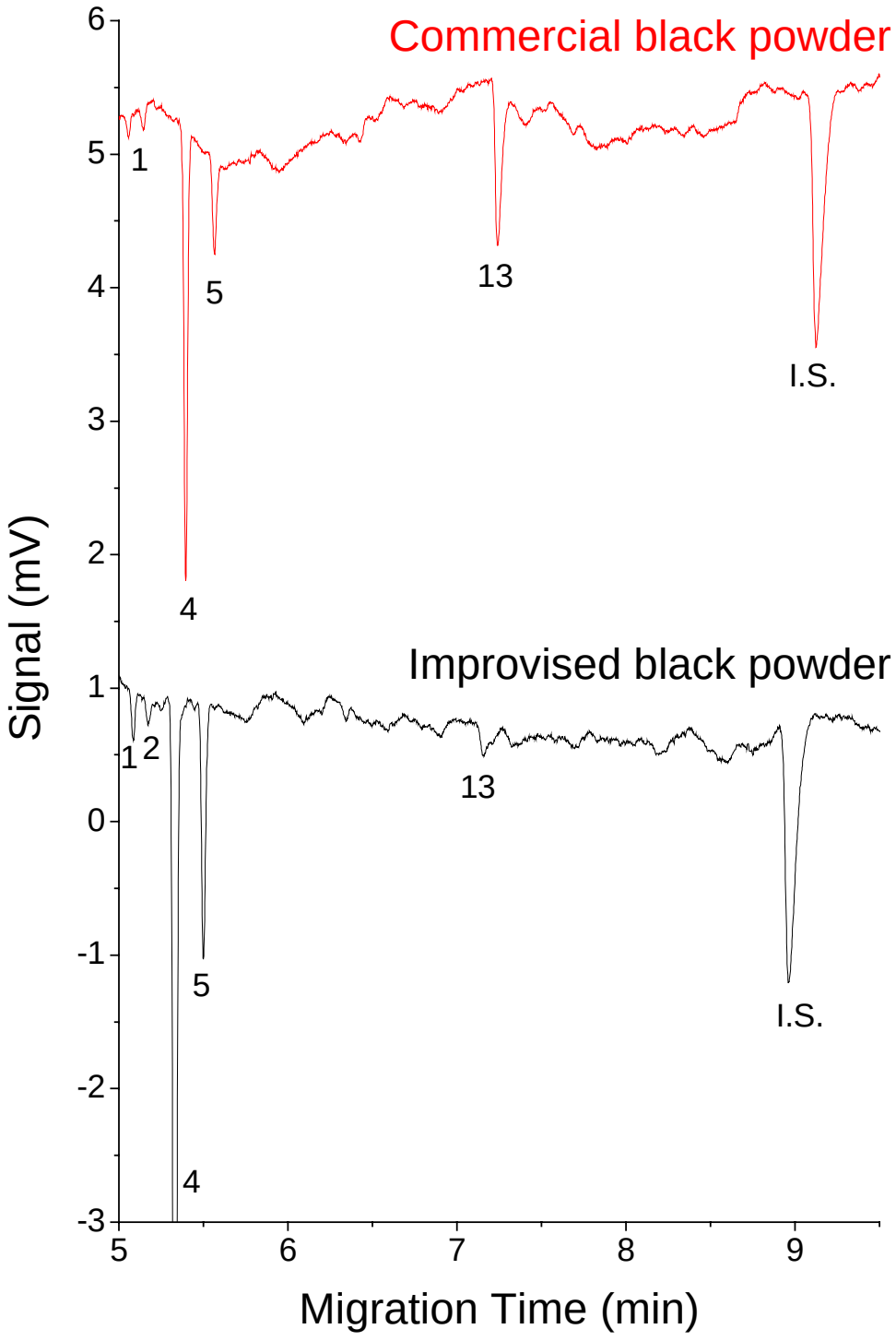
Commercial black powder
Improvised black powder
Signal (mV)
Migration Time (min)
1
2
4
5
13
I.S.

Figure S- 3

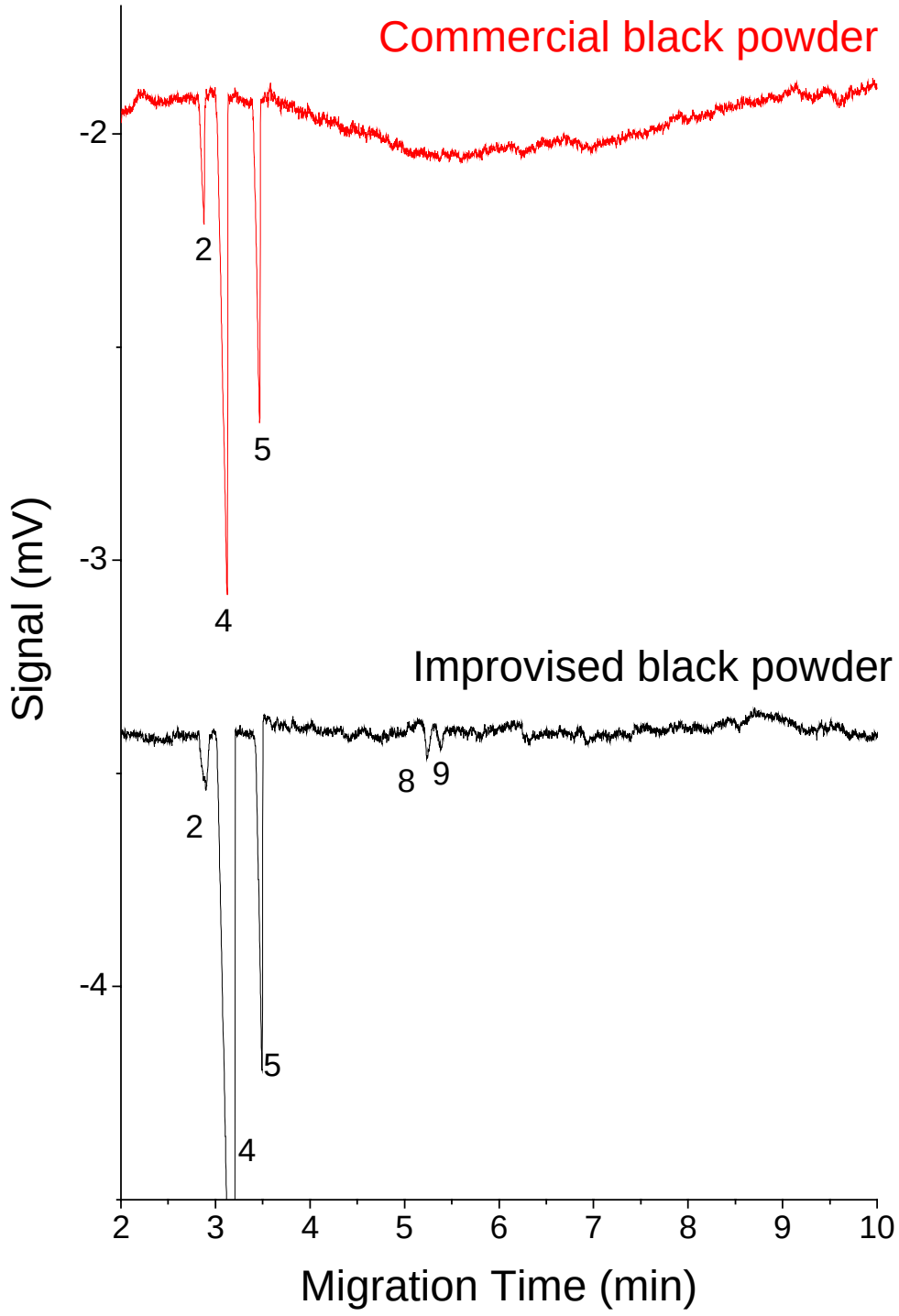
Commercial black powder
Improvised black powder
Signal (mV)
-2
-3
-4
2
4
5
8
9
2
3
4
5
6
7
8
9
10
Migration Time (min)

Figure S- 4

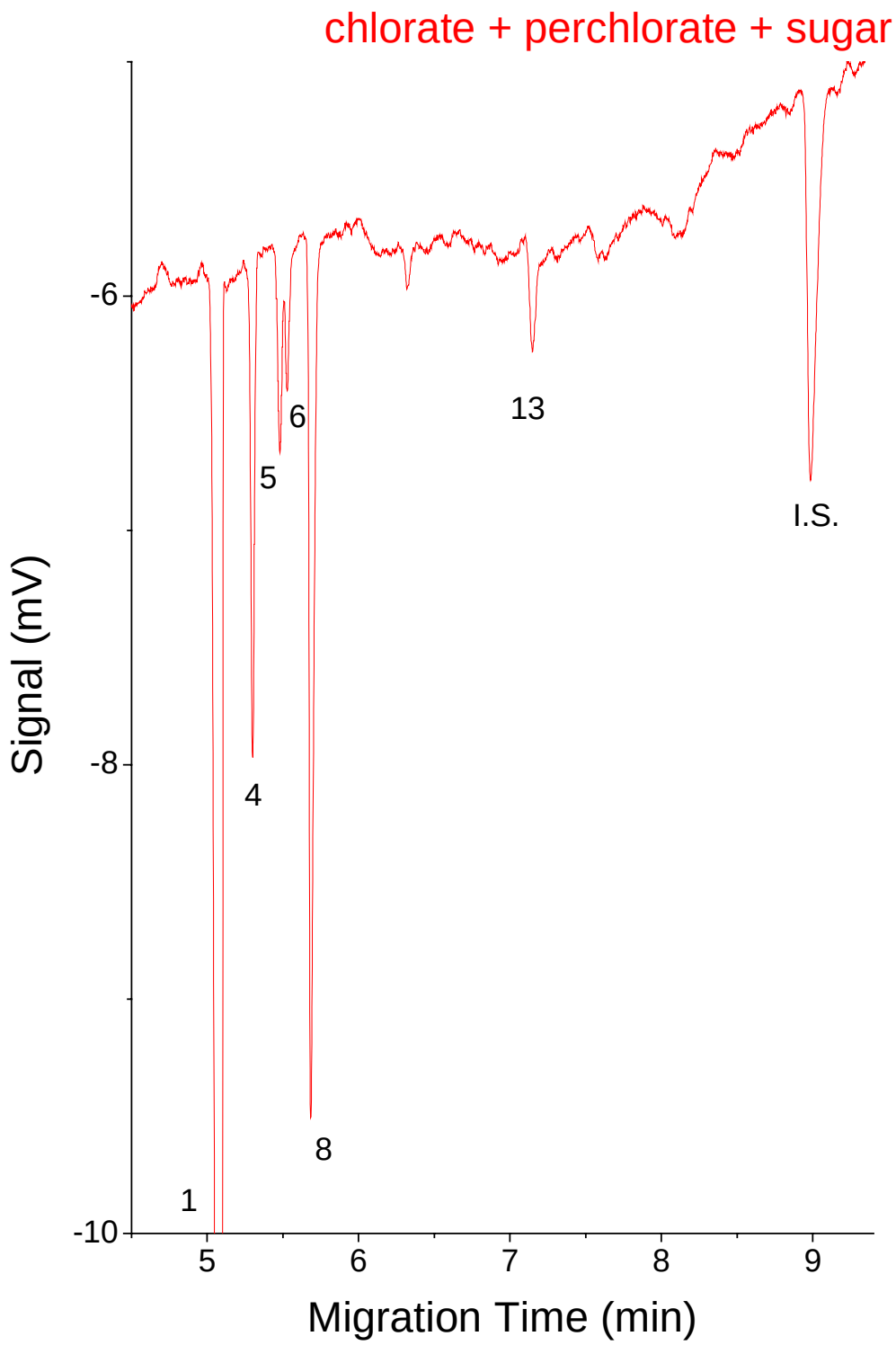
chlorate + perchlorate + sugar
Signal (mV)
-6
-8
-10
1
4
5
6
8
13
I.S.
5
6
7
8
9
Migration Time (min)

Figure S- 5

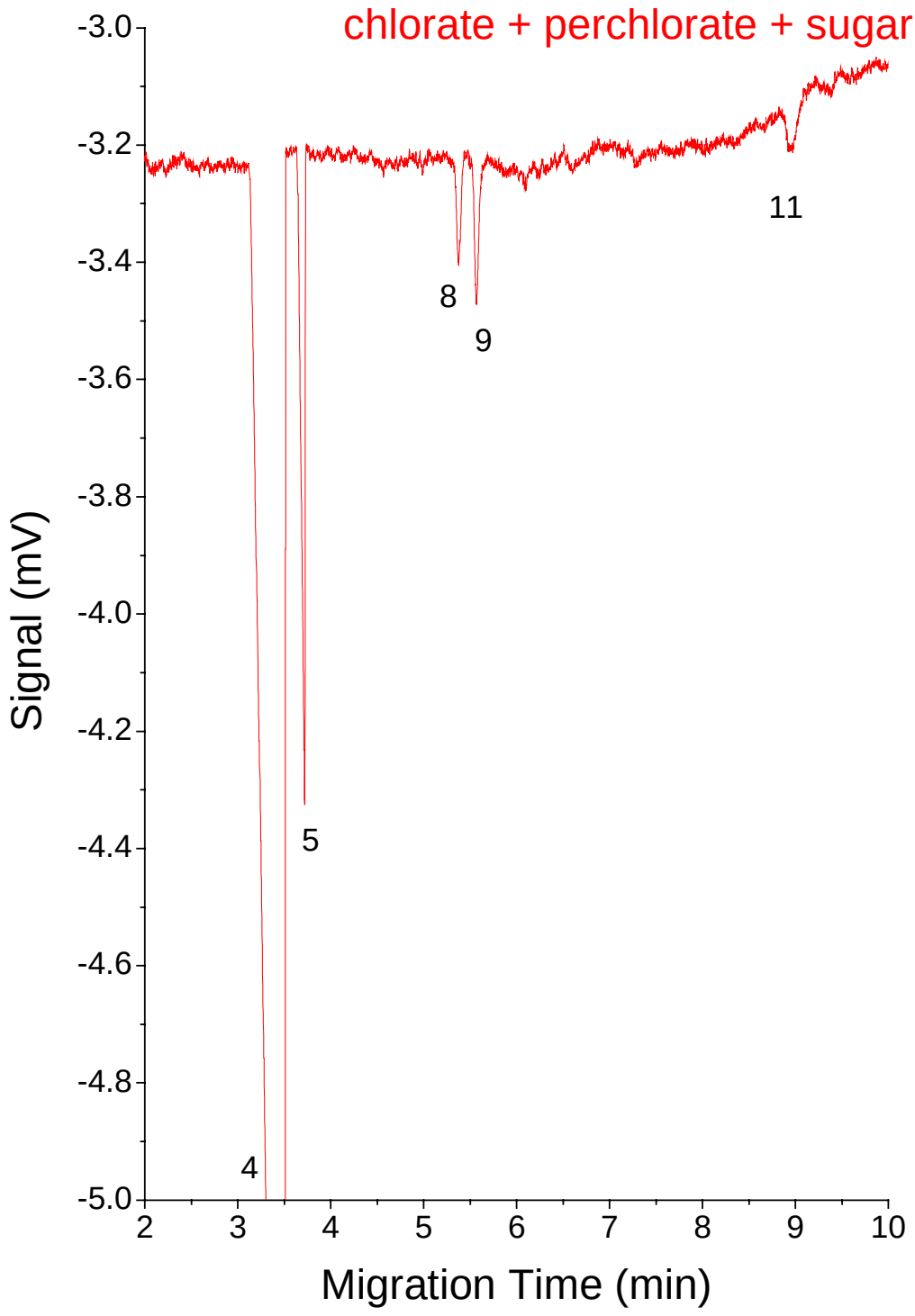
chlorate + perchlorate + sugar
Signal (mV)
Migration Time (min)
-3.0
-3.2
-3.4
-3.6
-3.8
-4.0
-4.2
-4.4
-4.6
-4.8
-5.0
2
3
4
5
6
7
8
9
10
4
5
8
9
11

Figure S- 6

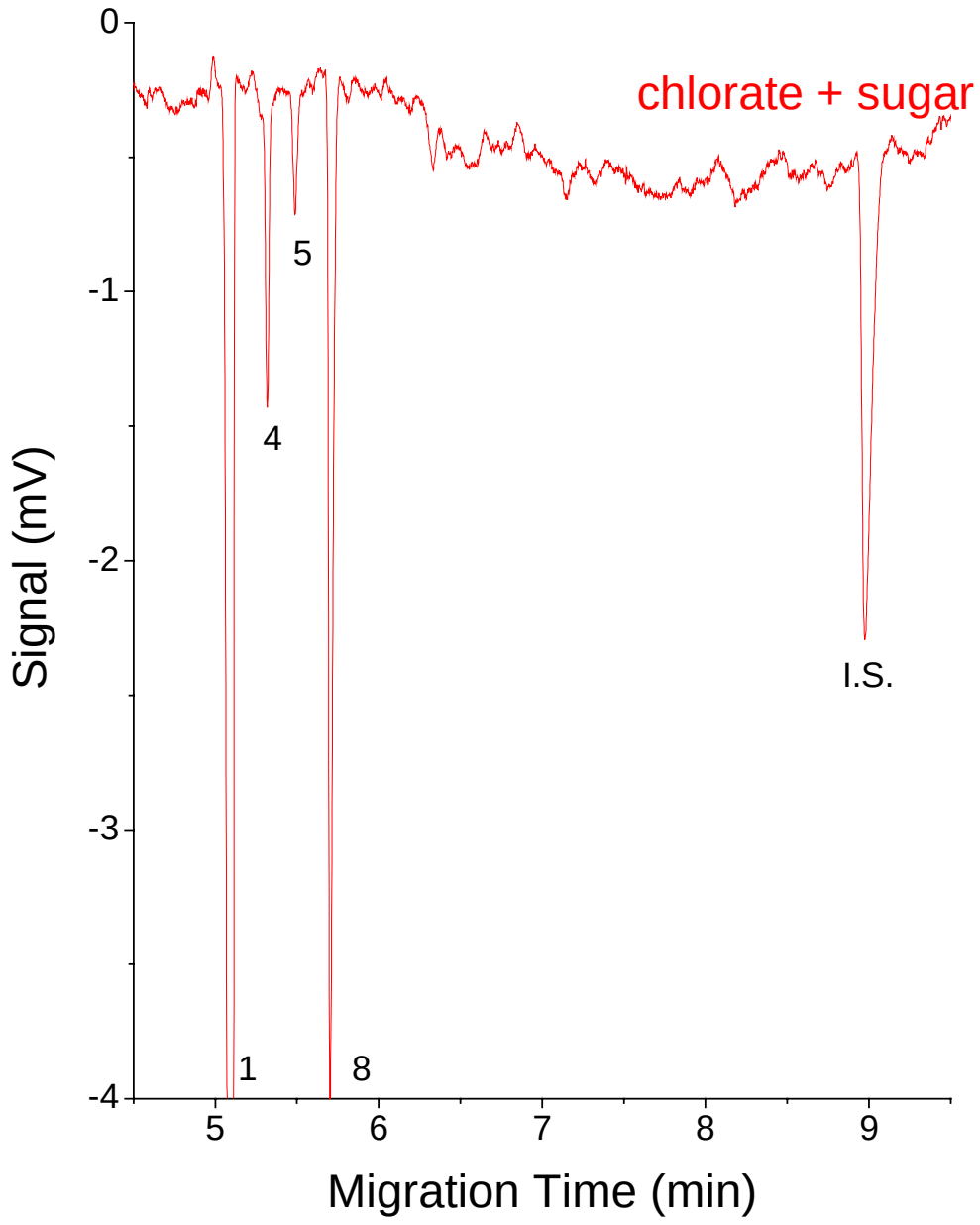
chlorate + sugar
Signal (mV)
Migration Time (min)
0
-1
-2
-3
-4
5
6
7
8
9
1
4
5
8
I.S.

Figure S- 7

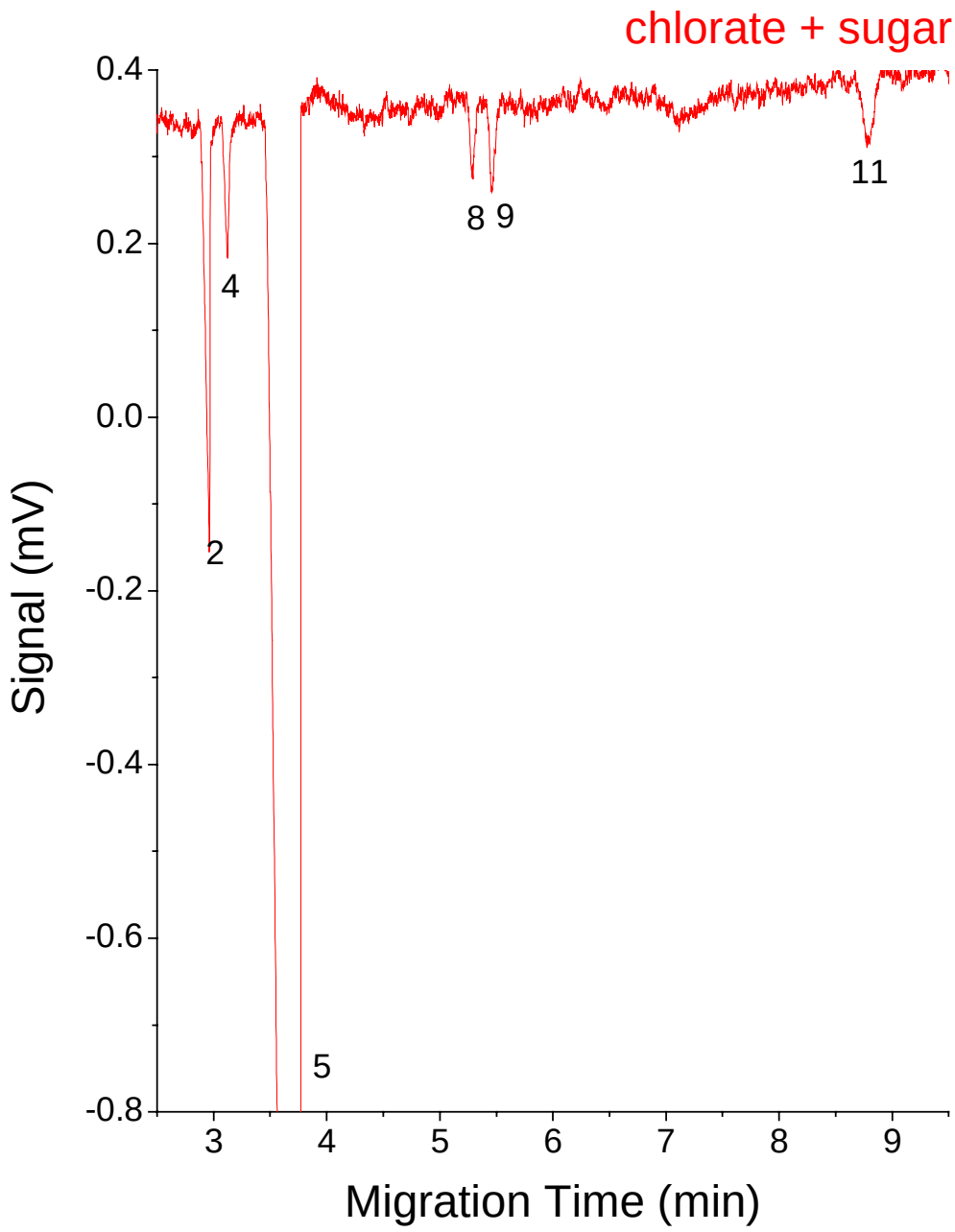
chlorate + sugar
0.4
0.2
0.0
-0.2
-0.4
-0.6
-0.8
Signal (mV)
2
4
5
8 9
11
3
4
5
6
7
8
9
Migration Time (min)

Figure S- 8

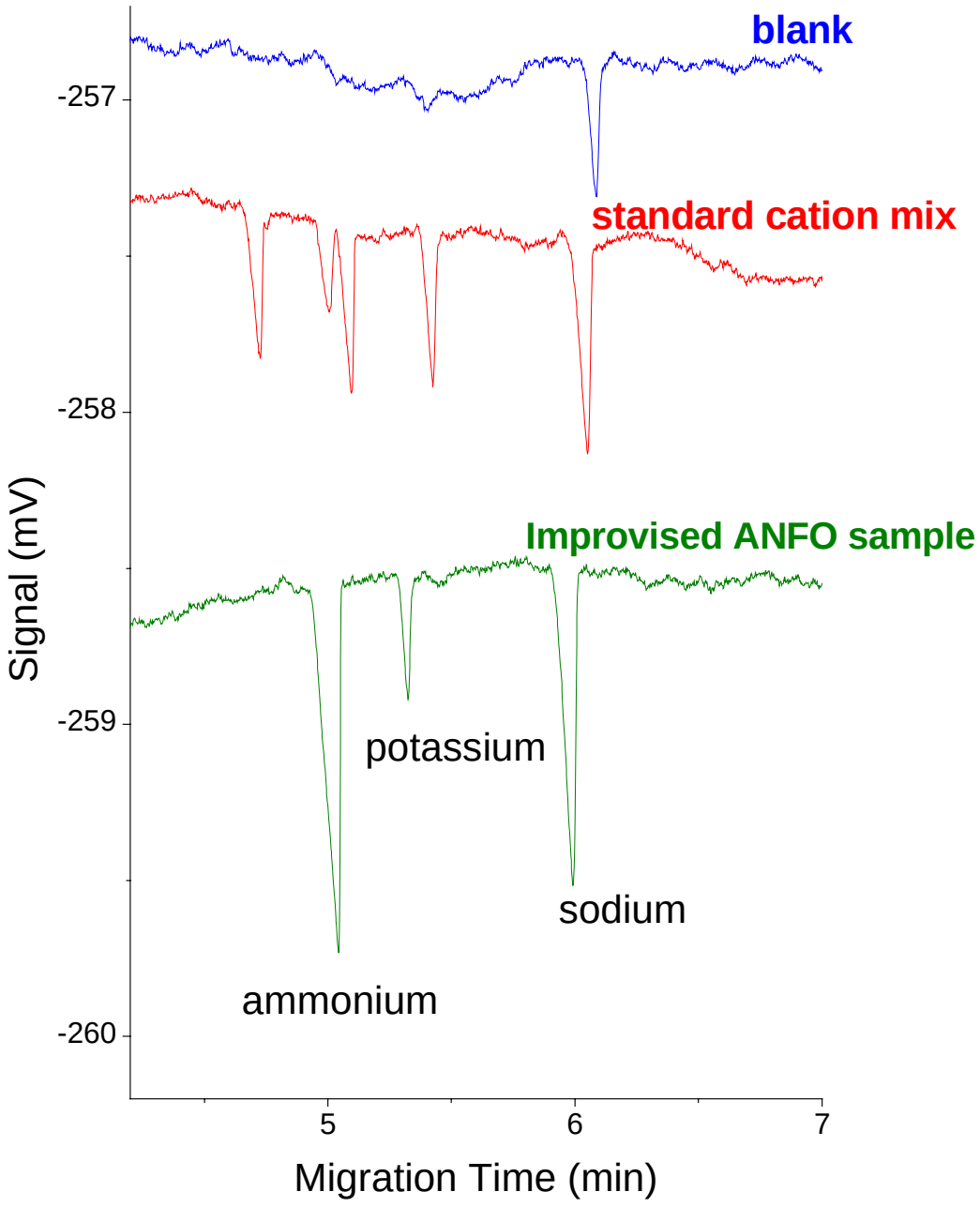
blank
standard cation mix
Improvised ANFO sample
potassium
sodium
ammonium
-257
-258
-259
-260
Signal (mV)
5
6
7
Migration Time (min)

Figure S- 9