Fig. 1

Extended Evap Profiles -- MTBE-Blended CaRFG

(species > 1%)

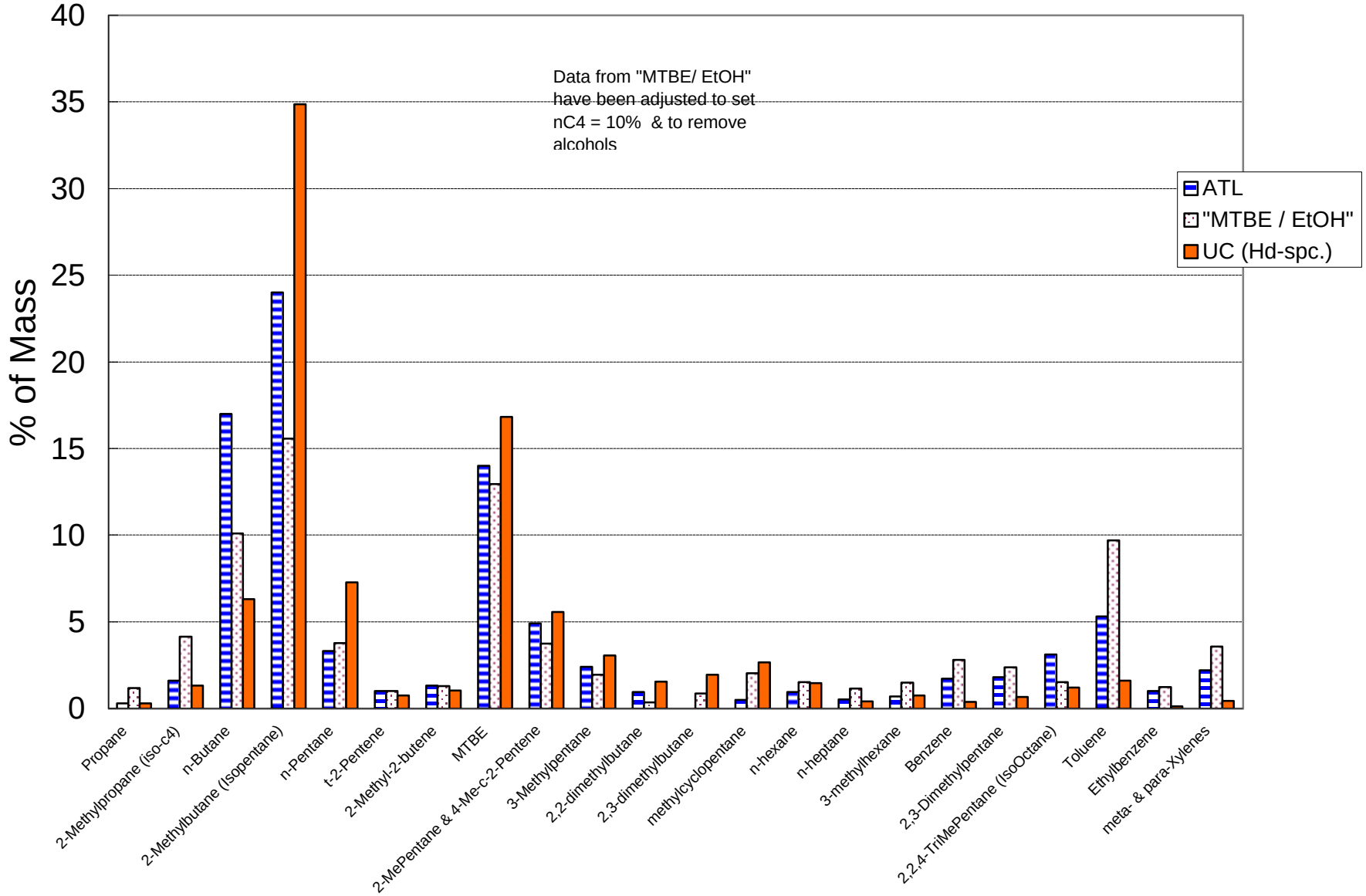


Fig. 2

Extended Evap Profiles -- EtOH-Blended CaRFG

(species > 1%)

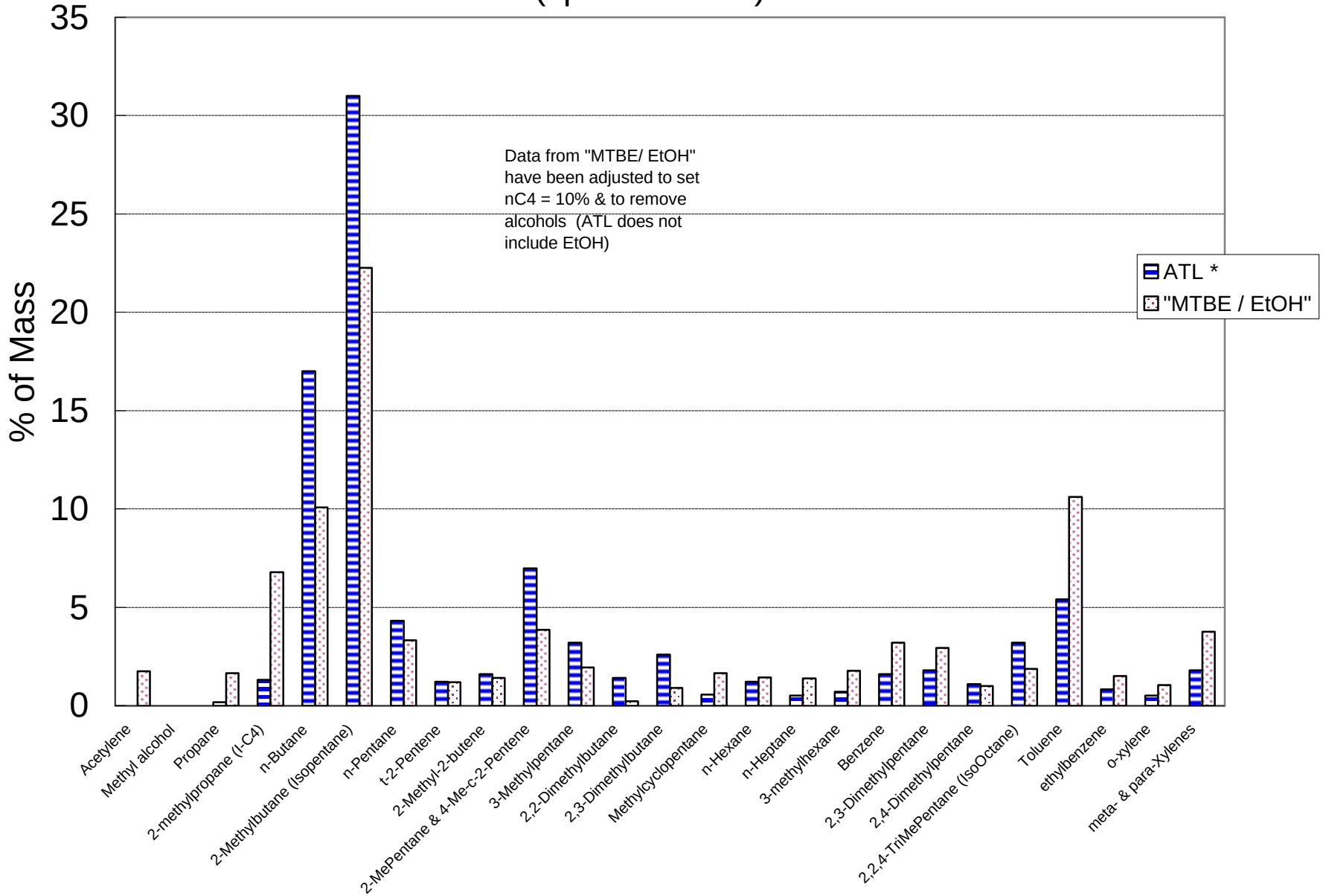


Fig. 3

Extended Evap Comparison -- ATL Ph-1-Ph2 Data

(excludes alcohols)

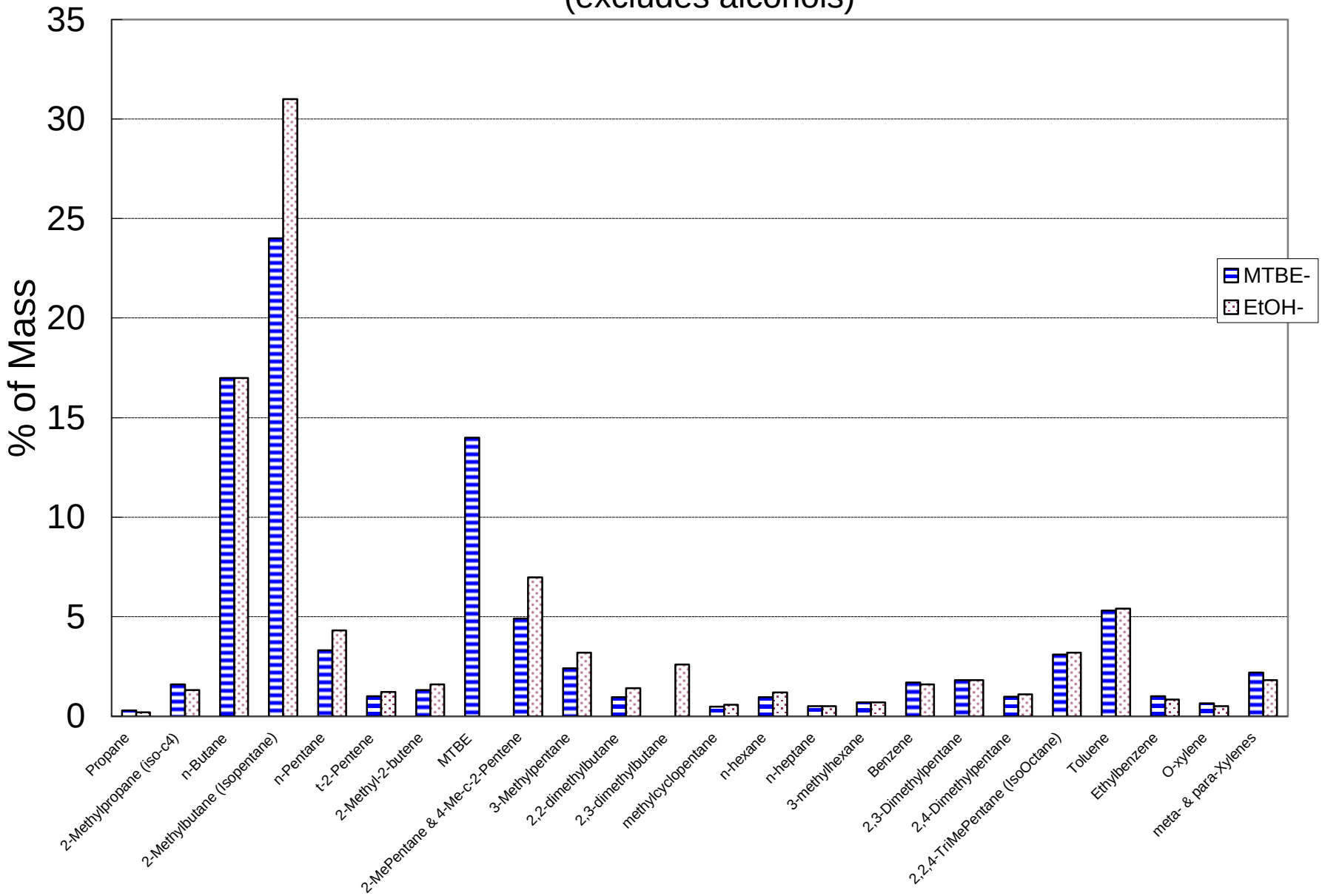


Fig. 4

Extended Evap Comparison -- "MTBE/EtOH" Data

(w. adjusted n-C4 & no MTBE or EtOH carry-over)

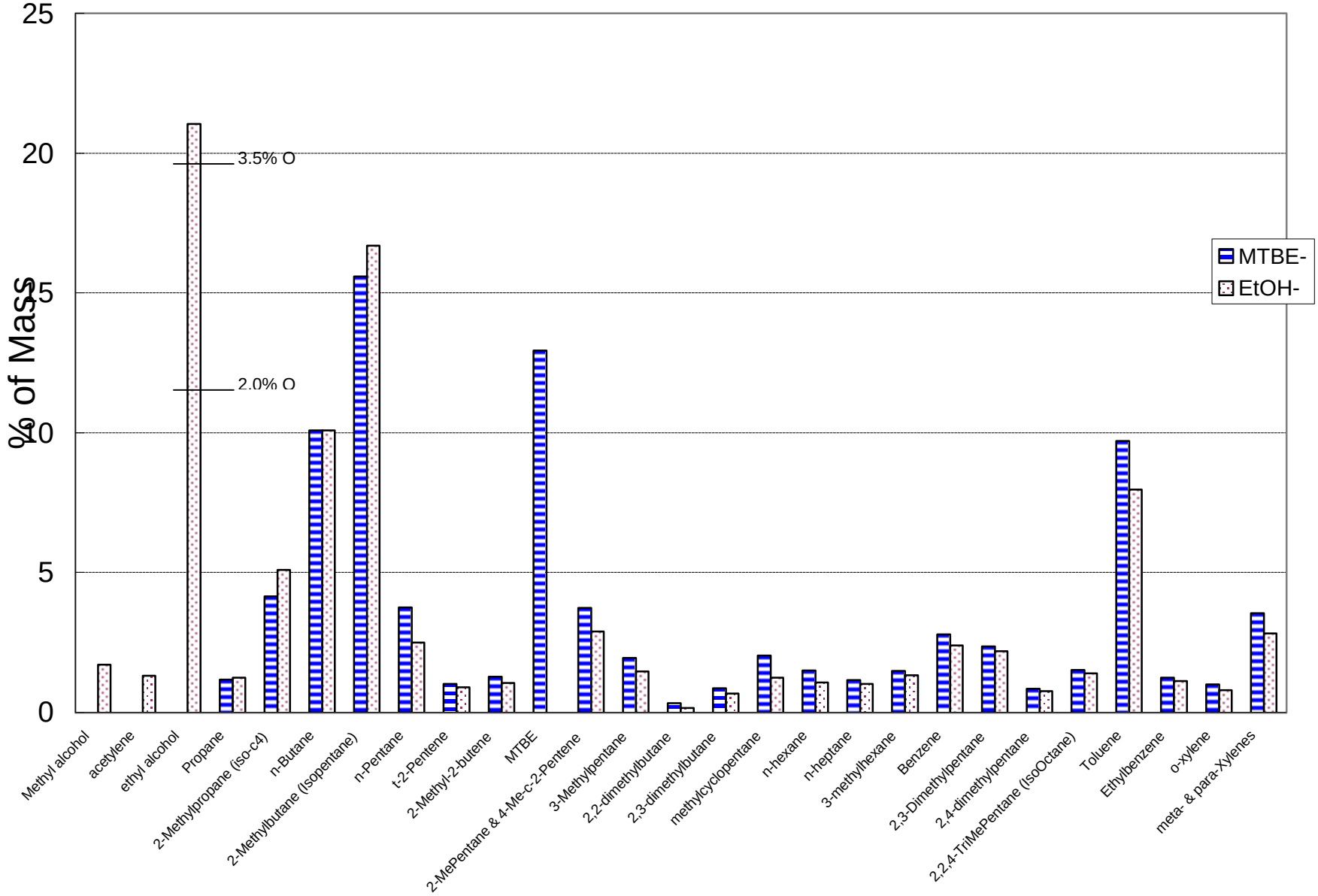


Fig. 5

Hot-Soak Profiles -- MTBE-Blended CaRFG

(species > 1%)

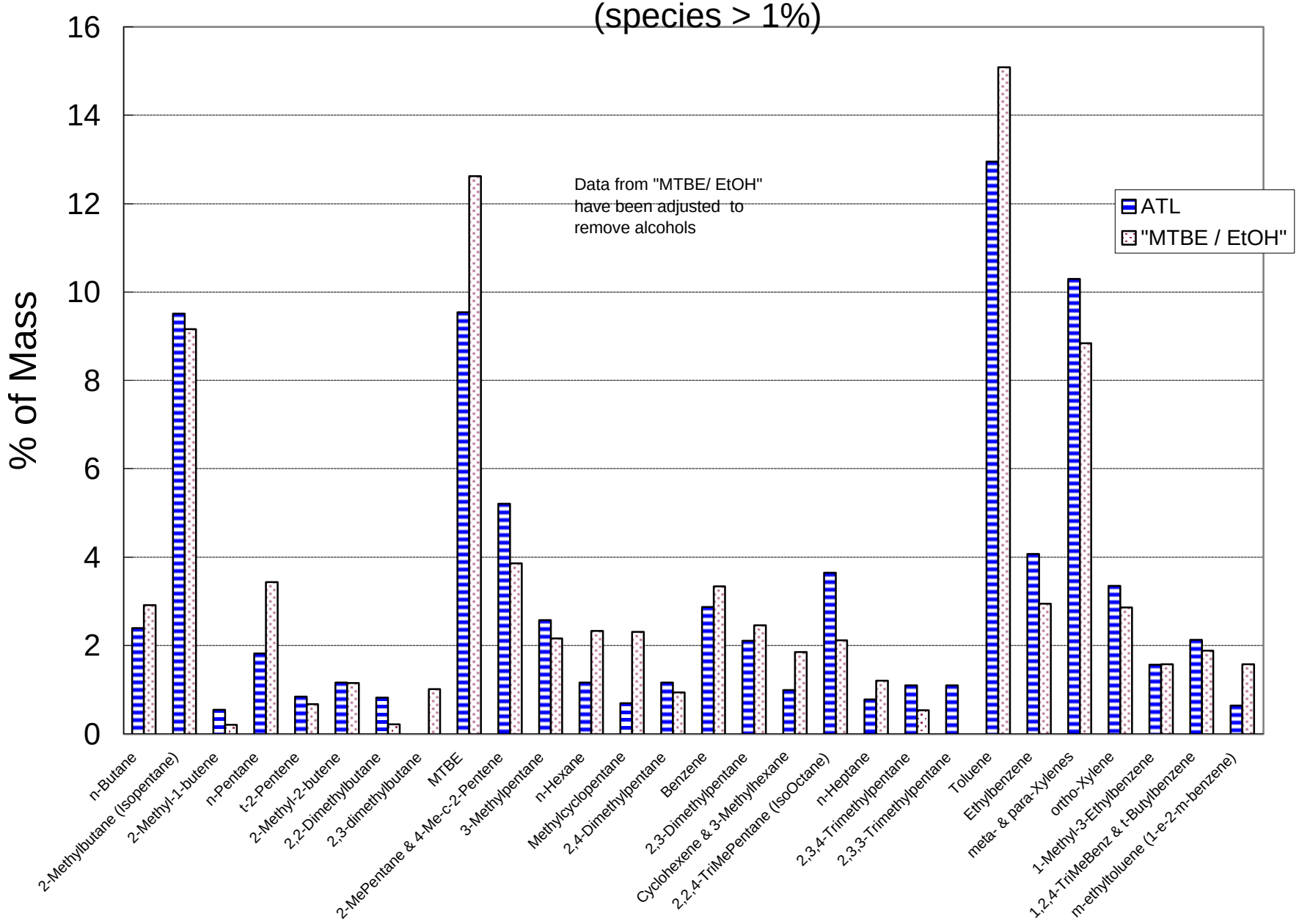


Fig. 6

Hot-Soak Profiles -- EtOH-Blended CaRFG

(species > 1%)

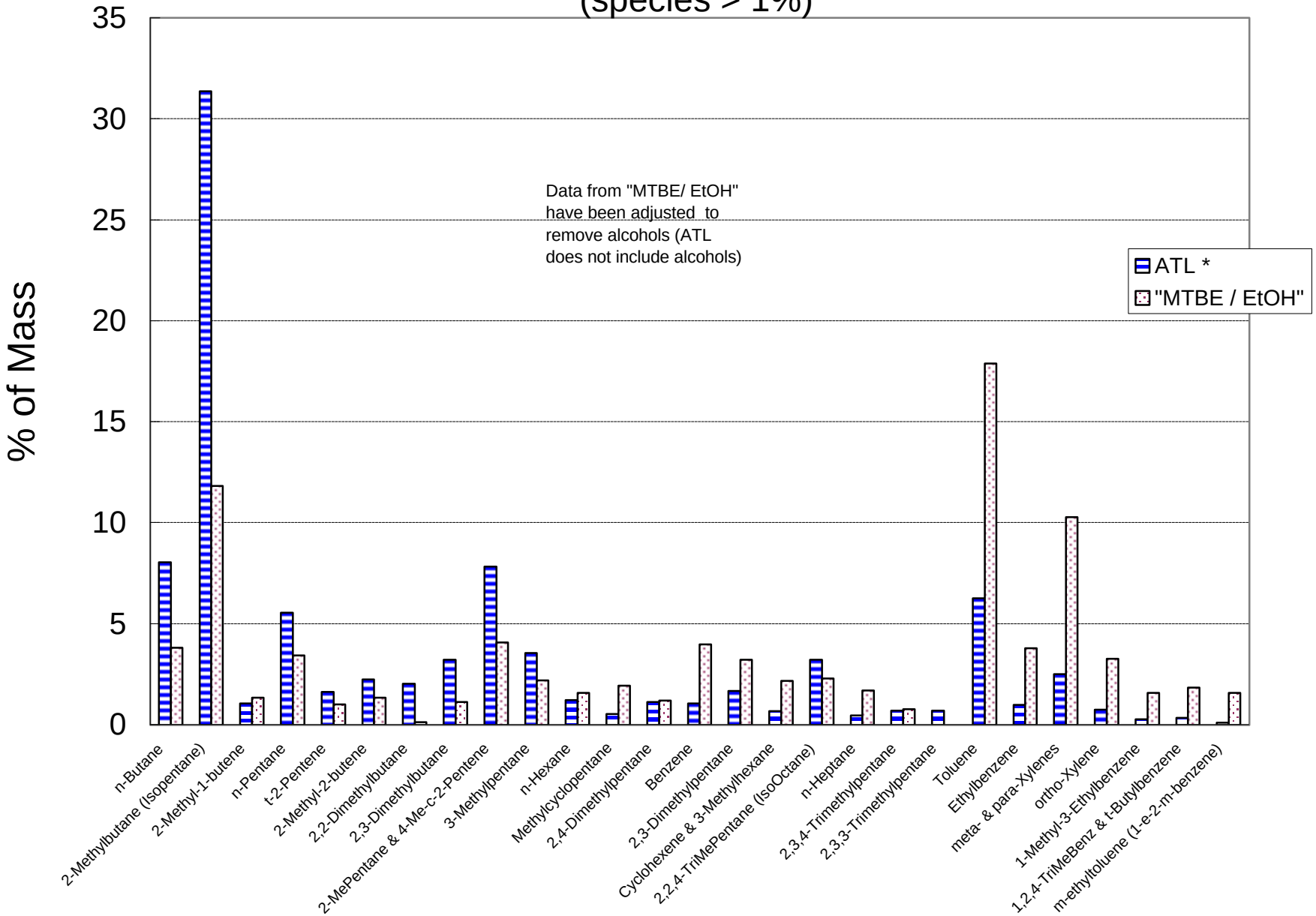


Fig. 7

Hot-Soak Comparison -- ATL Ph1- Ph2 Data

(excludes alcohols)

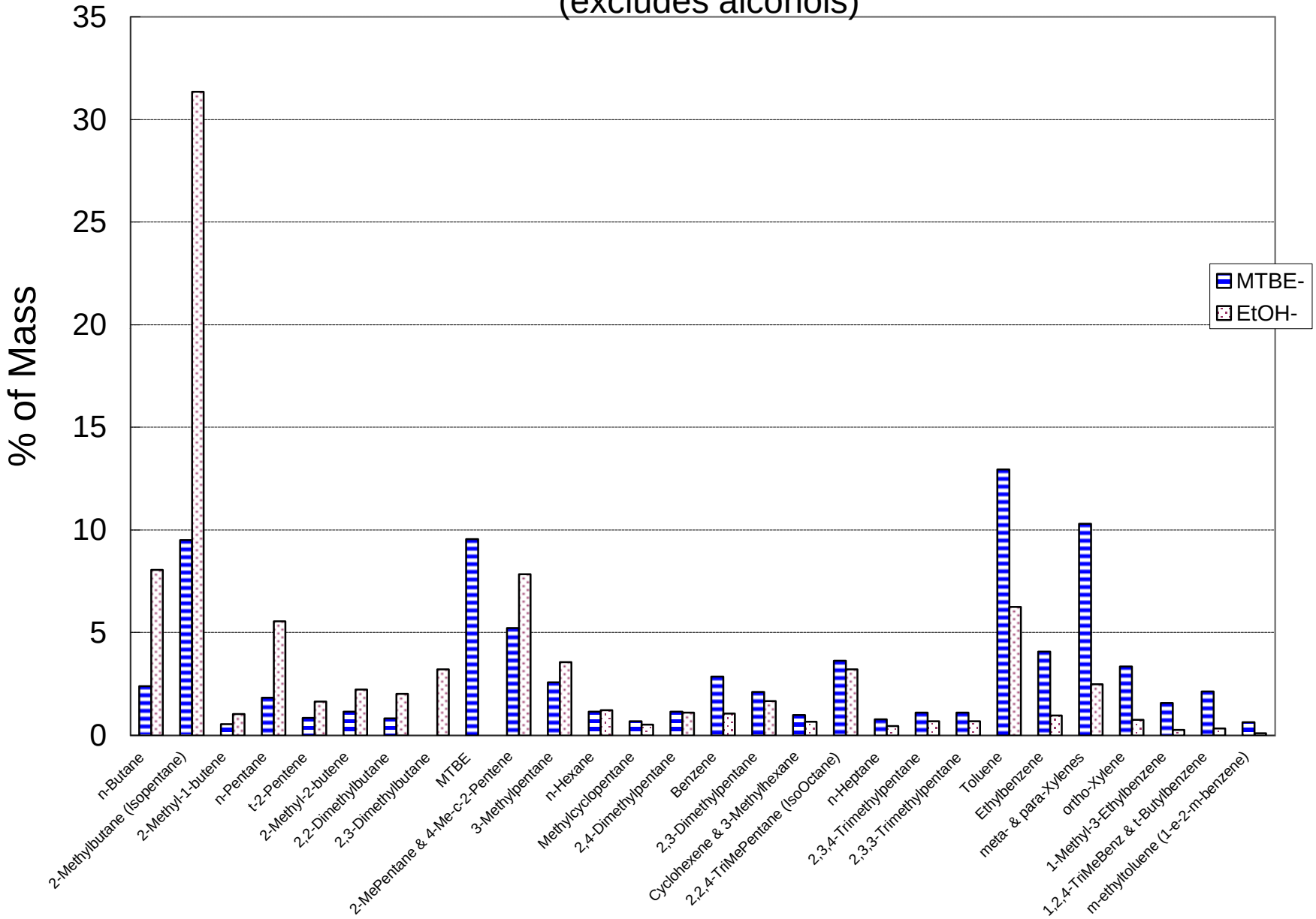


Fig. 8

Hot-Soak Comparison -- "MTBE - EtOH" Data

(species > 1%)

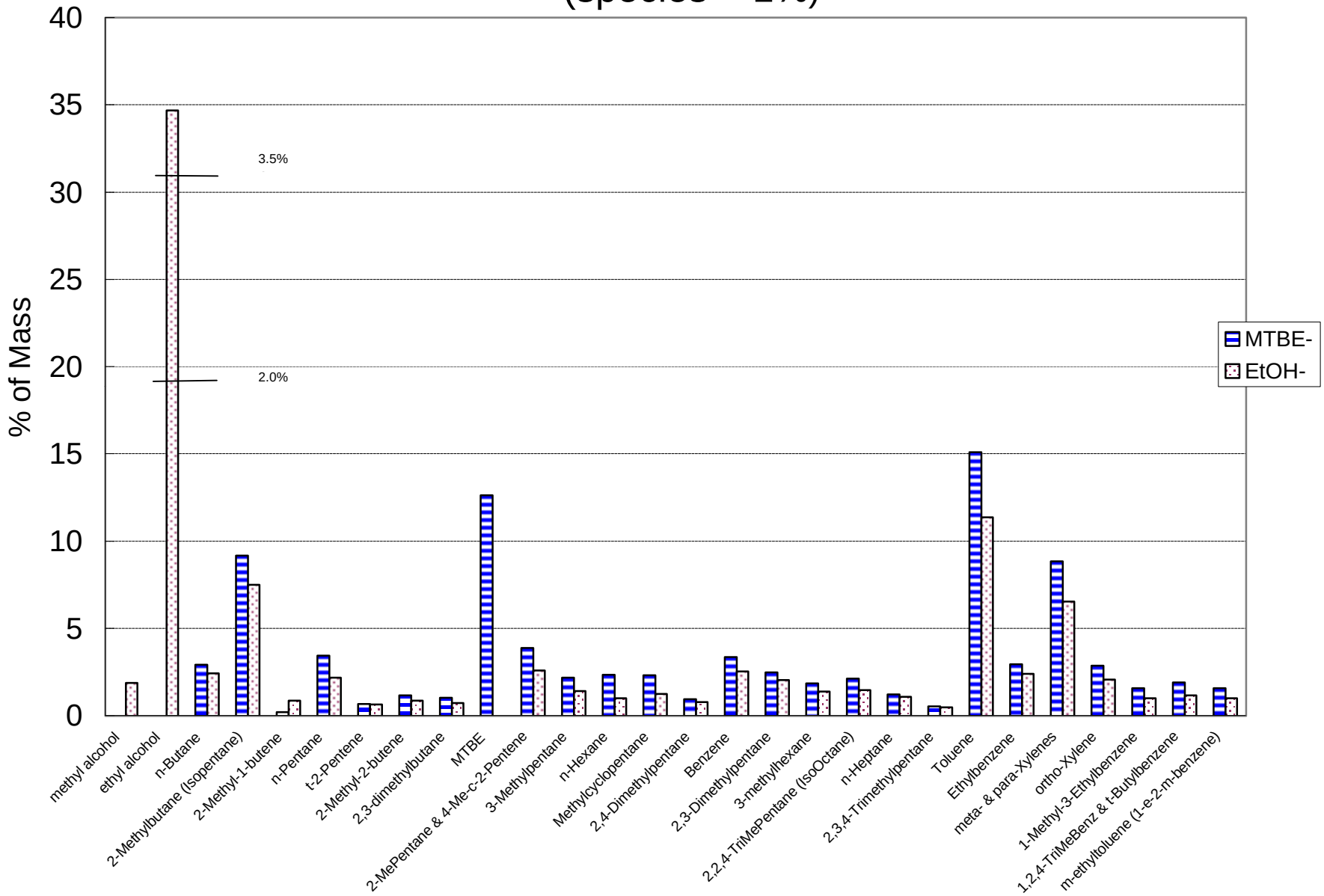


Fig. 9

Starts (B1-B3) Profiles -- MTBE-Blended CaRFG

(species > 1%)

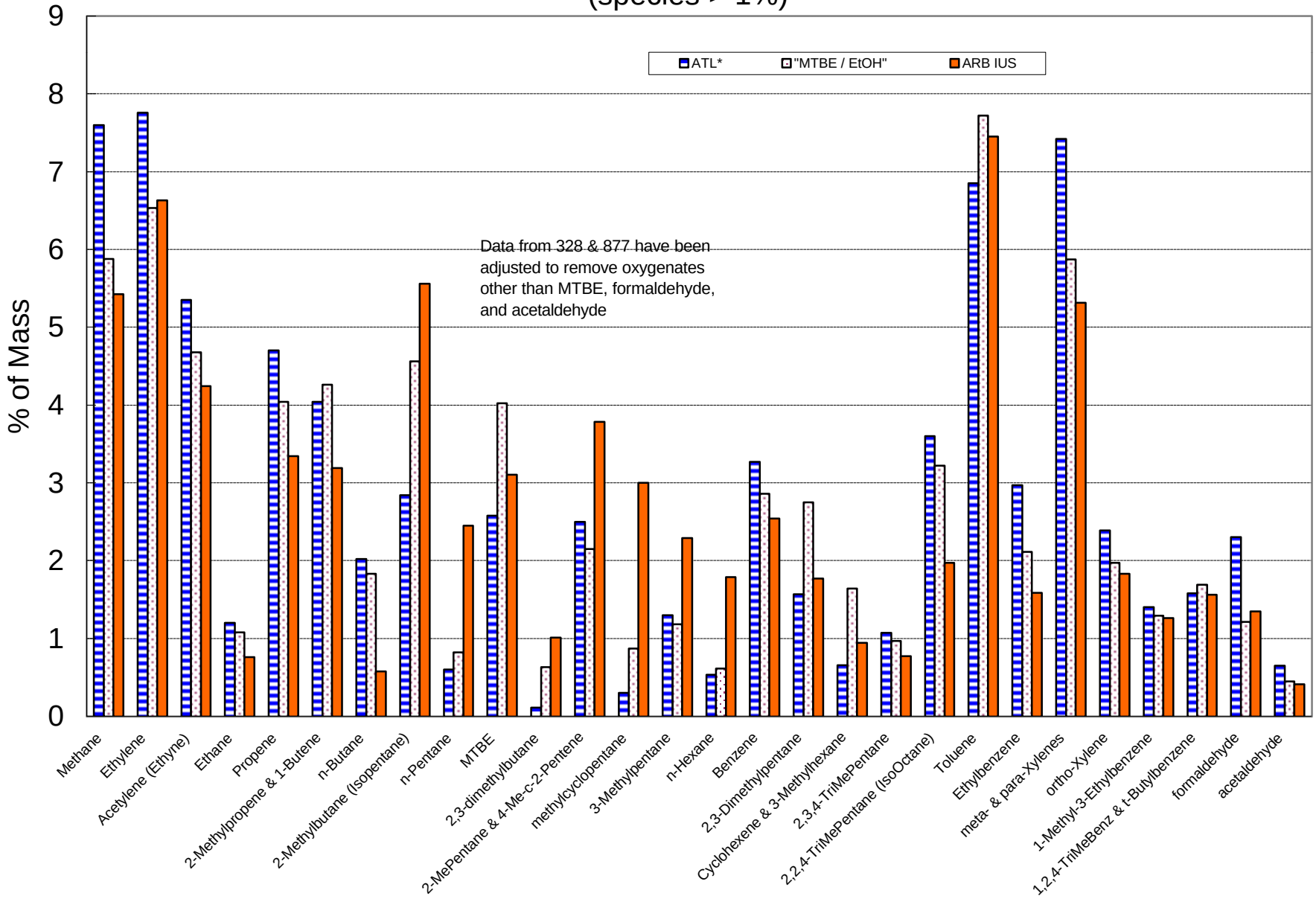
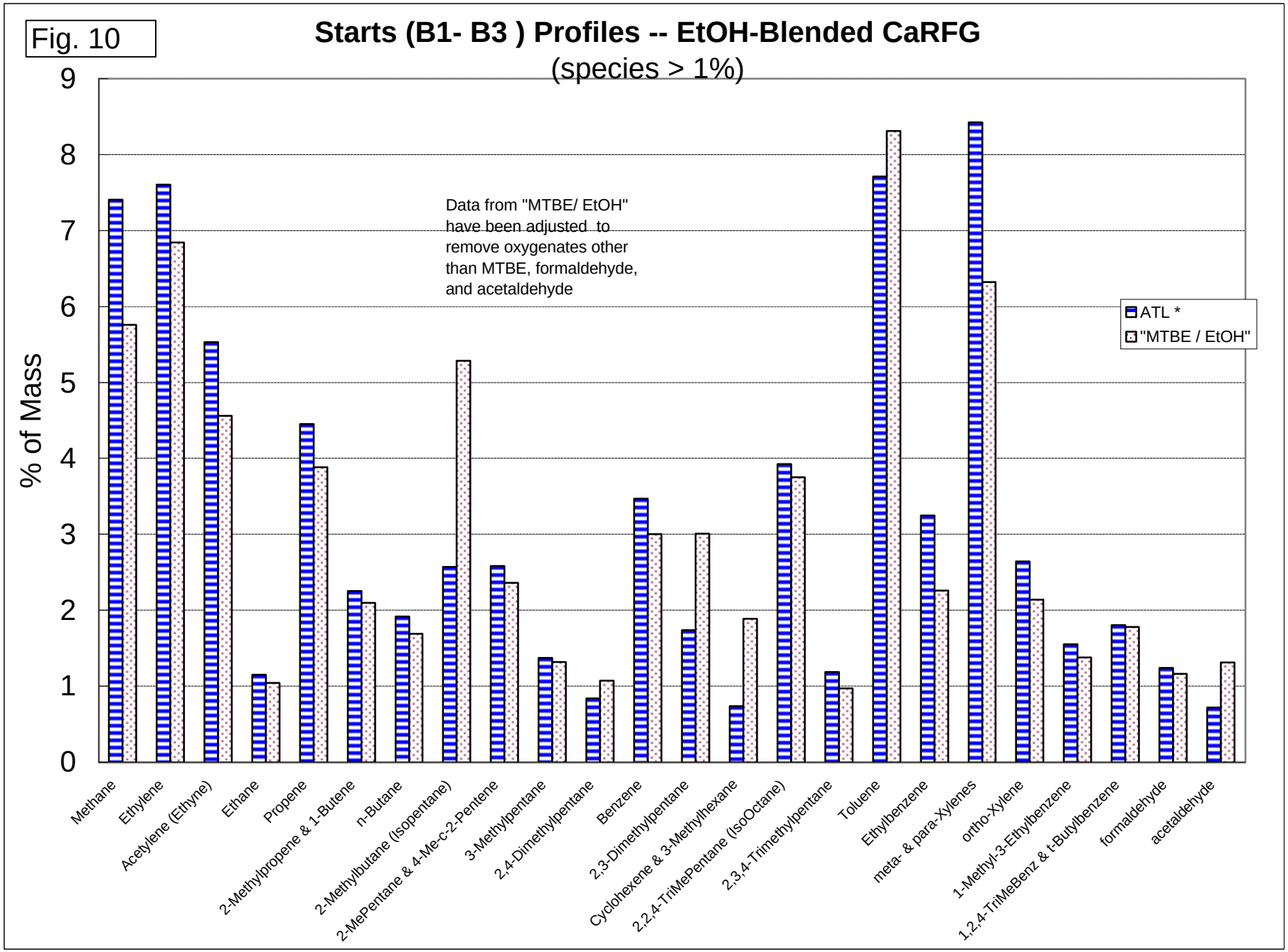


Fig. 10


Starts (B1- B3) Profiles -- EtOH-Blended CaRFG
(species > 1%)
% of Mass
0
1
2
3
4
5
6
7
8
9
Data from "MTBE/ EtOH" have been adjusted to remove oxygenates other than MTBE, formaldehyde, and acetaldehyde
ATL *
"MTBE / EtOH"
Methane
Ethylene
Acetylene (Ethyne)
Ethane
Propene
2-Methylpropene & 1-Butene
n-Butane
2-Methylbutane (Isopentane)
2-MePentane & 4-Me-c-2-Pentene
3-Methylpentane
2,4-Dimethylpentane
Benzene
2,3-Dimethylpentane
Cyclohexene & 3-Methylhexane
2,2,4-TriMePentane (IsoOctane)
2,3,4-Trimethylpentane
Toluene
Ethylbenzene
meta- & para-Xylenes
ortho-Xylene
1-Methyl-3-Ethylbenzene
1,2,4-TriMeBenz & t-Butylbenzene
formaldehyde
acetaldehyde

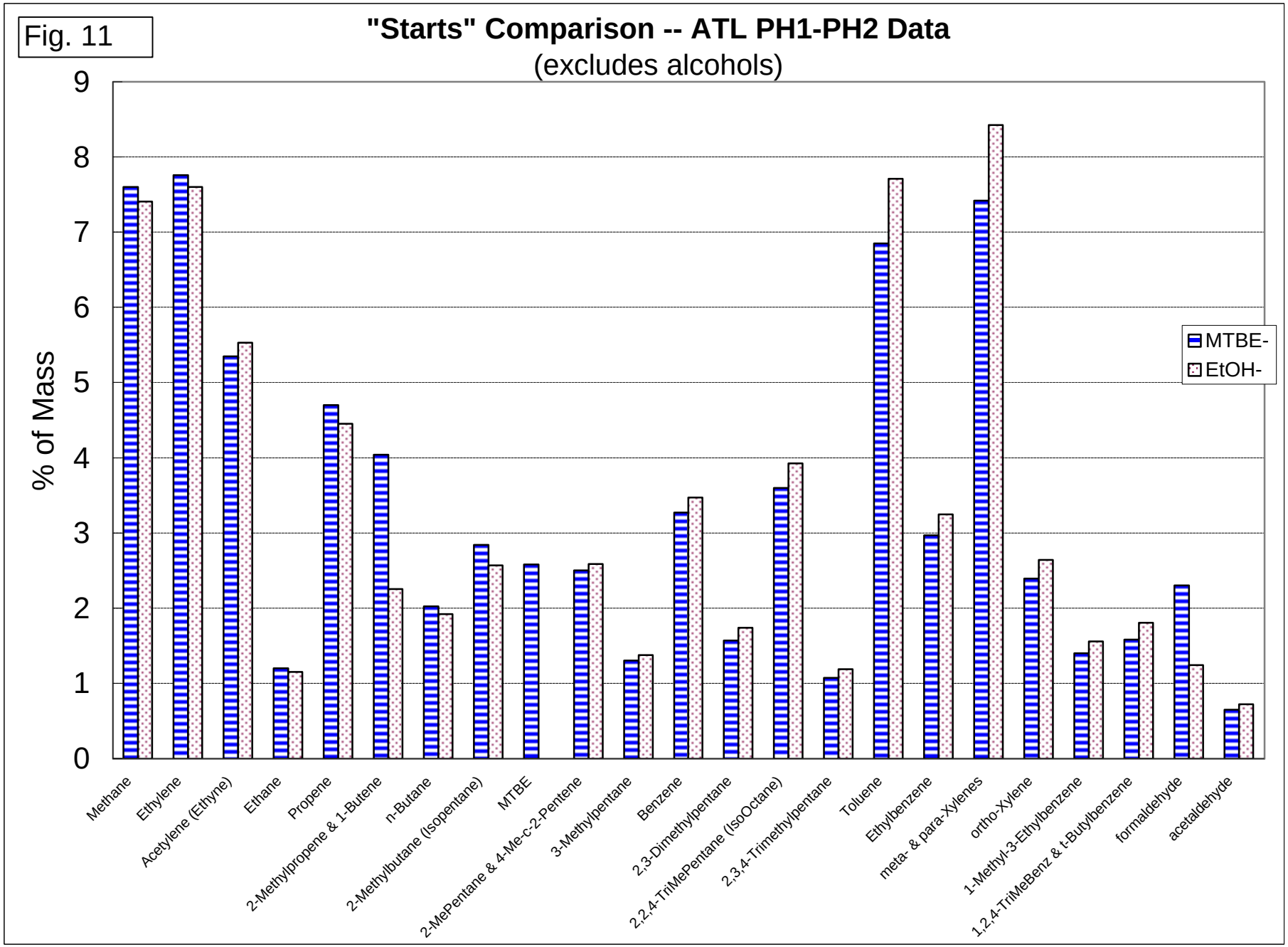


Fig. 11
"Starts" Comparison -- ATL PH1-PH2 Data
(excludes alcohols)
% of Mass
0
1
2
3
4
5
6
7
8
9
MTBE-
EtOH-
Methane
Ethylene
Acetylene (Ethyne)
Ethane
Propene
2-Methylpropene & 1-Butene
n-Butane
2-Methylbutane (Isopentane)
MTBE
2-MePentane & 4-Me-c-2-Pentene
3-Methylpentane
Benzene
2,3-Dimethylpentane
2,2,4-TriMePentane (IsoOctane)
2,3,4-Trimethylpentane
Toluene
Ethylbenzene
meta- & para-Xylenes
ortho-Xylene
1-Methyl-3-Ethylbenzene
1,2,4-TriMeBenz & t-Butylbenzene
formaldehyde
acetaldehyde

Fig. 12

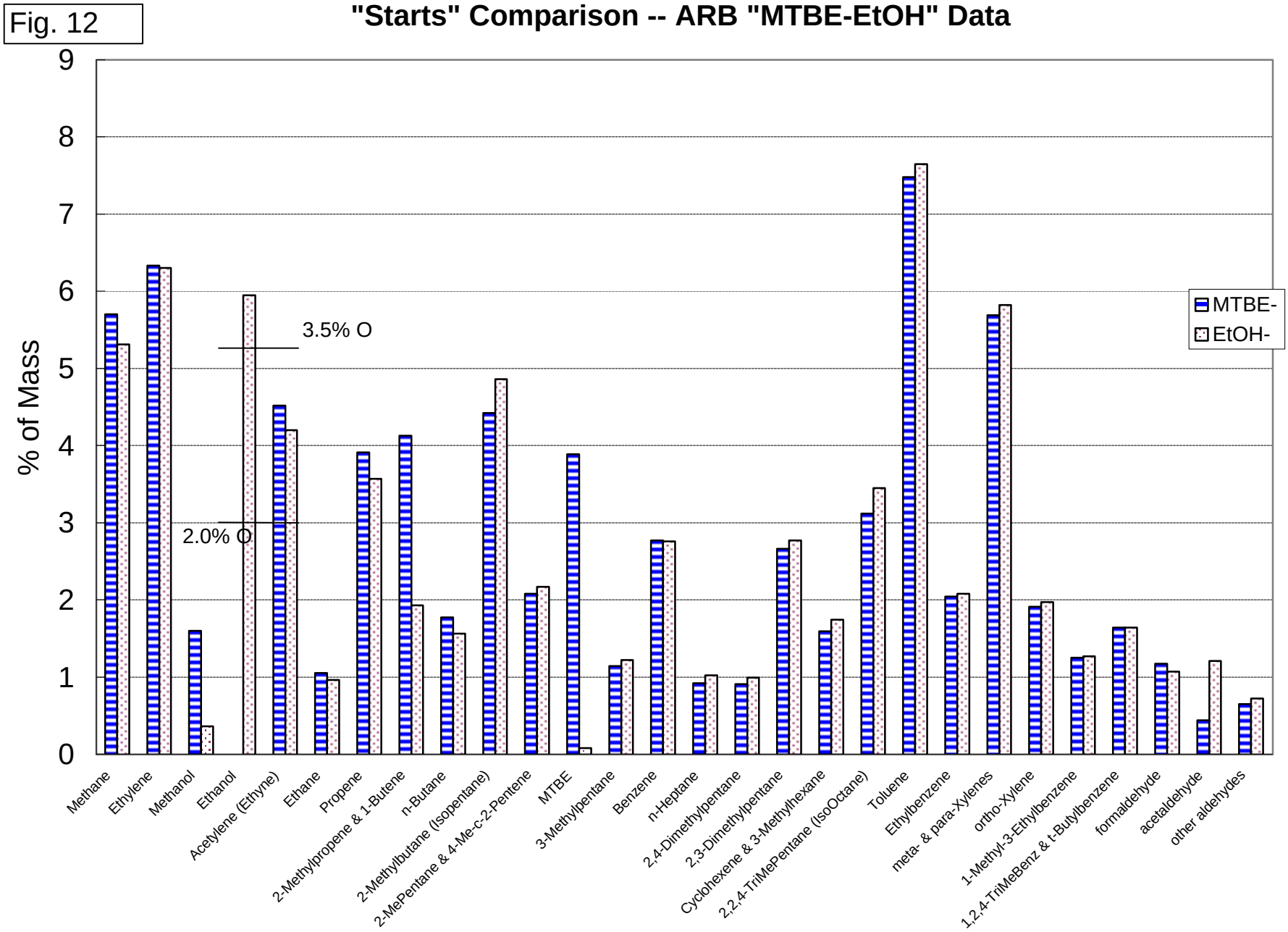

"Starts" Comparison -- ARB "MTBE-EtOH" Data
% of Mass
0
1
2
3
4
5
6
7
8
9
3.5% O
2.0% O
MTBE-
EtOH-
Methane
Ethylene
Methanol
Ethanol
Acetylene (Ethyne)
Ethane
Propene
2-Methylpropene & 1-Butene
n-Butane
2-Methylbutane (Isopentane)
2-MePentane & 4-Me-c-2-Pentene
MTBE
3-Methylpentane
Benzene
n-Heptane
2,4-Dimethylpentane
2,3-Dimethylpentane
Cyclohexene & 3-Methylhexane
2,2,4-TriMePentane (IsoOctane)
Toluene
Ethylbenzene
meta- & para-Xylenes
ortho-Xylene
1-Methyl-3-Ethylbenzene
1,2,4-TriMeBenz & t-Butylbenzene
formaldehyde
acetaldehyde
other aldehydes

Fig. 13

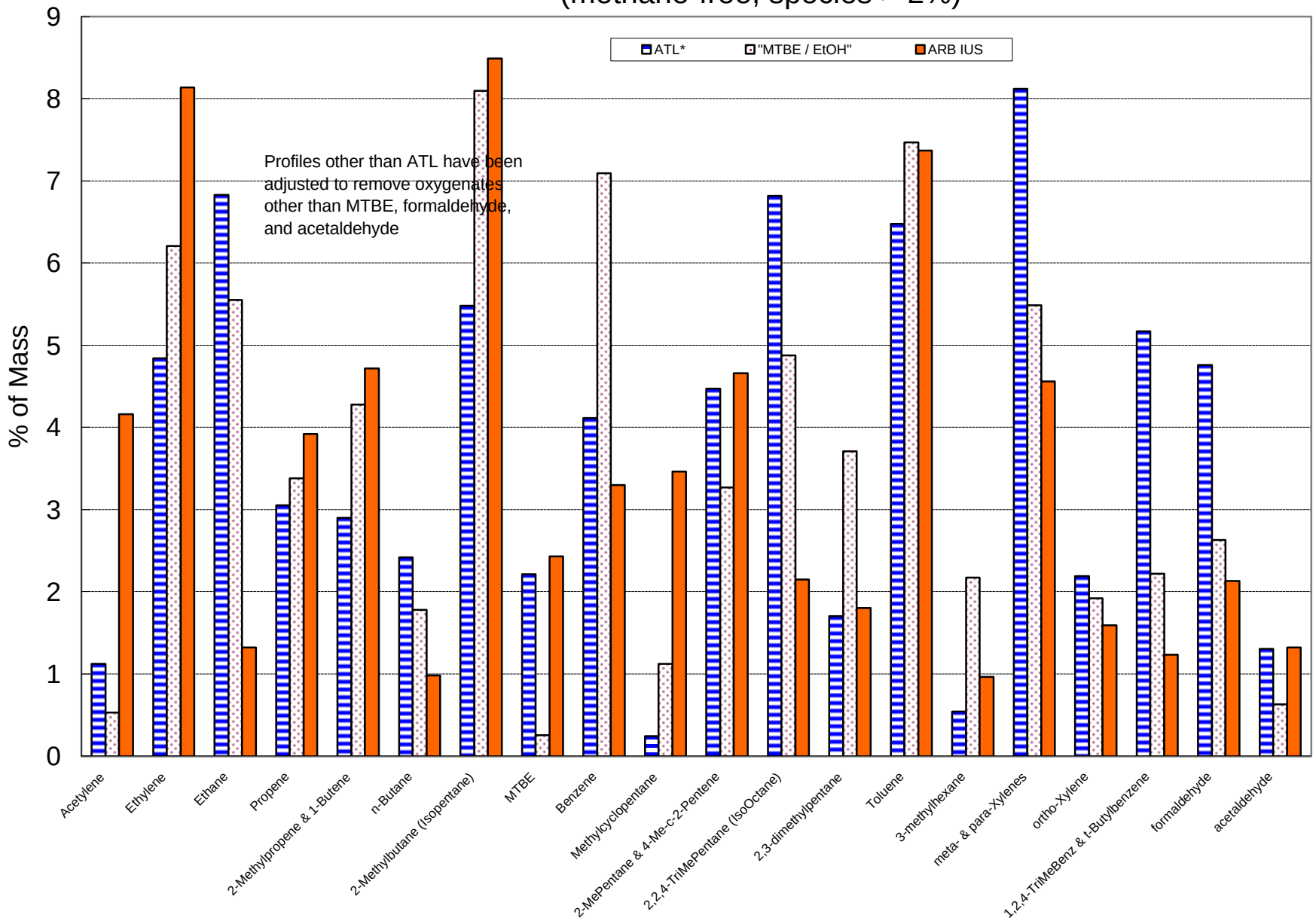

Bag 2 Profiles--MTBE-Blended CaRFG
(methane-free, species > 2%)
% of Mass
0
1
2
3
4
5
6
7
8
9
ATL*
"MTBE / EtOH"
ARB IUS
Profiles other than ATL have been adjusted to remove oxygenates other than MTBE, formaldehyde, and acetaldehyde
Acetylene
Ethylene
Ethane
Propene
2-Methylpropene & 1-Butene
n-Butane
2-Methylbutane (Isopentane)
MTBE
Benzene
Methylcyclopentane
2-MePentane & 4-Me-c-2-Pentene
2,2,4-TriMePentane (IsoOctane)
2,3-dimethylpentane
Toluene
3-methylhexane
meta- & para-Xylenes
ortho-Xylene
1,2,4-TriMeBenz & t-Butylbenzene
formaldehyde
acetaldehyde

Fig. 14

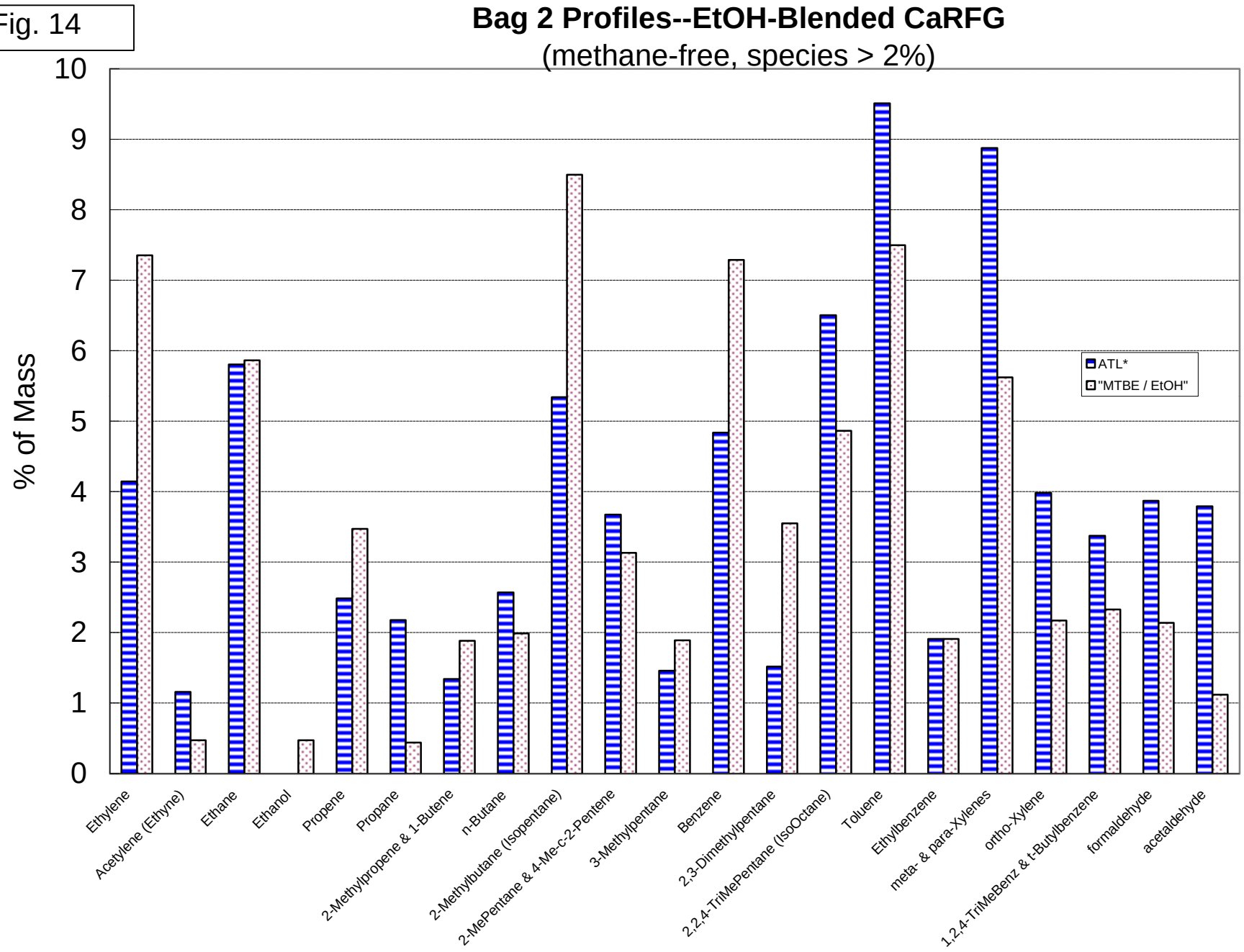

Bag 2 Profiles--EtOH-Blended CaRFG
(methane-free, species > 2%)
% of Mass
0
1
2
3
4
5
6
7
8
9
10
ATL*
"MTBE / EtOH"
Ethylene
Acetylene (Ethyne)
Ethane
Ethanol
Propene
Propane
2-Methylpropene & 1-Butene
n-Butane
2-Methylbutane (Isopentane)
2-MePentane & 4-Me-c-2-Pentene
3-Methylpentane
Benzene
2,3-Dimethylpentane
2,2,4-TriMePentane (IsoOctane)
Toluene
Ethylbenzene
meta- & para-Xylenes
ortho-Xylene
1,2,4-TriMeBenz & t-Butylbenzene
formaldehyde
acetaldehyde

Fig. 15

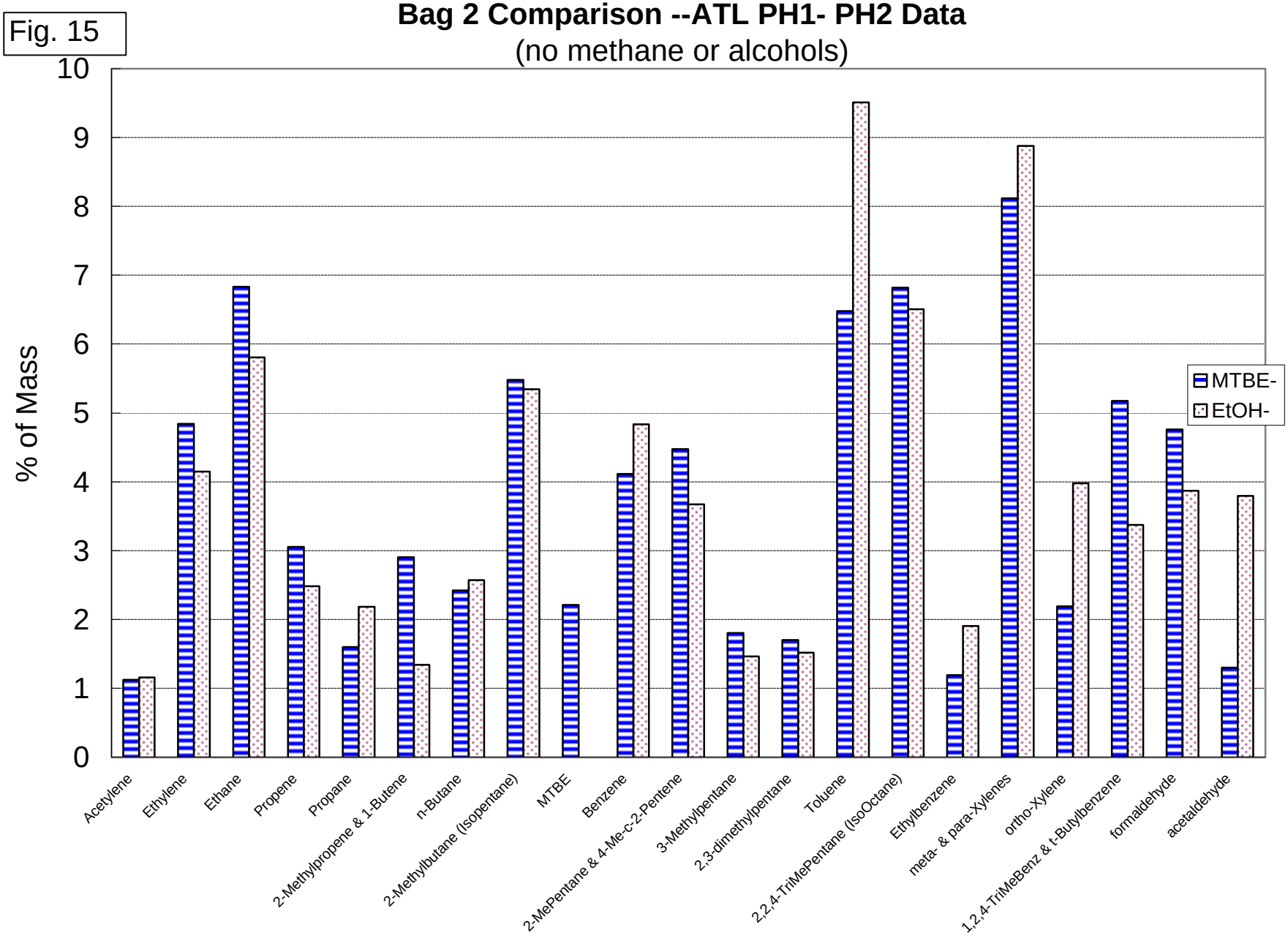

Bag 2 Comparison --ATL PH1- PH2 Data
(no methane or alcohols)
% of Mass
0
1
2
3
4
5
6
7
8
9
10
MTBE-
EtOH-
Acetylene
Ethylene
Ethane
Propene
Propane
2-Methylpropene & 1-Butene
n-Butane
2-Methylbutane (Isopentane)
MTBE
Benzene
2-MePentane & 4-Me-c-2-Pentene
3-Methylpentane
2,3-dimethylpentane
Toluene
2,2,4-TriMePentane (IsoOctane)
Ethylbenzene
meta- & para-Xylenes
ortho-Xylene
1,2,4-TriMeBenz & t-Butylbenzene
formaldehyde
acetaldehyde

Fig. 16

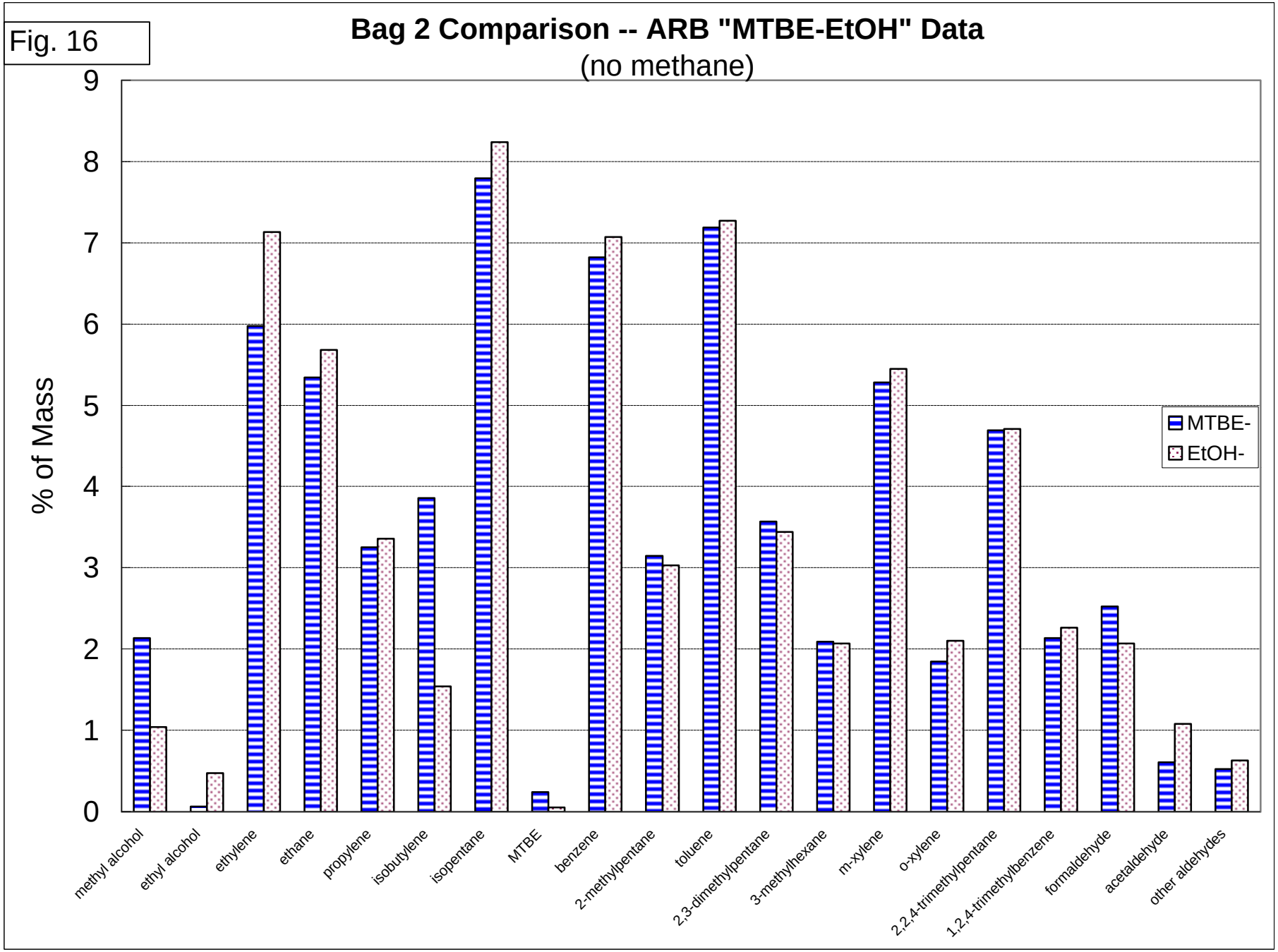

Bag 2 Comparison -- ARB "MTBE-EtOH" Data
(no methane)
% of Mass
0
1
2
3
4
5
6
7
8
9
MTBE-
EtOH-
methyl alcohol
ethyl alcohol
ethylene
ethane
propylene
isobutylene
isopentane
MTBE
benzene
2-methylpentane
toluene
2,3-dimethylpentane
3-methylhexane
m-xylene
o-xylene
2,2,4-trimethylpentane
1,2,4-trimethylbenzene
formaldehyde
acetaldehyde
other aldehydes

Fig. 17

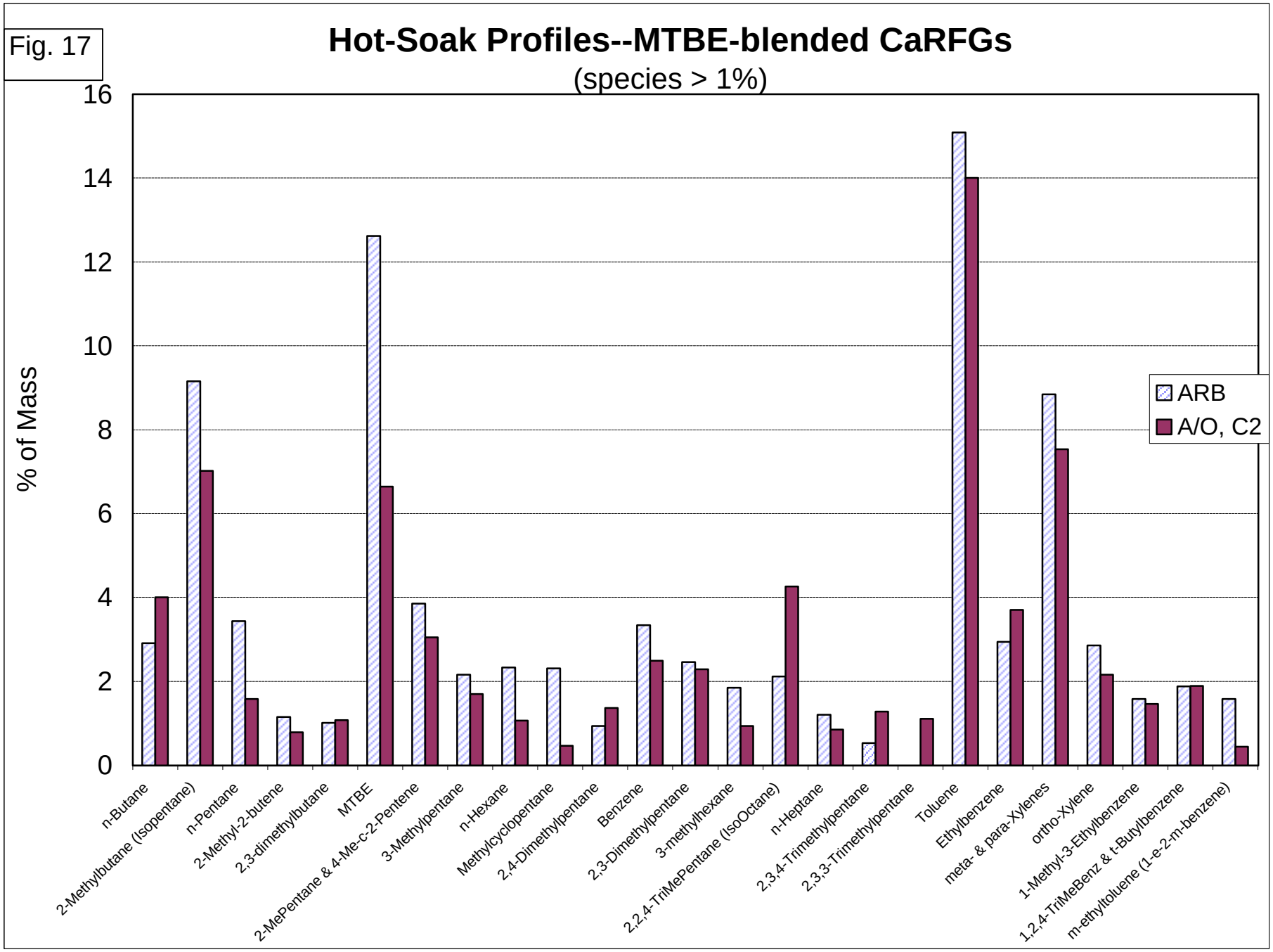

Hot-Soak Profiles--MTBE-blended CaRFGs
(species > 1%)
% of Mass
0
2
4
6
8
10
12
14
16
ARB
A/O, C2
n-Butane
2-Methylbutane (Isopentane)
n-Pentane
2-Methyl-2-butene
2,3-dimethylbutane
MTBE
2-MePentane & 4-Me-c-2-Pentene
3-Methylpentane
n-Hexane
Methylcyclopentane
2,4-Dimethylpentane
Benzene
2,3-Dimethylpentane
3-methylhexane
2,2,4-TriMePentane (IsoOctane)
n-Heptane
2,3,4-Trimethylpentane
2,3,3-Trimethylpentane
Toluene
Ethylbenzene
meta- & para-Xylenes
ortho-Xylene
1-Methyl-3-Ethylbenzene
1,2,4-TriMeBenz & t-Butylbenzene
m-ethyltoluene (1-e-2-m-benzene)

Fig. 18

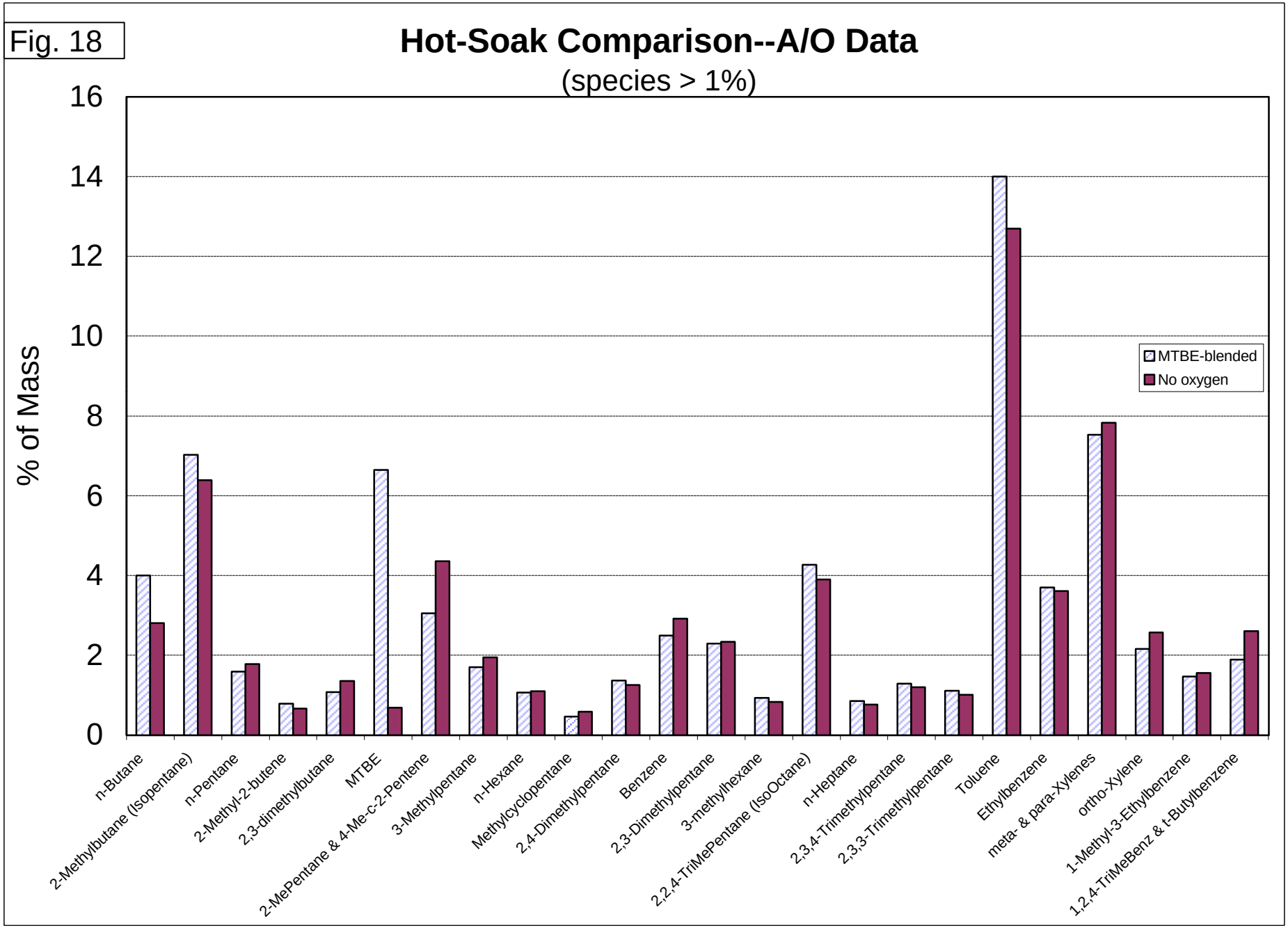

Hot-Soak Comparison--A/O Data
(species > 1%)
% of Mass
16
14
12
10
8
6
4
2
0
MTBE-blended
No oxygen
n-Butane
2-Methylbutane (Isopentane)
n-Pentane
2-Methyl-2-butene
2,3-dimethylbutane
MTBE
2-MePentane & 4-Me-c-2-Pentene
3-Methylpentane
n-Hexane
Methylcyclopentane
2,4-Dimethylpentane
Benzene
2,3-Dimethylpentane
3-methylhexane
2,2,4-TriMePentane (IsoOctane)
n-Heptane
2,3,4-Trimethylpentane
2,3,3-Trimethylpentane
Toluene
Ethylbenzene
meta- & para-Xylenes
ortho-Xylene
1-Methyl-3-Ethylbenzene
1,2,4-TriMeBenz & t-Butylbenzene

Fig. 19

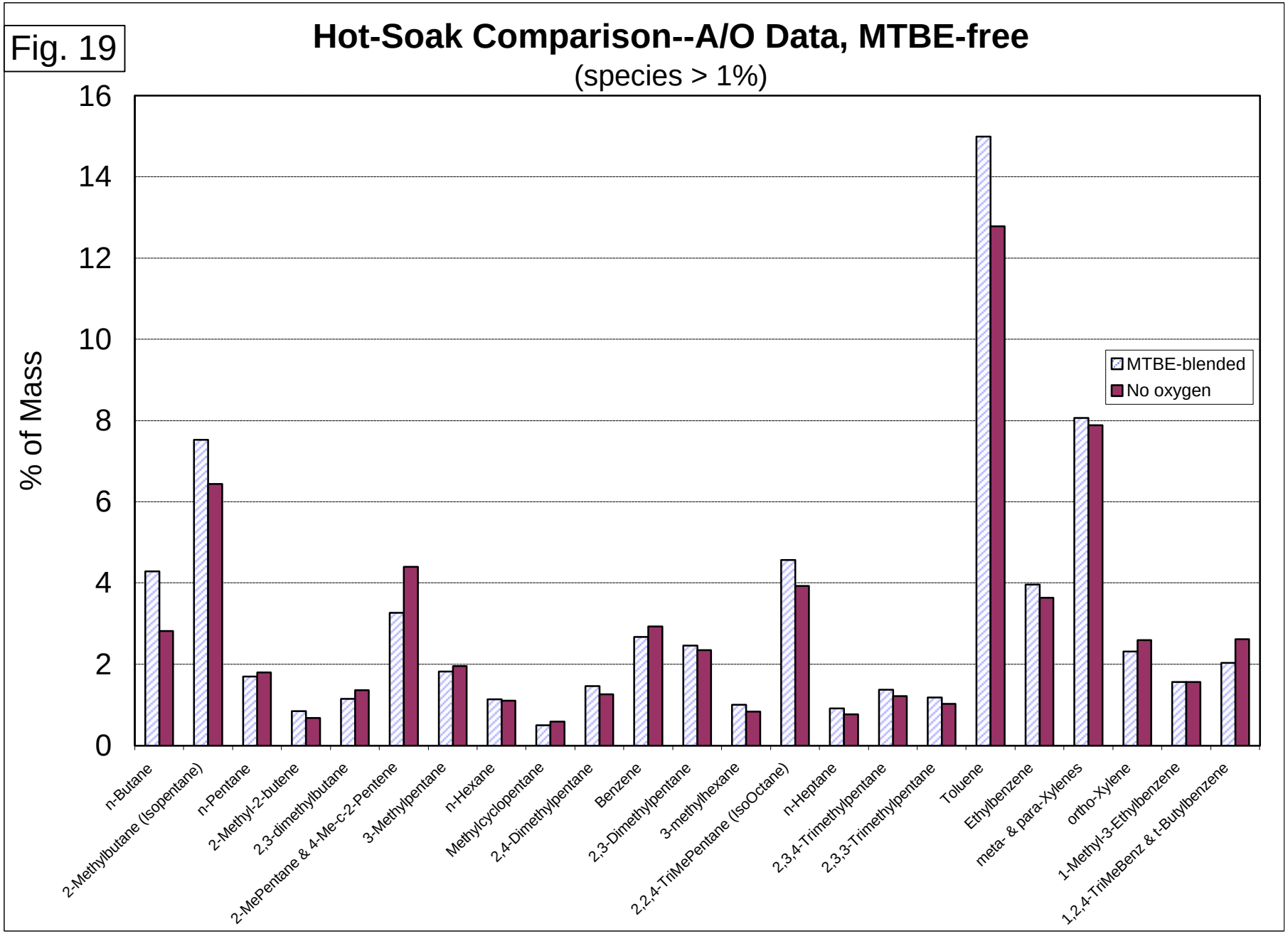

Hot-Soak Comparison--A/O Data, MTBE-free
(species > 1%)
% of Mass
0
2
4
6
8
10
12
14
16
MTBE-blended
No oxygen
n-Butane
2-Methylbutane (Isopentane)
n-Pentane
2-Methyl-2-butene
2,3-dimethylbutane
2-MePentane & 4-Me-c-2-Pentene
3-Methylpentane
n-Hexane
Methylcyclopentane
2,4-Dimethylpentane
Benzene
2,3-Dimethylpentane
3-methylhexane
2,2,4-TriMePentane (IsoOctane)
n-Heptane
2,3,4-Trimethylpentane
2,3,3-Trimethylpentane
Toluene
Ethylbenzene
meta- & para-Xylenes
ortho-Xylene
1-Methyl-3-Ethylbenzene
1,2,4-TriMeBenz & t-Butylbenzene

Fig. 20

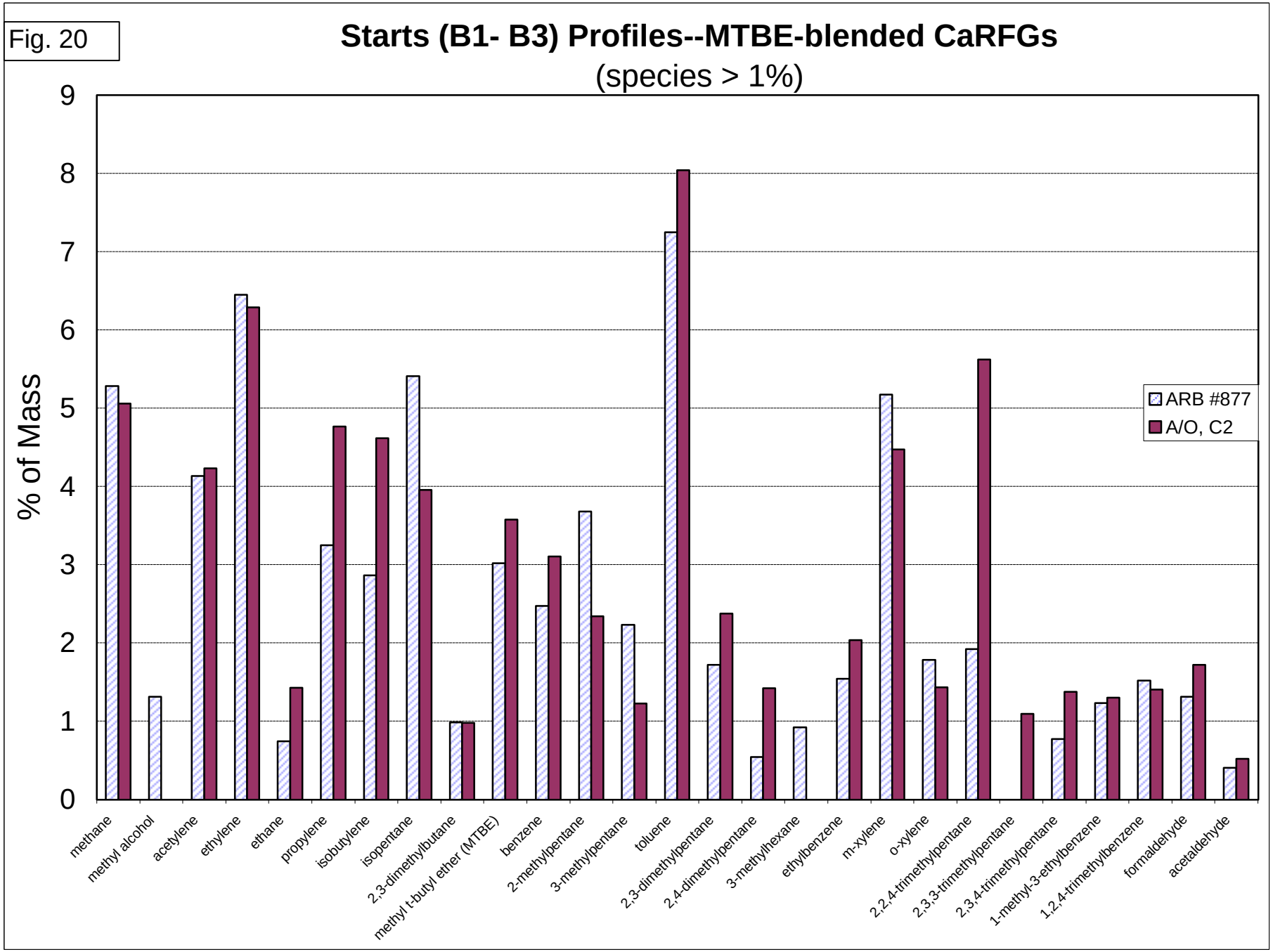

Starts (B1- B3) Profiles--MTBE-blended CaRFGs
(species > 1%)
% of Mass
0
1
2
3
4
5
6
7
8
9
ARB #877
A/O, C2
methane
methyl alcohol
acetylene
ethylene
ethane
propylene
isobutylene
isopentane
2,3-dimethylbutane
methyl t-butyl ether (MTBE)
benzene
2-methylpentane
3-methylpentane
toluene
2,3-dimethylpentane
2,4-dimethylpentane
3-methylhexane
ethylbenzene
m-xylene
o-xylene
2,2,4-trimethylpentane
2,3,3-trimethylpentane
2,3,4-trimethylpentane
1-methyl-3-ethylbenzene
1,2,4-trimethylbenzene
formaldehyde
acetaldehyde

Fig. 21

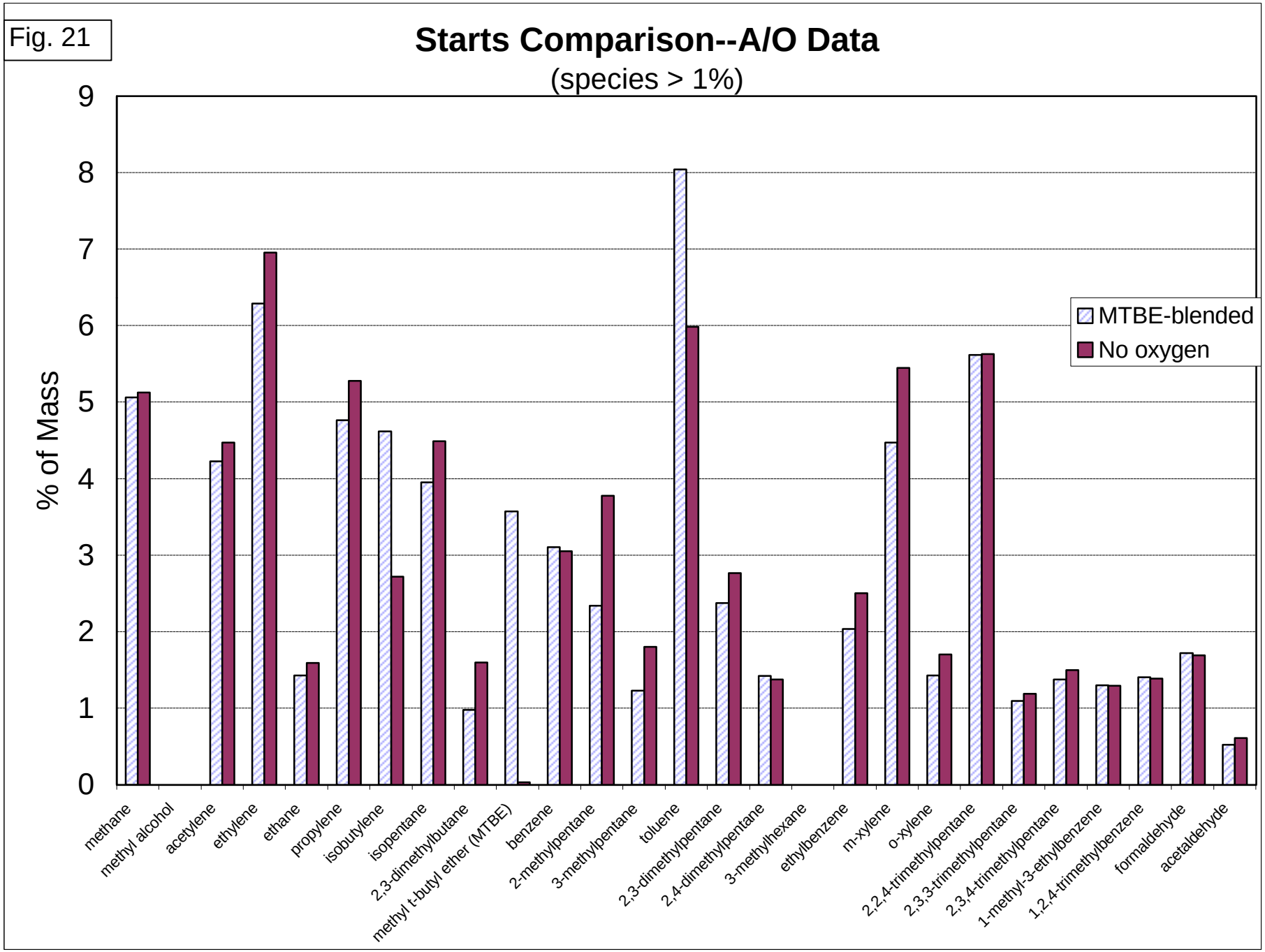

Starts Comparison--A/O Data
(species > 1%)
% of Mass
0
1
2
3
4
5
6
7
8
9
MTBE-blended
No oxygen
methane
methyl alcohol
acetylene
ethylene
ethane
propylene
isobutylene
isopentane
2,3-dimethylbutane
methyl t-butyl ether (MTBE)
benzene
2-methylpentane
3-methylpentane
toluene
2,3-dimethylpentane
2,4-dimethylpentane
3-methylhexane
ethylbenzene
m-xylene
o-xylene
2,2,4-trimethylpentane
2,3,3-trimethylpentane
2,3,4-trimethylpentane
1-methyl-3-ethylbenzene
1,2,4-trimethylbenzene
formaldehyde
acetaldehyde

Fig. 22

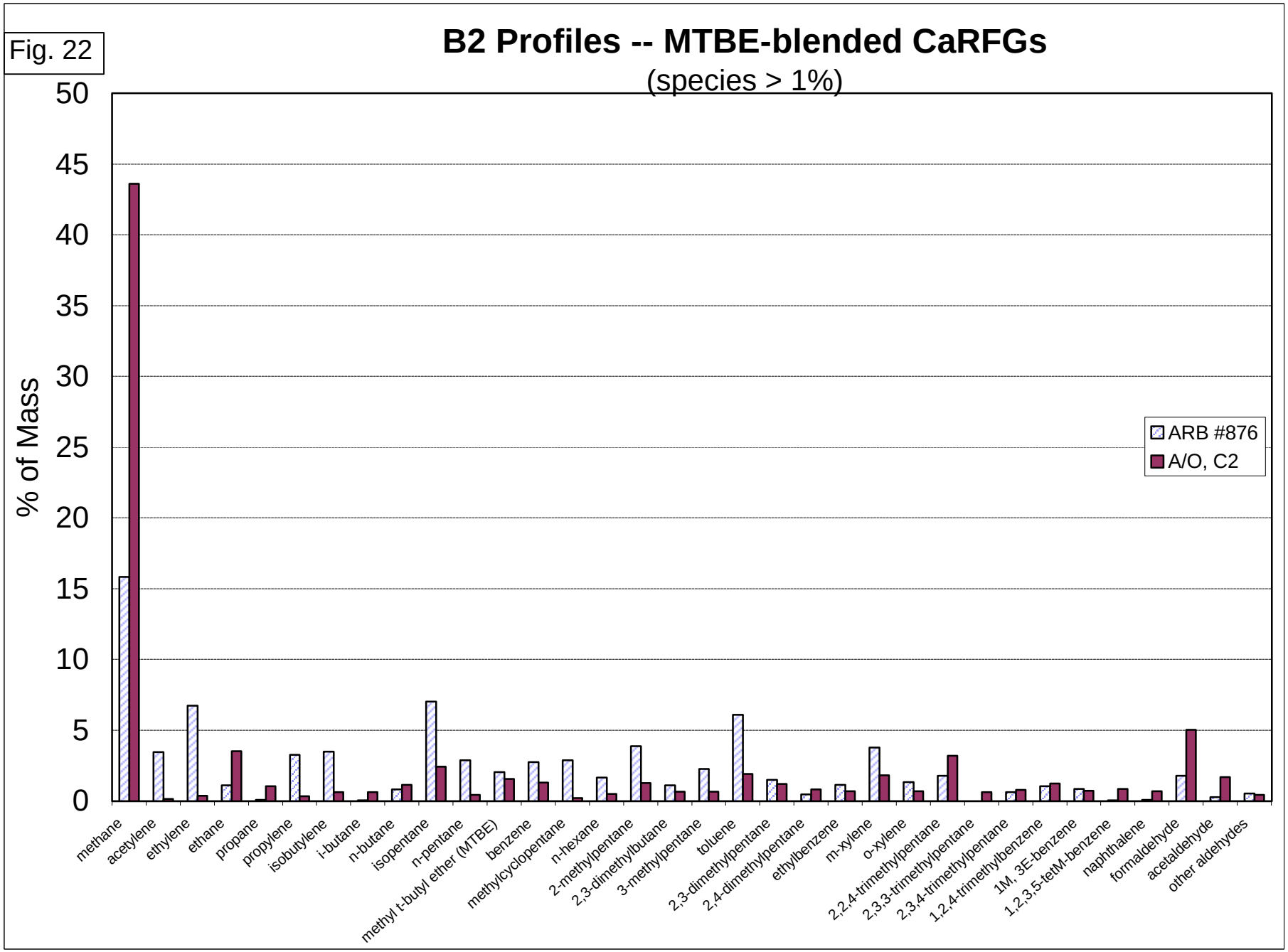

B2 Profiles -- MTBE-blended CaRFGs
(species > 1%)
% of Mass
50
45
40
35
30
25
20
15
10
5
0
ARB #876
A/O, C2
methane
acetylene
ethylene
ethane
propane
propylene
isobutylene
i-butane
n-butane
isopentane
n-pentane
methyl t-butyl ether (MTBE)
benzene
methylcyclopentane
n-hexane
2-methylpentane
2,3-dimethylbutane
3-methylpentane
toluene
2,3-dimethylpentane
2,4-dimethylpentane
ethylbenzene
m-xylene
o-xylene
2,2,4-trimethylpentane
2,3,3-trimethylpentane
2,3,4-trimethylpentane
1,2,4-trimethylbenzene
1M, 3E-benzene
1,2,3,5-tetM-benzene
naphthalene
formaldehyde
acetaldehyde
other aldehydes

Fig. 23

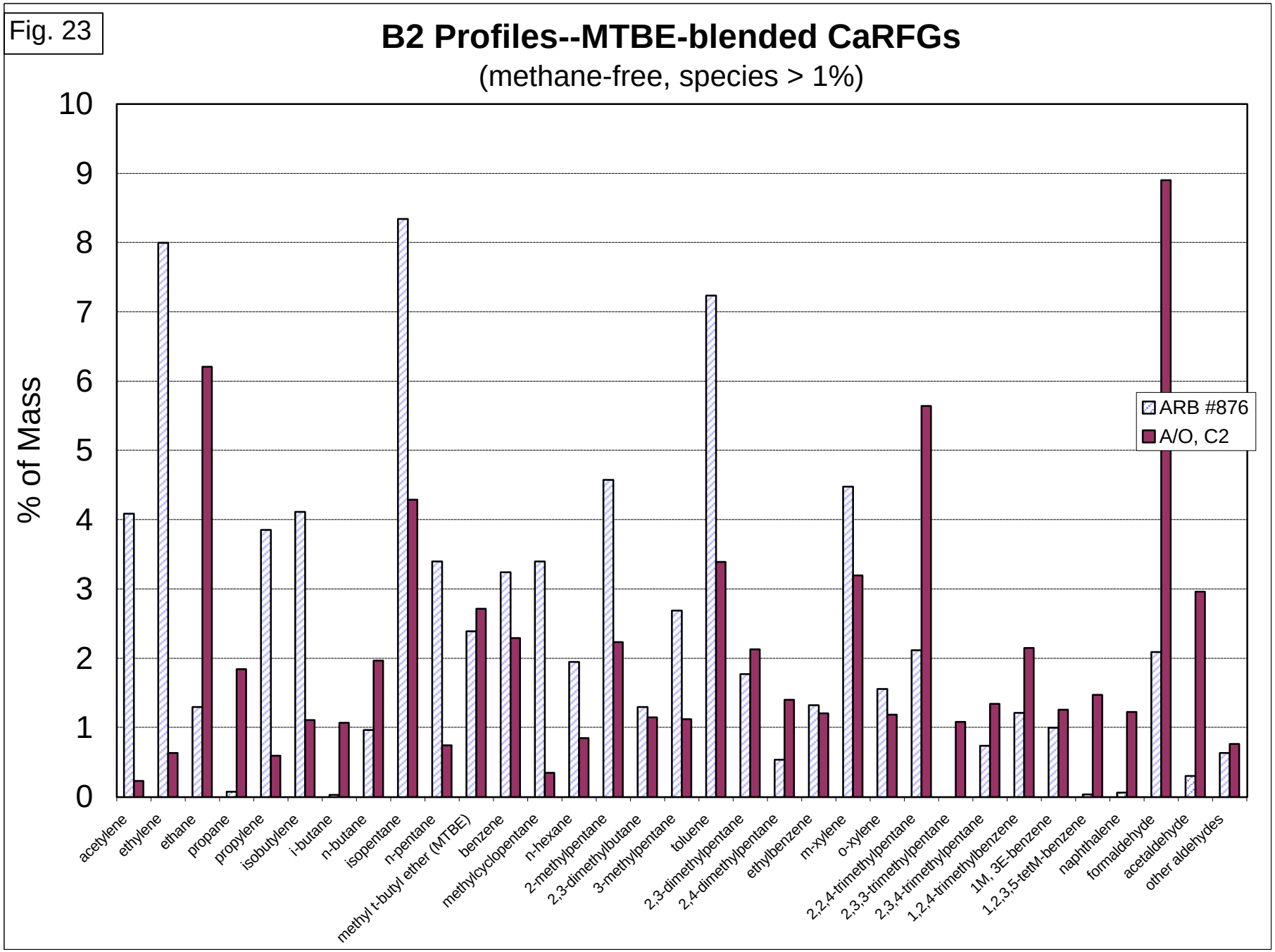

B2 Profiles--MTBE-blended CaRFGs
(methane-free, species > 1%)
% of Mass
0
1
2
3
4
5
6
7
8
9
10
ARB #876
A/O, C2
acetylene
ethylene
ethane
propane
propylene
isobutylene
i-butane
n-butane
isopentane
n-pentane
methyl t-butyl ether (MTBE)
benzene
methylcyclopentane
n-hexane
2-methylpentane
2,3-dimethylbutane
3-methylpentane
toluene
2,3-dimethylpentane
2,4-dimethylpentane
ethylbenzene
m-xylene
o-xylene
2,2,4-trimethylpentane
2,3,3-trimethylpentane
2,3,4-trimethylpentane
1,2,4-trimethylbenzene
1M, 3E-benzene
1,2,3,5-tetM-benzene
naphthalene
formaldehyde
acetaldehyde
other aldehydes

Fig. 24

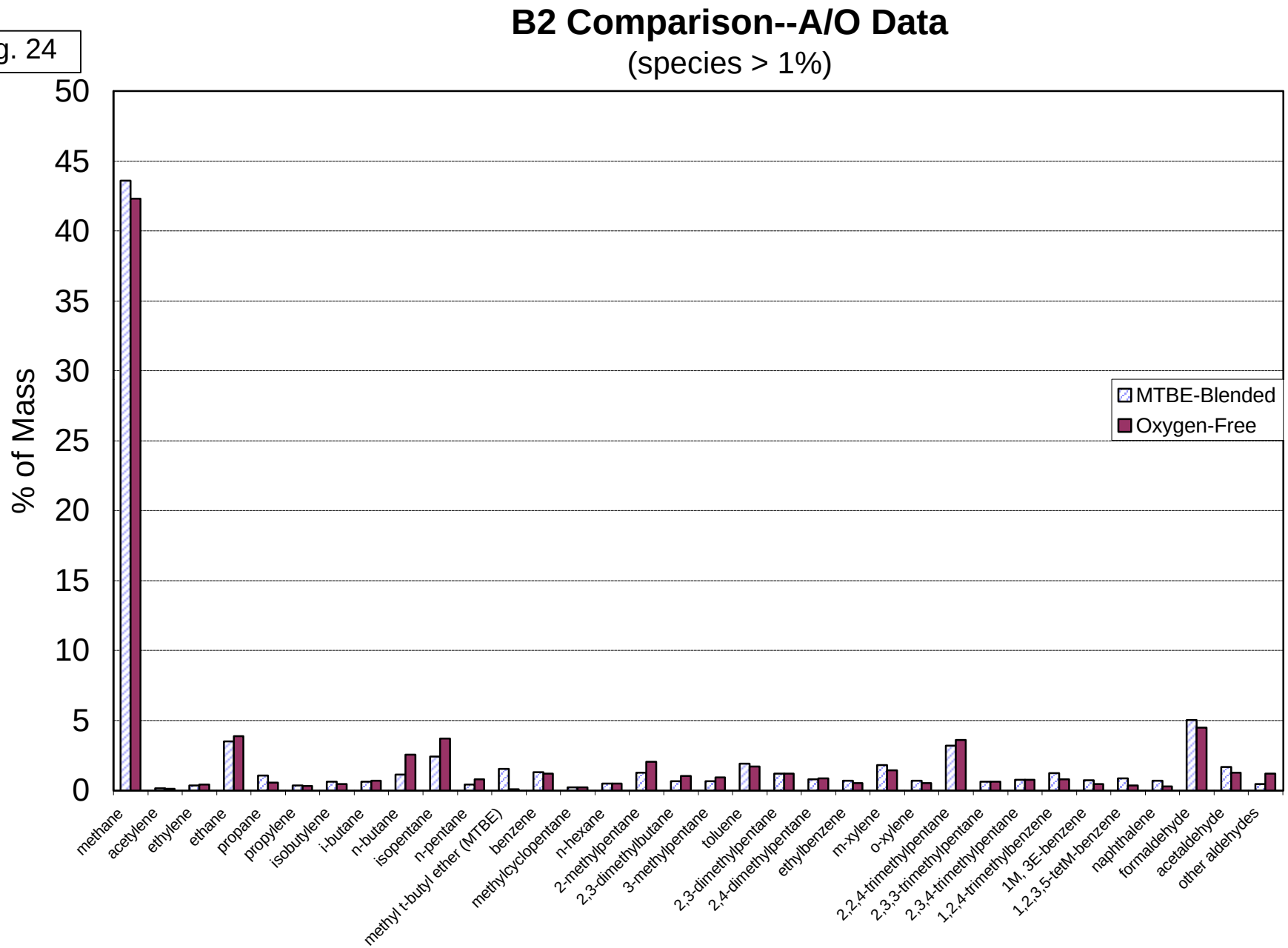
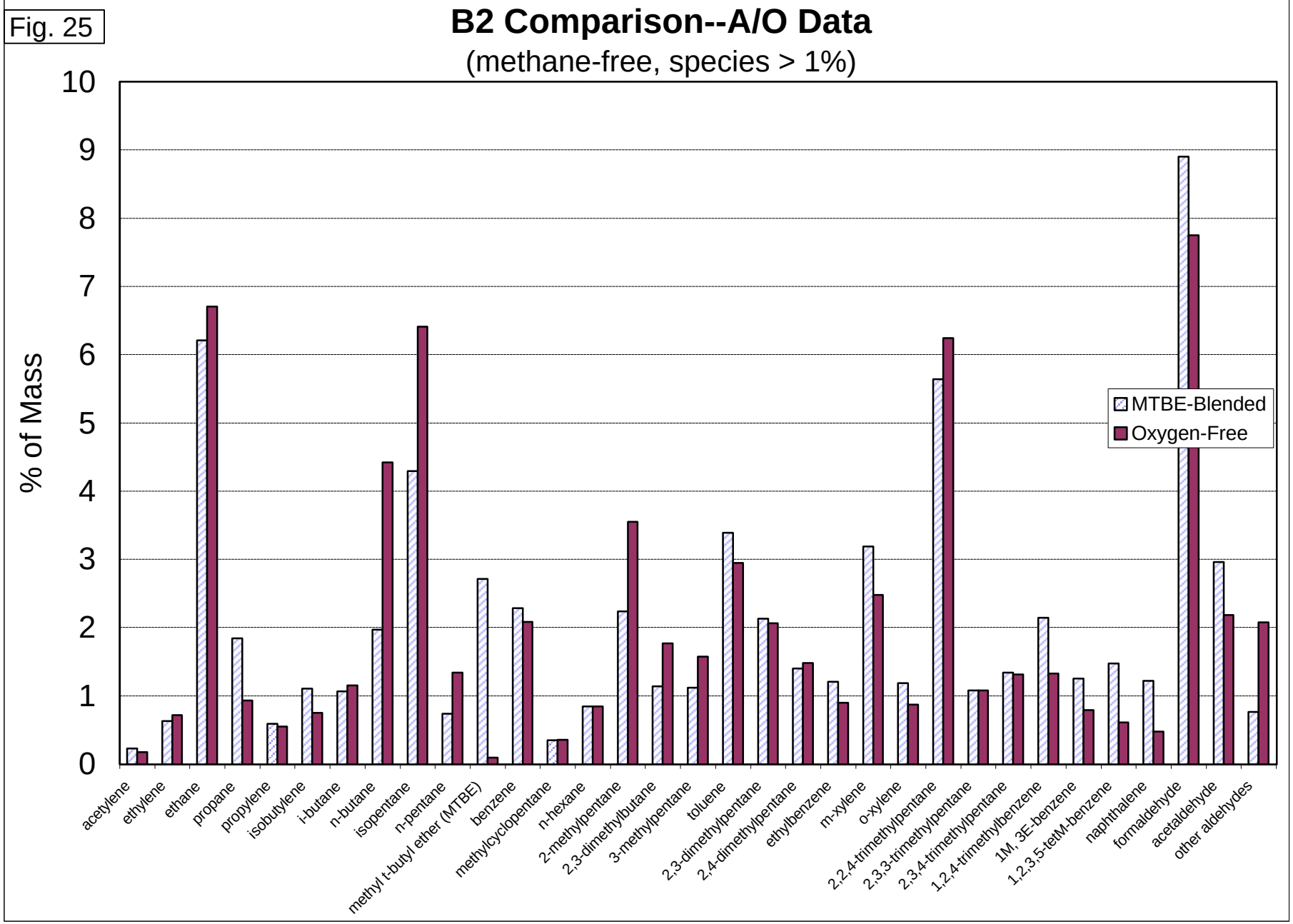

B2 Comparison--A/O Data
(species > 1%)
% of Mass
50
45
40
35
30
25
20
15
10
5
0
MTBE-Blended
Oxygen-Free
methane
acetylene
ethylene
ethane
propane
propylene
isobutylene
i-butane
n-butane
isopentane
n-pentane
methyl t-butyl ether (MTBE)
benzene
methylcyclopentane
n-hexane
2-methylpentane
2,3-dimethylbutane
3-methylpentane
toluene
2,3-dimethylpentane
2,4-dimethylpentane
ethylbenzene
m-xylene
o-xylene
2,2,4-trimethylpentane
2,3,3-trimethylpentane
2,3,4-trimethylpentane
1,2,4-trimethylbenzene
1M, 3E-benzene
1,2,3,5-tetM-benzene
naphthalene
formaldehyde
acetaldehyde
other aldehydes

Fig. 25


B2 Comparison--A/O Data
(methane-free, species > 1%)
% of Mass
0
1
2
3
4
5
6
7
8
9
10
MTBE-Blended
Oxygen-Free
acetylene
ethylene
ethane
propane
propylene
isobutylene
i-butane
n-butane
isopentane
n-pentane
methyl t-butyl ether (MTBE)
benzene
methylcyclopentane
n-hexane
2-methylpentane
2,3-dimethylbutane
3-methylpentane
toluene
2,3-dimethylpentane
2,4-dimethylpentane
ethylbenzene
m-xylene
o-xylene
2,2,4-trimethylpentane
2,3,3-trimethylpentane
2,3,4-trimethylpentane
1,2,4-trimethylbenzene
1M, 3E-benzene
1,2,3,5-tetM-benzene
naphthalene
formaldehyde
acetaldehyde
other aldehydes