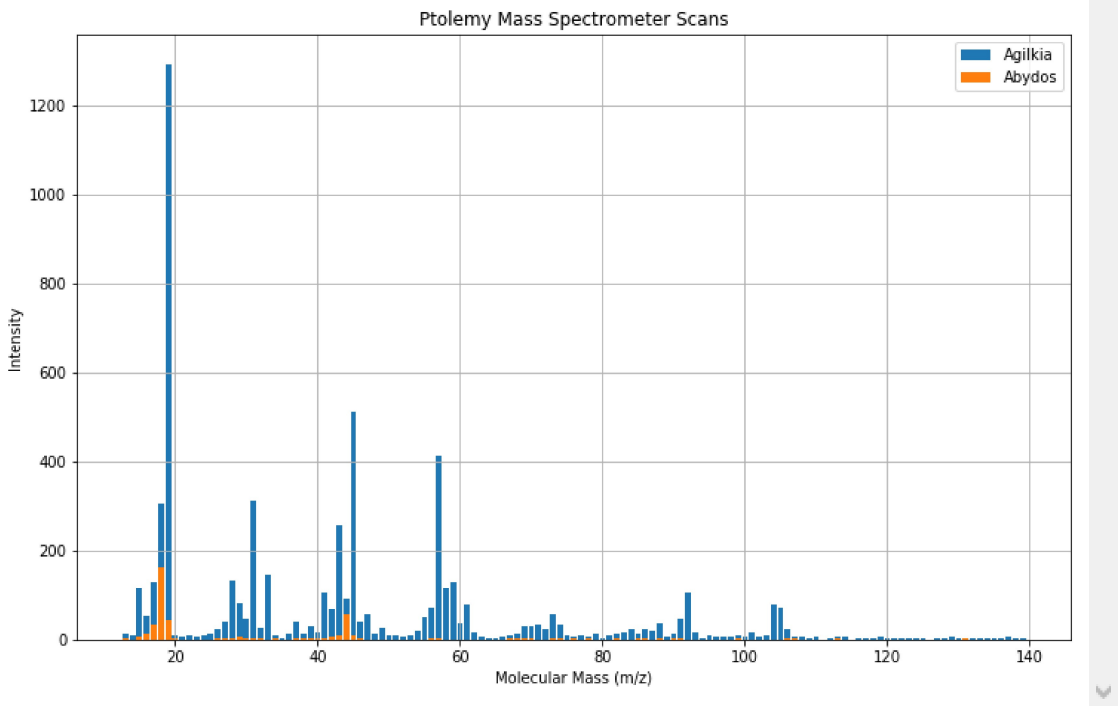
In [1]:

```
# Imports
import pandas as pd
import matplotlib.pyplot as plt
%matplotlib inline

# Set Matplotlib size

plt.rcParams["figure.figsize"] = [12, 7.5]

# Read in only relevant data from .txt files and give names to columns.

df1 = pd.read_csv('MS_AGILKIA.txt',sep = '\t',header = 14, usecols = [1,2,3])
df1.columns = ['Molecular Mass','Scan 1 Intensity','Scan 2 Intensity']

df2 = pd.read_csv('MS_ABYDOS2.txt',sep = '\t',header = 14, usecols = [1,2,3])
df2.columns = ['Molecular Mass','Scan 1 Intensity','Scan 2 Intensity']

# Select the rows with only one measurement and apply the scaling factors.
# Then sum the rows with two measurements (summing all rows at this point
# works because the rows with one measurement have 0 in the other column).

df1.iloc[0:12,1:2]=df1.iloc[0:12,1:2]*1.35
df1.iloc[77:,2:]=df1.iloc[77:,2:]*1.35
df1['Sum']=df1['Scan 1 Intensity']+df1['Scan 2 Intensity']

df2.iloc[0:12,1:2]=df2.iloc[0:12,1:2]*1.47
df2.iloc[77:,2:]=df2.iloc[77:,2:]*1.47
df2['Sum']=df2['Scan 1 Intensity']+df2['Scan 2 Intensity']

# Plot data and label as appropriate

plt.bar(df1['Molecular Mass'],df1['Sum'],label = 'Agilkia')
plt.bar(df2['Molecular Mass'],df2['Sum'], label = 'Abydos')
plt.title('Ptolemy Mass Spectrometer Scans')
plt.xlabel("Molecular Mass (m/z)")
plt.ylabel("Intensity")
plt.grid()
plt.legend(loc = 'upper right')
```

Out[1]:

```
<matplotlib.legend.Legend at 0x289833d47b8>
```




In [2]:

```
# Agilkia CO & CO2
print(df1.iloc[15:17])
print(df1.iloc[31:33])
```

```
    Molecular Mass  Scan 1 Intensity  Scan 2 Intensity    Sum
15              28              91.0              40.0  131.0
16              29              47.0              34.0   81.0
    Molecular Mass  Scan 1 Intensity  Scan 2 Intensity    Sum
31              44              53.0              40.0   93.0
32              45             310.0             201.0  511.0
```

In [3]:

```
# Abydos CO & CO2
print(df2.iloc[15:17])
print(df2.iloc[31:33])
```

```
    Molecular Mass  Scan 1 Intensity  Scan 2 Intensity  Sum
15              28               2.0               2.0  4.0
16              29               3.0               3.0  6.0
    Molecular Mass  Scan 1 Intensity  Scan 2 Intensity   Sum
31              44              27.0              28.0  55.0
32              45               3.0               5.0   8.0
```

In [4]:

```
Ag_CO = 131+81
Ag_CO2 = 93+511
Ab_CO = 4+6
Ab_CO2 = 55+8

Ag_ratio = Ag_CO/Ag_CO2
print('The CO:CO$_2$ ratio for Agilkia is 1:',Ag_ratio)

Ab_ratio = Ab_CO/Ab_CO2
print ('The CO:CO$_2$ ratio for Abydos is 1:',Ab_ratio)
```

```
The CO:CO$_2$ ratio for Agilkia is 1: 0.3509933774834437
The CO:CO$_2$ ratio for Abydos is 1: 0.15873015873015872
```

In [5]:

```
# Select the sums for the two molecular masses of CO at Agilkia and add them together,
# then do the same for CO2.

Ag_CO = df1.iloc[15,3]+df1.iloc[16,3]
Ag_CO2 = df1.iloc[31,3]+df1.iloc[32,3]

# Take these values and divide them, printing the answer.

Ag_ratio = Ag_CO/Ag_CO2
print('The CO:CO$_2$ ratio for Agilkia is',Ag_ratio)

# Repeat the process for Abydos

Ab_CO = df2.iloc[15,3]+df2.iloc[16,3]
Ab_CO2 = df2.iloc[31,3]+df2.iloc[32,3]

Ab_ratio = Ab_CO/Ab_CO2
print ('The CO:CO$_2$ ratio for Abydos is',Ab_ratio)
```

```
The CO:CO$_2$ ratio for Agilkia is 0.3509933774834437
The CO:CO$_2$ ratio for Abydos is 0.15873015873015872
```