```
PROGRAM MODULE      acarb01

DATE                29/04/2010
TIME                21:30:41
ID NUMBER           1
COMMENT             test

DESCRIPTION

AROMATIC CARBON CALCULATIONS
MODULE 1

This program calculates the aromatic carbon content Ca%
and aromatic hydrogen content Ha% of gas oils, fuel oils,
kerosines and heavy oils, when the density at 15.0 C and
average T50% distillation points and aniline point are known.


INPUT DATA
_____
Give the measured density at 15.0 C, in units of grams/cm3.        0.8922
Give the average T50% distillation point, in units of degrees celsius   274.1
Give aniline point, in units of degrees celsius                    49

CALCULATED RESULTS
_____
The calculated aromatic carbon content Ca% is:                     16.1352%
The calculated aromatic hydrogen content Ha% is:                    5.14634%
```

```
PROGRAM MODULE        acarb02

DATE                  29/04/2010
TIME                  21:33:14
ID NUMBER             1
COMMENT               test

DESCRIPTION

AROMATIC CARBON CALCULATIONS
MODULE 2

This module calculates generally the content of
aromatic carbon, Ca%, naphthenic carbon, Cn%, and paraffinic
carbon, Cp%, in petroleum products, when density at 15.0 C,
T50% distillation point and refractive index at 20.0 C are known.

INPUT DATA
```

Give the measured density, at 15.0 C, in units of grams/ml	0.9772
Give the measured refractive index, at 20.0 C	1.5492
Give the T50% distillation point, in units of degrees celsius	385

```
CALCULATED RESULTS
```

The calculated refractive dispersion is	176.725
Aromatic carbon content Ca% is	41.2826 %
Naphthenic carbon content Cn% is	32.1829 %
Paraffinic carbon content Cp% is	26.5345 %
Number of total rings R is	3.68427
Number of aromatic rings Ra is	1.85128
Number of naphthenic rings Rn is	1.833
Number of total carbons C is	22.7822
The average molecular mass is	314.951 grams/mol

```
PROGRAM MODULE      acarb03

DATE                29/04/2010
TIME                21:34:35
ID NUMBER           1
COMMENT             test

DESCRIPTION

AROMATIC CARBON CALCULATIONS
MODULE 3

This module calculates the number of aromatic carbons in
the petroleum fraction average molecule, when the average
molecular mass M, hydrogen Z-deficiency Z (in formula CnH2 * n + z) and
total carbon number C are known.


INPUT DATA
```

Give the average molecular mass M	337
Give the Z-deficiency. OBSERVE: Give a positive (not negative) Z number	8.9
Give the number of total carbon atoms C, in average molecule	24.1

```
CALCULATED RESULTS
```

The number of aromatic carbon atoms Ca in average molecule is	6.09673

```
PROGRAM MODULE      acarb04

DATE                29/04/2010
TIME                21:35:40
ID NUMBER           1
COMMENT             test

DESCRIPTION

AROMATIC CARBON CALCULATIONS
MODULE 4

This module calculates the aromatic carbon content Ca% of
petroleum fractions, when density at 15.0 C and kinematic
viscosity values at 2 different temperatures are known.


INPUT DATA
_____
Give the measured density at 15.0 C, in units of grams/ml          0.8860
Give the first measured kinematic viscosity value, in units of cSt  16.1
Give the corresponding temperature, in units of degrees celsius     50
Give the second measured kinematic viscosity value, in units of cSt 4.44
Give the corresponding temperature, in units of degrees celsius     100

CALCULATED RESULTS
_____
Calculated molecular mass M is                          354.914 grams/mol
Calculated average carbon number C is                   25.5128
The calculated hydrogen deficiency Z in formula CcH2 * c + z is  -2.93058
The calculated aromatic carbon content Ca% = 100 * Ca/C is       9.98464%
```

```
PROGRAM MODULE        acarb05

DATE                  29/04/2010
TIME                  21:37:08
ID NUMBER             1
COMMENT               test

DESCRIPTION

AROMATIC CARBON CALCULATIONS                                                    1
MODULE 5

This module calculates the aromatic carbon content of petroleum
products, when density at 20.0 C, hydrogen content and sulfur content are known.


INPUT DATA
_____
Give the measured density at 20.0 C, in units of grams/ml         1.001
Givethe hydrogen content, in units of weight-%                    10.8
Give the sulfur content, in units of weight-%                     3.2

CALCULATED RESULTS
_____
The calculated carbon aromaticity is                              28.4724%
The calculated aromatic carbon content, Ca% is                    24.2807 weight-%
```

```
PROGRAM MODULE      acarb06

DATE                29/04/2010
TIME                21:37:50
ID NUMBER           1
COMMENT             test

DESCRIPTION

AROMATIC CARBON CALCULATIONS
MODULE 6

This program calculates the aromatic carbon content, Ca% of heavy
petroleum products, when the kinematic viscosity at 40.0 C,
density at 15.0 C and refractive index at 20.0 C are known.
The viscosity must be greater than 5.6 cSt. at 40.0 C.


INPUT DATA
_____
Give the density at 15.0 C, in units of grams/cm3            1.00585
Give the kinematic viscosity at 40.0 C, in units of cSt      85.212
Give the refractive index at 20.0 C                          1.5737

CALCULATED RESULTS
_____
The calculated aromatic carbon content Ca% is               41.7231 %
```

```
PROGRAM MODULE        acarb07

DATE                  29/04/2010
TIME                  21:38:33
ID NUMBER             1
COMMENT               test

DESCRIPTION

AROMATIC CARBON CALCULATIONS
MODULE 7

This module calculates the aromaticity of heavy oils, pyrolysis
residue, vacuum residue etc., when density at 20.0 C and the hydrogen and
carbon contents in weight-% are known.


INPUT DATA
_____
Give the density at 20.0 C, in units of grams/cm3          1.0360
Give the hydrogen content, in weight-%                     9.10
Give the carbon content, in weight-%                       90.90

CALCULATED RESULTS
_____
The calculated carbon aromaticity is                       54.548 %
The calculated hydrogen aromaticity is                     25.2859 %
```

```
PROGRAM MODULE      acarb08

DATE                29/04/2010
TIME                21:39:29
ID NUMBER           1
COMMENT             test

DESCRIPTION

AROMATIC CARBON CALCULATIONS
MODULE 8

This module calculates the aromatic carbon content of
marine diesel oil, heavy fuel oil, TCC feeds and other heavy oils,
when density at 15.0 C and kinematic viscosity at 50.0 C or any other
temperature between 20.0 C and 100.0 C is known.


INPUT DATA
_____
Give the density at 15.0 C, in units of kg/m3                    947
Give the measured kinematic viscosity, in units of cSt (CentiStokes)  108
Give the temperature, where viscosity was measured, in units of degrees celsius 50

CALCULATED RESULTS
_____
The calculated aromatic carbon content Ca% is            21.6836 %
```

```
PROGRAM MODULE        acarb09

DATE                  29/04/2010
TIME                  21:40:24
ID NUMBER             1
COMMENT               test
```

DESCRIPTION

AROMATIC CARBON CALCULATIONS
MODULE 9

This module calculates the aromatic hydrogen content Ha& of
petroleum products, when the hydrogen content in weight-% and atomic
H/C-ratio are known.

INPUT DATA

Give the hydrogen content, in weight-%	13.40
Give the atomic H/C-ratio	1.851

CALCULATED RESULTS

The calculated aromatic hydrogen content Ha% is	4.62348%

```
PROGRAM MODULE        acarb10

DATE                  29/04/2010
TIME                  21:41:00
ID NUMBER             1
COMMENT               test

DESCRIPTION

AROMATIC CARBON CALCULATIONS
MODULE 10

This module calculates the aromatic content Ca% of petroleum
fractions, when the hydrogen content in weight-% and atomic H/C-ratio
are known.


INPUT DATA
```

Give the hydrogen content, in weight-%	8.18
Give the atomic H/C-ratio	0.992

```
CALCULATED RESULTS
```

The calculated aromatic carbon content Ca% is	66.7907%