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APPENDIX

Calculation the amount of the carbon by temperature programmed oxidation (TPO)

The temperature programmed oxidation technique was used to determine the amount of carbon. It can be calculated from the area under peak of the TPO profile. The carbon dioxide gas was used as the reference peak (so-called A) which was 100 μl. On the other hand, the sample peak was called B.

From $PV = nRT$ (1)

As, P = Pressure (atm), 1 atm

V = Volume (cm^3), 100μl (0.1 cm^3)

n = Number of mole (mole)

R = Gas constant (cm^3.atm/gmole.K), 82.058 cm^3.atm/gmole.K

T = Temperature (K), 27°C (300 K)

Therefore, $n = 4.06 \times 10^{-6}$ gmole

The carbon dioxide 1 mole gave 1 mole of carbon. So, the carbon dioxide 4.06×10^{-6} mole gave the equal mole of carbon.

Let, Area A has the amount of carbon 4.06×10^{-6} mole. So, the area B has the amount of carbon

The amount of sample's carbon $4.06 \times 10^{-6} * B/A$

Example: The unknown coke

Area under pulse peaks of carbon dioxide were

1st peak	2nd peak	3rd peak
8.50×10^5	8.83×10^5	8.40×10^5
Avergae (A)	8.57×10^5	

Area under peak of sample, which has weight 2.16 mg, was 1.64×10^7 (B).

Then, the amount of sample's carbon was 7.65×10^{-5} mole, 9.18×10^{-4} grams. The percentage of carbon was $(9.18 \times 10^{-4} / 0.0216) * 100 = 4.25$ wt%.

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