Where:

WHC=HC volume concentration in exhaust, ppmC wet

WCO=CO percent concentration in the exhaust, wet

DCO=CO percent concentration in the exhaust, dry

WCO_2=CO_2 percent concentration in the exhaust, wet

DCO_2=CO_2 percent concentration in the exhaust, dry

WNO_X=NO volume concentration in exhaust, ppm wet

WO_2=O_2 percent concentration in the exhaust, wet

WH_2=H_2 percent concentration in exhaust, wet

K=correction factor to be used when converting dry measurements to a wet basis. Therefore, wet concentration=dry concentration × K,

where K is:

$$K = \frac{1}{1 + 0.005 \times (DCO + DCO_2) \times \alpha - 0.01 DH_2}$$

DH_2=H_2 percent concentration in exhaust, dry, calculated from the following equation:

$$DH_2 = \frac{0.5 \times \alpha \times DCO \times (DCO + DCO_2)}{DCO + (3 \times DCO_2)}$$

W_{co}=Mass rate of CO in exhaust, [g/hr]

M_{co}=Molecular weight of CO=28.01

W_{NOx}=Mass rate of NO_X in exhaust, [g/hr]

M_{NO2}=Molecular weight of NO_2=46.01

K_H=Factor for correcting the effects of humidity on NO_2 formation for 4-stroke gasoline small engines, see the equation below :

$$K_H = \frac{1}{1 - 0.0329(H - 10.71)}$$

Where:

H=absolute humidity of the intake air in grams of moisture per kilogram of dry air, see § 90.426(f) for a method by which H can be calculated.

For two-stroke gasoline engines, K_H should be set to 1.

(c) *Fuel flow method*. The following equations are to be used when fuel flow is selected as the basis for mass emission calculations using the raw gas method.

$$W_{HC} = \frac{M_{HC_{exh}}}{M_F} \times \frac{G_{FUEL}}{TC} \times \frac{WHC}{10^4}$$

$$W_{CO} = \frac{M_{CO}}{M_F} \times \frac{G_{FUEL}}{TC} \times WCO$$

$$W_{NO_X} = \frac{M_{NO_X}}{M_F} \times \frac{G_{FUEL}}{TC} \times \frac{WNO_X}{10^4} \times K_H$$

Where:

W_{HC}=Mass rate of HC in exhaust, [g/hr]

$M_{HC\ exh}$=Molecular weight of hydrocarbons in the exhaust, see following equation:

$$M_{HC_{exh}} = M_C + \alpha M_H + \beta M_O$$

M_C=Molecular weight of carbon=12.01 [g/mole]

M_H=Molecular weight of hydrogen=1.008 [g/mole]

M_O=Molecular weight of oxygen=16.00 [g/mole]

α=Hydrogen to carbon ratio of the test fuel

β=Oxygen to carbon ratio of the test fuel

M_F=Molecular weight of test fuel

G_{FUEL}=Fuel mass flow rate, [g/hr]

TC=Total carbon in exhaust, see following equation:

$$TC = WCO + WCO_2 + \frac{WHC}{10^4}$$

WCO=CO percent concentration in the exhaust, wet

WCO_2=CO_2 percent concentration in the exhaust, wet

DCO=CO percent concentration in the exhaust, dry

DCO_2=CO_2 percent concentration in the exhaust, dry

WHC=HC volume concentration in exhaust, ppmC wet

WNO_X=NO_X volume concentration in exhaust, ppm wet

K=correction factor to be used when converting dry measurements to a wet basis. Therefore, wet concentration=dry concentration x K, where K is:

$$K = \frac{1}{1 + 0.005 \times (DCO + DCO_2) \times \alpha - 0.01 DH_2}$$

DH_2=H_2 percent concentration in exhaust, dry, calculated from the following equation:

$$DH_2 = \frac{0.5 \times \alpha \times DCO \times (DCO + DCO_2)}{DCO + (3 \times DCO_2)}$$

W_{CO}=Mass rate of CO in exhaust, [g/hr]

M_{CO}=Molecular weight of CO=28.01

WNO_X=Mass rate of NO_X in exhaust, [g/hr]

MNO_2=Molecular weight of NO_2=46.01

K_H=Factor for correcting the effects of humidity on NO_2 formation for 4-stroke gasoline small engines, see the following equation:

$$K_H = \frac{1}{1 - 0.0329(H - 10.71)}$$

Where:

H=specific humidity of the intake air in grams of moisture per kilogram of dry air.

For two-stroke gasoline engines, K_H should be set to 1.

(d) Calculate the final weighted brake-specific emission rate for each individual gas component using the following equation:

$$A_{WM} = \frac{\sum_i^n (W_i \times WF_i)}{\sum_i^n (P_i \times WF_i)}$$

Where:

A_{WM}=Final weighted brake-specific mass emission rate (HC, CO, NO_X) [g/kW-hr]

W_i=Mass emission rate during mode i [g/hr]

WF_i=Weighting factors for each mode according to § 90.410(a)

P_i=Gross average power generated during mode i [kW], calculated from the following equation,