Determine the Percent Composition of the following molecules:[1]

1. C_2H_5F

C ⇒ 12.01 g/mole #C ≡ 2

H ⇒ 1.008 g/mole #H ≡ 5

F ⇒ 19.00 g/mole #F ≡ 1

MW = (2 x C) + (5 x H) + (1 x F)

MW = (2 x 12.01 g/mole) + (5 x 1.008 g/mole) + (1 x 19.00 g/mole)

MW = 48.06 g/mole ⇒ 4.806×10^1 g/mole

% = (# x AM / MW) x 100

%C = (2 x 12.01 g/mole / 48.06 g/mole) x 100 = 49.98 % [2]

%H = (5 x 1.008 g/mole / 48.06 g/mole) x 100 = 10.49 %

%F = (1 x 19.00 g/mole / 48.06 g/mole) x 100 = 39.53 %

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2. C_3H_5O

C ⇒ 12.01 g/mole #C ≡ 3

H ⇒ 1.008 g/mole #H ≡ 5

O ⇒ 16.00g/mole #O ≡ 1

MW = (3 x C) + (5 x H) + (1 x O)

MW = (3 x 12.01 g/mole) + (5 x 1.008 g/mole) + (1 x 16.00 g/mole)

MW = 57.07 g/mole ⇒ 5.707×10^1 g/mole

% = (# x AM / MW) x 100

%C = (3 x 12.01 g/mole / 57.07 g/mole) x 100 = 63.19 %

%H = (5 x 1.008 g/mole / 57.07 g/mole) x 100 = 8.83 %

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[1] Note: Use the Atomic Masses from the table on the inside front cover of the text book.

[2] Note: The number of atoms of each type is EXACT and the Atomic Weights of the elements used are all four significant figures. Therefore, the answers have four significant figures.

%O = (1 x 16.00 g/mole / 57.07 g/mole) x 100 = 28.04 %

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3. C_5H_5N

C ⇒ 12.01 g/mole #C ≡ 5

H ⇒ 1.008 g/mole #H ≡ 5

N ⇒ 14.01g/mole #N ≡ 1

MW = (5 x C) + (5 x H) + (1 x N)

MW = (5 x 12.01 g/mole) + (5 x 1.008 g/mole) + (1 x 14.01 g/mole)

MW = 79.10 g/mole ⇒ 7.910×10^1 g/mole

% = (# x AM / MW) x 100

%C = (5 x 12.01 g/mole / 79.10 g/mole) x 100 = 75.92 %

%H = (5 x 1.008 g/mole / 79.10 g/mole) x 100 = 6.37 %

%N = (1 x 14.01 g/mole / 79.10 g/mole) x 100 = 17.71 %

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4. $C_6H_{12}O_6$

C ⇒ 12.01 g/mole #C ≡ 6

H ⇒ 1.008 g/mole #H ≡ 12

O ⇒ 16.00g/mole #O ≡ 6

MW = (6 x C) + (12 x H) + (1 x O)

MW = (6 x 12.01 g/mole) + (12 x 1.008 g/mole) + (6 x 16.00 g/mole)

MW = ~~180.156~~ g/mole = 180.2 g/mole ⇒ 1.802×10^2 g/mole

% = (# x AM / MW) x 100

%C = (6 x 12.01 g/mole / 180.156 g/mole) x 100 = 40.00 %

%H = (12 x 1.008 g/mole / 180.156 g/mole) x 100 = 6.71 %

%O = (6 x 16.00 g/mole / 180.156 g/mole) x 100 = 53.29 %

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5. NaCl

Na ⇒ 22.99 g/mole #Na ≡ 1

Cl ⇒ 35.45 g/mole #Cl ≡ 1

MW = (1 x Na) + (1 x Cl)

MW = (1 x 22.99 g/mole) + (1 x 35.45 g/mole)

MW = 58.44 g/mole ⇒ 5.844×10^1 g/mole

% = (# x AM / MW) x 100

%Na = (1 x 22.99 g/mole / 58.44 g/mole) x 100 = 39.33 %

%Cl = (1 x 35.45 g/mole / 58.44 g/mole) x 100 = 60.66 %

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6. C_6CrO_6

C ⇒ 12.01 g/mole #C ≡ 6

Cr ⇒ 52.00 g/mole #Cr ≡ 1

O ⇒ 16.00 g/mole #O ≡ 6

MW = (6 x C) + (1 x Cr) + (6 x O)

MW = (6 x 12.01 g/mole) + (1 x 52.00 g/mole) + (6 x 16.00 g/mole)

MW = ~~220.06~~ g/mole = 220.1 g/mole ⇒ 2.201×10^2 g/mole

% = (# x AM / MW) x 100

%C = (6 x 12.01 g/mole / 220.06 g/mole) x 100 = 32.75 %

%Cr = (1 x 52.00 g/mole / 220.06 g/mole) x 100 = 23.63 %

%O = (6 x 16.00 g/mole / 220.06 g/mole) x 100 = 43.62 %

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7. $C_{10}H_{10}Fe$

C ⇒ 12.01 g/mole #C ≡ 10

H ⇒ 1.008 g/mole #H ≡ 10

Fe ⇒ 55.85g/mole #Fe ≡ 1

MW = (10 x C) + (10 x H) + (1 x Fe)

MW = (10 x 12.01 g/mole) + (10 x 1.008 g/mole) + (1 x 55.85 g/mole)

MW = ~~186.03~~ g/mole = 186.0 g/mole ⇒ 1.860×10^2 g/mole

% = (# x AM / MW) x 100

%C = (10 x 12.01 g/mole / 186.03 g/mole) x 100 = 64.56 %

%H = (10 x 1.008 g/mole / 186.03 g/mole) x 100 = 5.42 %

%Fe = (1 x 55.85 g/mole / 186.03 g/mole) x 100 = 30.02 %

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8. MgO

Mg ⇒ 24.31 g/mole #Mg ≡ 1

O ⇒ 16.00 g/mole #O ≡ 1

MW = (1 x Mg) + (1 x O)

MW = (1 x 24.31 g/mole) + (1 x 16.00 g/mole)

MW = 40.31 g/mole ⇒ 4.031×10^1 g/mole

% = (# x AM / MW) x 100

%Mg = (1 x 24.31 g/mole / 40.31 g/mole) x 100 = 60.31 %

%O = (1 x 16.00 g/mole / 40.31 g/mole) x 100 = 39.69 %

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9. Na_2SiO_3

Na ⇒ 22.99 g/mole #Na ≡ 2

Si ⇒ 28.09 g/mole #Si ≡ 1

O ⇒ 16.00 g/mole #O ≡ 3

MW = (2 x Na) + (1 x Si) + (3 x O)

MW = (2 x 22.99 g/mole) + (1 x 28.09 g/mole) + (3 x 16.00 g/mole)

MW = ~~122.07~~ g/mole = 122.1 g/mole ⇒ 1.221×10^2 g/mole

% = (# x AM / MW) x 100

%Na = (2 x 22.99 g/mole / 122.07 g/mole) x 100 = 37.67 %

%Si = (1 x 28.09 g/mole / 122.07 g/mole) x 100 = 23.01 %

%O = (3 x 16.00 g/mole / 122.07 g/mole) x 100 = 39.32 %