TEST CODE: 000 PAGE: 001

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TION NO: 1
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Find the value of 'X' to the proper number of significant digits

X = (2.500 + 0.10) x 12.35 / 1.468

(A.) 21.9
B. 22
C. 21.87
D. 21.873

$= \frac{(2.60)\times 12.35}{1.468} = 21.87 \simeq \boxed{21.9}$

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TION NO: 2
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The density of a certain liquid is 69.4 lb/ft³ .
Express this in g / cm³, given :
1 lb = 453.6 g, 1 ft = 30.48 cm.

(A.) 1.11 g/cm³
B. 2.36 g/cm³
C. 0.78 g/cm³
D. 69.4 g/cm³

$69.4 \frac{lb}{ft^3} \times \frac{453.6\ g}{1\ lb} \times \frac{1\ ft^3}{(30.48)^3\ cm^3} = \boxed{1.11 \frac{g}{cm^3}}$

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TION NO: 3
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Copper is composed of two isotopes; Cu-63 and Cu-65. The mass of Cu-63 is 62.9298 amu and the abundance is 69.09 %.
What is the mass of Cu-65 ?

(A.) 64.9363 amu.
B. 65.0921 amu.
C. 63.5504 amu.
D. 66.4781 amu.

Atomic Mass = (At. Mass)$_1$ × % Abundance + (At. Mass)$_2$ × % Abund.

$63.55 = 62.9298 \times \frac{69.09}{100} + (Cu\text{-}65) \times \frac{100-69.09}{100}$

$63.55 = 43.4782 + (Cu\text{-}65) \times 0.3091$

$(Cu\text{-}65) = \frac{63.55 - 43.4782}{0.3091} = \boxed{64.9363}$

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TION NO: 4
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How many silicon atoms, Si, are there in 56.2 g of silicon ?

(A.) 1.20 x 10^{24}
B. 3.01 x 10^{23}
C. 2.62 x 10^{21}
D. 3.81 x 10^{28}

1 mol of Si ≡ 28.1 g

$56.2\ g\ Si \times \frac{1\ mol\ Si}{28.1\ g\ Si} \times \frac{6.022\times 10^{23}\ atoms}{1\ mol\ Si} = \boxed{1.20\times 10^{24}}$

=

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TION NO: 5
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The nuclear symbol ($^{129}_{52}Te$) indicates that the Te atom contains:

A. 52 electrons and 52 protons.
B. 52 electrons and 77 protons.
C. 77 electrons and 52 protons.
D. 77 protons and 52 neutrons.

IN A NEUTRAL ATOM,
No. of electrons ≡ No. of Protons

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TION NO: 6
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How many grams of Na_2SO_4 are required to prepare 250 mL of 0.355 M solution of Na_2SO_4 ?

Molar Mass of $Na_2SO_4 \equiv 142\ g/mol$

A. 12.6 g
B. 3.25 g
C. 161 g
D. 202 g

$0.250\ L \times 0.355\ \frac{mols}{L} \equiv 0.08875\ mols$

grams of $Na_2SO_4 \equiv 0.08875\ mols \times \frac{142\ g}{mols}$

$\equiv \boxed{12.6\ g}$

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TION NO: 7
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How many moles of electrons are there in 19.22 g of SO_4^{2-} ?

Total No. of electrons $S + 4O + 2$

$16 + 4\times8 + 2 \equiv 50\ e^-$

A. 10.00
B. 2.411×10^{23}
C. 20.02
D. 1.157×10^{25}

Molar Mass of $SO_4^{2-} \equiv 32.06 + 16\times4 \equiv 96.06\ \frac{g}{mol}$

$19.22\ g\ SO_4^{2-} \times \frac{1\ mol\ SO_4^{2-}}{96.06\ g\ SO_4^{2-}} \times \frac{50\ e^-}{1\ mol\ SO_4^{2-}} \equiv \boxed{10.00}$

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TION NO: 8
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When 6.315 g sample of a compound containing carbon, hydrogen and nitrogen, is burned with oxygen, 14.36 g of CO_2 and 7.832 g of H_2O are formed. If the molar mass of the compound is 116.2 g what is its molecular formula ?

A. $C_6H_{16}N_2$
B. C_3H_8N
C. $C_5H_{14}N_3$
D. $C_7H_4N_2$

$14.36\ g\ CO_2 \times \frac{12\ g\ C}{44\ g\ CO_2} = 3.916\ g\ C \xrightarrow{12.01} 0.326\ mol\ of\ C$

$7.832\ g\ H_2O \times \frac{2.016\ g\ H}{18.002\ g\ H_2O} = 0.8771\ g\ H \rightarrow 0.8701\ mol\ H$

MASS OF $N \equiv 6.315 - (3.916 + 0.8771) \equiv 1.522\ g\ N \rightarrow 0.1087$ N

Devide by Lowest No. of Mols (0.1087 of N)

C_3H_8N (Molar Mass = 58.1 g/mol) $\therefore \times 2 \equiv \boxed{C_6H_{16}N_2}$ $\boxed{116.2\ g/mol}$

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TION NO: 9
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When aluminum reacts with oxygen the product would have the formula:

A. Al_2O_3
B. AlO
C. AlO_2
D. AlO_6

$Al \rightarrow Al^{+++}$
$O \rightarrow O^{--}$
$\Big\} \boxed{Al_2O_3}$

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TION NO: 10
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Given the balanced equation:

$$3\ I_2\ (s) + 6\ NaOH\ (s) \Longrightarrow 5\ NaI\ (s) + NaIO_3\ (s) + 3\ H_2O\ (l)$$

If 8.00 g of NaI are produced from a mixture of 10.0 g I_2 and 10.0 g NaOH, what is the percent yield ? (MM: $I_2 = 254$; NaOH = 40; NaI = 150)

A. 81.3 %
B. 40.6 %
C. 25.6 %
D. 19.5 %

$10.0\ g\ I_2 \times \frac{1\ mol\ I_2}{254\ g\ I_2} \times \frac{5\ mol\ NaI}{3\ mol\ I_2} \times \frac{150\ g\ NaI}{1\ mol\ NaI} \equiv 9.84\ g\ NaI$

$10.0\ g\ NaOH \times \frac{1\ mol\ NaOH}{40\ g\ NaOH} \times \frac{5\ mol\ NaI}{6\ mol\ NaOH} \times \frac{150\ g\ NaI}{1\ mol\ NaI} \equiv 31.25\ g\ NaI$

9.84 g NaI is Theoretical yield. % yield $= \frac{8.00\ g}{9.84\ g} \times 100 \equiv \boxed{81.3\%}$

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N NO: 11
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What is the mass percent of nitrogen in NH_4NO_3 ?

) 35 %
. 18 %
. 39 %
. 70 %

Total Molar Mass $= 14 + 4\times1.008 + 14 + 3\times16 \equiv 80.03\,g$

Mass of $N = 14 + 14 = 28$

Mass % $N = \frac{28}{80.03} \times 100 \equiv$ **35%**

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N NO: 12
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Two gas cylinders at the same temperature, the first one has 20.0 liters at a pressure of 13.0 atm. and the other one has 50.0 liters at a pressure of 9.0 atm. If the two cylinders are connected what will the final pressure be ?

) 10.1 atm.
. 22.0 atm.
. 11.0 atm.
. 4.02 atm.

Total volume $= 20.0\,L + 50.0\,L \equiv 70.0\,L \equiv V_2$ $\quad P_2 = ??$

$P_1V_1 = P_2V_2$ (i) $\frac{13.0\,Atm \times 20.0\,L}{70.0\,L} \equiv 3.71\,Atm$

(ii) $\frac{50.0\,L \times 9.0\,Atm}{70.0\,L} \equiv 6.43\,Atm$ ∴ Total $3.71 + 6.43 \equiv$ **10.1 Atm**

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N NO: 13
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The compound N_2O_3 is named:

) dinitrogen trioxide.
. nitrogen trioxide.
. dinitrogen tetroxide.
. trinitrogen dioxide.

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N NO: 14
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A real gas closely approaches the behavior of an ideal gas at conditions of

) low pressure and high temperature.
. high pressure and high temperature.
. low pressure and low temperature.
. high pressure and low temperature.

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ON NO: 15
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$$C_3H_8\ (g) + 5O_2\ (g) \Longrightarrow 3CO_2\ (g) + 4H_2O\ (g)$$

The minimum whole number coefficient of oxygen when the above equation is balanced is

A. 5
B. 4
C. 3
D. 1

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ON NO: 16
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Real gases deviate from Ideal gas behavior as a result of:
1. attractive forces between gas particles.
2. vibration of gas particles.
3. the finite volume of real gas particles.
4. the size of the gas particles.

A. 1 & 3 ; Vanderwalls equation applies here
B. 2 & 4
C. 1, 2 & 4
D. 4 only.

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ON NO: 17
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1.00 g of dry oxygen occupies 700 mL at STP. What volume would it occupy if collected over water at 24.0 °C and a total pressure of 726 mm Hg ?
(vapor pressure of water at 24.0 °C is 22.4 mm Hg)

A. 822 mL
B. 262 mL
C. 726 mL
D. 846 mL

$V_1 = 700\,mL$; $P_1 = 1.0\,Atm$; $T_1 = 273\,K$

$V_2 = ??$; $P_2 = 726 - 22.4 = \frac{703.6}{760} \equiv 0.926\,Atm$; $T_2 = 297$

$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$; $V_2 = V_1 \times \frac{P_1}{P_2} \times \frac{T_2}{T_1}$; $= 700\,mL \times \frac{1\,atm}{0.926\,atm} \times \frac{297\,atm}{273}$;

$V_2 = 822\,mL$

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ON NO: 18
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5.20 g sample of a gas is collected in a 4.0-L flask at 27.0 °C and 760 mm Hg. What is the molar mass of the gas ?

A. 32.0 g/mol.
B. 2.88 g/mol.
C. 4.21 g/mol.
D. 3.79 g/mol.

$PV = \frac{g}{MM} \cdot RT$

$MM = \frac{g \cdot RT}{PV} \equiv \frac{5.20g \times 0.0821 \times 300K}{1.0Atm \times 4.0L} \equiv 32.0\ g/mol$

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TION NO: 19
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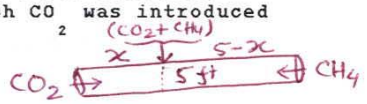
Samples of CO_2 gas and CH_4 gas at the same temperature and pressure are introduced at opposite ends of a 5.0 feet long tube. At what distance from the end at which CO_2 was introduced will the two gases meet ?



A. 1.9 ft.
B. 3.7 ft.
C. 1.3 ft.
D. 4.2 ft.

$$\left(\frac{d_{CH_4}}{d_{CO_2}}\right) = \left(\frac{MM_{CO_2}}{MM_{CH_4}}\right)^{1/2}$$

$$\frac{5-x}{x} = \left(\frac{44.01}{16.04}\right)^{1/2} \equiv (2.74)^{1/2} \equiv 1.66 \quad \because 5 = 1.66x + x$$

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TION NO: 20
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$$\because 5 = x(1+1.66), \quad x = \frac{5}{2.66} \equiv 1.87 \simeq \boxed{1.9\ ft}$$

A mixture of gases at 750 mm Hg contains 1.50 mol of N_2, 2.20 mol of O_2 and 4.80 mol of CO_2.

What is the partial pressure of nitrogen in the mixture ?

(A) 132 mm Hg.
B. 194 mm Hg.
C. 423 mm Hg.
D. 288 mm Hg.

Total mols $\equiv 1.50 + 2.20 + 4.80 \equiv 8.50$

Mol Fraction $N_2 \equiv \frac{1.50}{8.50} \equiv 0.176$

Partial Pressure = Total Pressure x Mol fraction

$= 750\ mm\ Hg \times 0.176$

$$\boxed{P_{N_2} = 132\ mm\ Hg}$$