

Form
A/B
C/D

mass H in 25.00 g compd = $1.595 \times 10^{23} \text{ H atoms} \left(\frac{1 \text{ mol H}}{6.022 \times 10^{23} \text{ atoms}} \right) \left(\frac{1.008 \text{ g H}}{1 \text{ mol H}} \right) = 0.267 \text{ g H}$
 mass C in 25.00 g compd = 19.08 g C

CHEMISTRY 102
HOUR EXAM II

mass O = $25.00 - 0.267 \text{ g H} - 19.08 \text{ g C} = 5.653 \text{ g O}$

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mol O = $5.653 \text{ g O} \left(\frac{1 \text{ mol O}}{16.00 \text{ g}} \right) = 0.3533 \text{ mol O}$
 $0.3533 \text{ mol O} \times 3 = 1.06 \text{ mol O} \approx 1.33 \text{ mol O}$

1/12
10/21

1. A hypothetical compound containing carbon, hydrogen, and oxygen consists of 76.33% carbon by mass. A 25.00 g sample of the compound contains 1.595×10^{23} H atoms. What is the empirical formula of this compound?
 mol C = $19.08 \text{ g C} \left(\frac{1 \text{ mol C}}{12.01 \text{ g}} \right) = 1.589 \text{ mol C} / 0.2649 = 6 \text{ mol C}$
 a) $\text{C}_6\text{H}_3\text{O}_3$ b) CH_2O_2 c) C_3HO d) $\text{C}_5\text{H}_4\text{O}_5$ e) $\text{C}_{18}\text{H}_3\text{O}_4$ is empirical formula

2/13
11/22

2. A 1.00 g-sample of a metal chloride, MCl_2 , is first dissolved in some water and then excess aqueous silver nitrate is added. A precipitate forms having a mass of 1.29 g. Calculate the molar mass of the metal, M. Silver chloride has a molar mass of 143.35 g/mol.
 mol $\text{MCl}_2 = 1.29 \text{ g AgCl} \left(\frac{1 \text{ mol AgCl}}{143.35 \text{ g}} \right) \left(\frac{1 \text{ mol Cl}}{1 \text{ mol AgCl}} \right) \left(\frac{1 \text{ mol MCl}_2}{2 \text{ mol Cl}} \right) = 4.45 \times 10^{-3} \text{ mol MCl}_2$
 a) 151 g/mol b) 222 g/mol c) 76 g/mol d) 111 g/mol e) 56 g/mol

3/14
12/23

3. Consider the following four compounds: Br_2 , KCl , Xe , CIBr . How many of these four compounds will have a vapor pressure greater than that of ICl at 25°C ?
 molar mass $\text{ICl} = 162 \text{ g/mol}$; ICl has dipole forces + LDF. KCl is ionic, so has stronger IMF and a lower vapor pressure. The other 3 compounds (Br_2 , Xe and CIBr) have weaker IMF, so higher vapor pressure. The nonpolar Br_2 has similar molar mass to ICl , but is not polar. Xe is nonpolar and has smaller molar mass. CIBr is polar, but has smaller molar mass than ICl so weaker LDF.
 a) 0 (none) b) 1 c) 2 d) 3 e) 4 (All four of these compounds have a vapor pressure greater than ICl at 25°C).

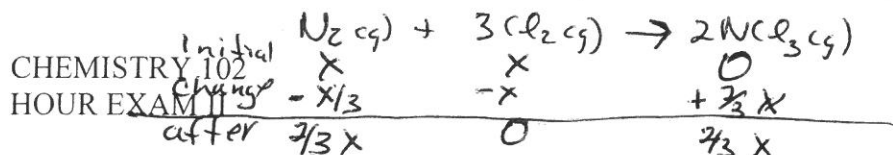
4/15
13/24

4. Consider the following balanced reaction:
 $2 \text{C}_2\text{H}_6(\text{g}) + 7 \text{O}_2(\text{g}) \rightarrow 6 \text{H}_2\text{O}(\text{l}) + 4 \text{CO}_2(\text{g})$
 The molar mass of C_2H_6 and O_2 are about the same. So equal masses indicates that we start the reaction with about equal moles of C_2H_6 and O_2 . Which of the following statements (a-d) is/are true?
 F a) If we react equal masses of C_2H_6 and O_2 , then C_2H_6 is limiting.
 F b) If we react equal moles of C_2H_6 and O_2 , then both reactants run out at the same time.
 + c) If the mass of C_2H_6 reacted is larger than the mass of O_2 reacted, then O_2 must be limiting. we have more moles of C_2H_6 as compared to moles of O_2 . Since O_2 is used up faster, then O_2 must be limiting in this case.
 F d) If the mass of O_2 reacted is larger than the mass of C_2H_6 reacted, then C_2H_6 must be limiting. not necessarily.
 e) At least two of the above statements (a-d) are true.

5/16
14/25

5. A compound consists of 49.0% C, 4.44% H, and 48.2% Cl by mass. The gaseous density of the compound at 120°C and 250. torr is 2.25 g/L. What is the molecular formula of the compound? Assume 100.00 g compound.
 $m = \frac{dRT}{P} = \frac{2.25 \text{ g/L} (0.08206 \frac{\text{L}\cdot\text{atm}}{\text{K}\cdot\text{mol}}) (393 \text{ K})}{250/760 \text{ atm}} = 220.6 \text{ g/mol}$
 $49.0 \text{ g C} \left(\frac{1 \text{ mol C}}{12.01 \text{ g}} \right) = 4.08 \text{ mol C} / 1.36 = 3 \text{ mol C}$
 $2.74 \text{ g H} \left(\frac{1 \text{ mol H}}{1.008 \text{ g}} \right) = 2.718 \text{ mol H} / 1.36 = 2 \text{ mol H}$
 $48.2 \text{ g Cl} \left(\frac{1 \text{ mol Cl}}{35.45 \text{ g}} \right) = 1.36 \text{ mol Cl} / 1.36 = 1 \text{ mol Cl}$
 empirical formula: $\text{C}_3\text{H}_2\text{Cl}$
 emp mass $\approx 3(12) + 2(1) + 35.5 = 73.5 \text{ g/mol}$
 molecular formula: $\frac{220.6}{73.5} = 3$, $(\text{C}_3\text{H}_2\text{Cl})_3 = \text{C}_9\text{H}_6\text{Cl}_3$ is molecular formula.

A + constant T + P, $V \propto n$, so $\frac{V_2}{V_1} = \frac{n_2}{n_1}$. Assume x mol N_2 and x mol Cl_2 initially.



Spring 2019 Initial total moles
Page 2 $\Rightarrow n_1 = x + x = 2x$

6/7
15/16

6. Equal moles of $Cl_2(g)$ and $N_2(g)$ are placed in a 4.00 L flexible container. The Cl_2 and N_2 are reacted to form $NCl_3(g)$ at some constant temperature. After the reaction has gone to completion, determine the final volume of the container. Assume a constant pressure.

final moles of gas = $\frac{2}{3}x + 0 + \frac{2}{3}x = \frac{4}{3}x$

- a) 2.00 L b) 2.67 L c) 3.00 L d) 4.00 L e) 6.00 L

$\frac{n_2}{n_1} = \frac{V_2}{V_1}$, $\frac{\frac{4}{3}x}{2x} = \frac{V_2}{4.00 L}$, $\frac{4}{6} = \frac{V_2}{4.00 L}$, $V_2 = \frac{4}{6}(4.00 L) = 2.67 L$

7/8
16/17

7. How many gas particles remain in a 2.0 L flask initially filled with air which is then evacuated to a pressure of 8.0×10^{-7} torr at $20.^\circ C$?

$n = \frac{PV}{RT}$
 $n = \frac{(8.0 \times 10^{-7} \text{ torr}) (2.0 L)}{(0.08206 \text{ L atm / mol K}) (293 K)} = 8.756 \times 10^{-11} \text{ mol gas}$

- a) 2.3×10^{10} particles b) 2.6×10^{13} particles c) 8.8×10^{10} particles

gas particles = $8.756 \times 10^{-11} \text{ mol} \left(\frac{6.022 \times 10^{23} \text{ gas particles}}{\text{mol}} \right) = 5.27 \times 10^{13} \text{ gas particles}$

$(P_{meas} + \frac{an^2}{V^2})(V_{meas} - nb) = nRT$ a refers to strength of intermolecular forces and b refers to size of gas molecule.

8. Which answer best completes the following statement: 'In the van der Waals equation for gases given on the constants page, the symbol labeled "b"

of intermolecular forces and b refers to size of gas molecule.

- a) is expected to be a small value for polar gas molecules and a large value for nonpolar gas molecules. Both a + b values are always positive.

- b) depends on the size of the gas molecule.

- c) is expected to be large for gases that exactly obey Dalton's Law of Partial Pressures.

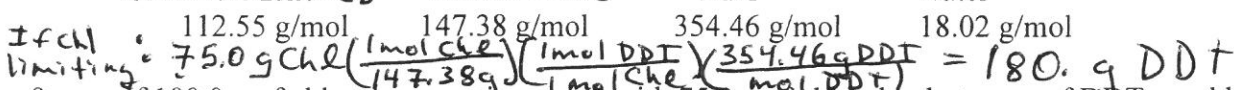
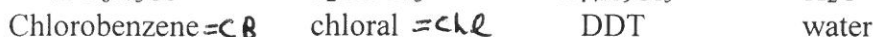
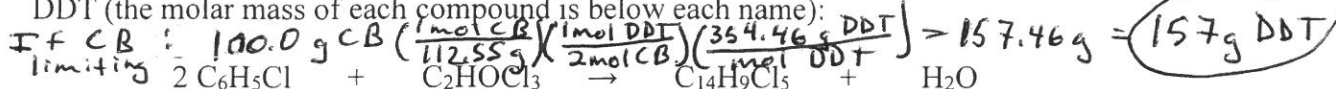
- d) often has negative values.

- e) is always a negative value.

8/9
17/18

The next two questions refer to the following balanced reaction to produce the toxic insecticide

DDT (the molar mass of each compound is below each name):



9. If 100.0 g of chlorobenzene is reacted with 75.0 g of chloral, what mass of DDT would be produced assuming 100% yield?

Since CB reactant produces smallest amount of DDT, CB

- a) 134 g b) 145 g c) 157 g d) 175 g e) 180 g

is limiting and 157 g DDT can be produced.

10. If 100.0 g of chlorobenzene is reacted with 75.0 g of chloral, what mass of excess reactant is left over assuming 100% yield?

mass chl that reacts with 100.0 g CB = $100.0 \text{ g CB} \left(\frac{1 \text{ mol CB}}{112.55 \text{ g}} \right) \left(\frac{1 \text{ mol chl}}{2 \text{ mol CB}} \right) \left(\frac{147.38 \text{ g}}{\text{mol chl}} \right) = 65.47 \text{ g chl reacted}$

- a) 9.5 g excess b) 11.4 g excess c) 16.9 g excess

- d) 22.0 g excess e) 25.0 g excess

excess chloral = $75.0 \text{ g chl initial} - 65.47 \text{ g chl reacted} = 9.5 \text{ g excess chloral}$

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Form

A/B
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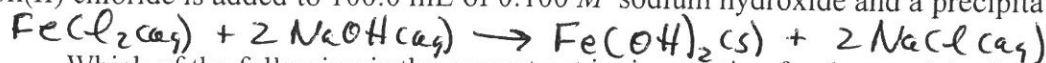
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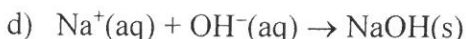
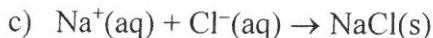
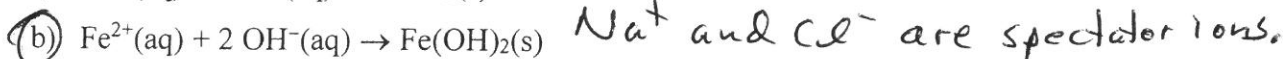
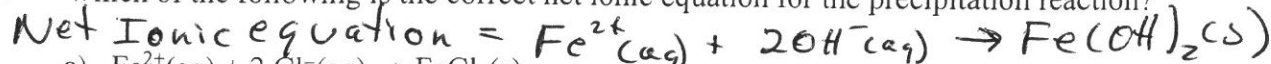
$$0.100 \text{ L} \left(\frac{0.100 \text{ mol}}{\text{L}} \right) = 0.0100 \text{ mol FeCl}_2 = 0.0100 \text{ mol Fe}^{2+} + 0.0200 \text{ mol Cl}^-$$

$$0.100 \text{ L} \left(\frac{0.100 \text{ mol}}{\text{L}} \right) = 0.0100 \text{ mol NaOH} = 0.0100 \text{ mol Na}^+ + 0.0100 \text{ mol OH}^-$$

Consider the following information for the next three questions. 100.0 mL of 0.100 M iron(II) chloride is added to 100.0 mL of 0.100 M sodium hydroxide and a precipitate forms.



11. Which of the following is the correct net ionic equation for the precipitation reaction?



If Fe^{2+} limiting: $0.0100 \text{ mol Fe}^{2+} \left(\frac{1 \text{ mol Fe}(\text{OH})_2}{1 \text{ mol Fe}^{2+}} \right) = 0.0100 \text{ mol Fe}(\text{OH})_2$

12. How many moles of precipitate form assuming 100% yield?

If OH^- limiting: $0.0100 \text{ mol OH}^- \left(\frac{1 \text{ mol Fe}(\text{OH})_2}{2 \text{ mol OH}^-} \right) = 0.00500 \text{ mol Fe}(\text{OH})_2$

a) 0.0100 mol

b) 0.00750 mol

c) 0.00667 mol

Since OH^- produces smallest amount of precipitate, OH^- is limiting and 0.00500 mol $\text{Fe}(\text{OH})_2$ precipitate can form.

d) 0.00500 mol

e) 0.00333 mol

13. Calculate the molarity of the Fe^{2+} ions after precipitation is complete.

excess mol $\text{Fe}^{2+} = 0.0100 \text{ mol Fe}^{2+} - \text{mol Fe}^{2+} \text{ in precipitate}$

a) 0 M

b) 0.0500 M

c) 0.0750 M

mol Fe^{2+} in precipitate = $0.00500 \text{ mol Fe}(\text{OH})_2 \left(\frac{1 \text{ mol Fe}}{1 \text{ mol Fe}(\text{OH})_2} \right) = 0.00500 \text{ mol Fe}^{2+}$

d) 0.0330 M

e) 0.0250 M

excess $\text{Fe}^{2+} = 0.0100 - 0.00500 = 0.00500 \text{ excess mol Fe}^{2+}$

mol Fe^{2+}

$M_{\text{Fe}^{2+}} = \frac{0.00500 \text{ mol Fe}^{2+}}{0.2000 \text{ L}} = 0.0250 \text{ M}$

0.0250 M

14. Consider four different solutions that are each prepared by adding the same mass of solute dissolved in the same volume of solution. The solutes are LiCl, KCl, KOH, and NaOH. Which solution has the largest molar concentration of solute?

molarity = $\frac{\text{moles solute}}{\text{Volume solution}}$; the solution with the largest concentration

a) LiCl

b) KCl

c) KOH

d) NaOH

has the largest number of moles present. Since all are made from the same mass of solute, the solute with the smallest molar mass will have the most moles present. This is NaOH (40.00 g/mol).

15. Consider the following four conditions (I-IV) describing 1.0 mol of a gas sample. A gas behaves most ideally at low pressures and high temps.

I. small container volume

II. high container temperature

III. low container pressure

IV. slow moving gas particle velocities

Fast

This corresponds to relatively large container volumes and the molecules of gas moving very rapidly (at high T, gas particles are moving very fast).

How many of these conditions help a "real" gas behave more ideally?

a) 0 (none)

b) 1

c) 2

d) 3

e) 4; (All of these conditions help a "real" gas behave more ideally.)

Form
A/B
C/D

Chemistry 102
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If Fe limiting: $5.00 \text{ mol Fe} \left(\frac{1 \text{ mol Fe}_3\text{O}_4}{3 \text{ mol Fe}} \right) = 5/3 \text{ mol Fe}_3\text{O}_4$
If H₂O limiting: $4.00 \text{ mol H}_2\text{O} \left(\frac{1 \text{ mol Fe}_3\text{O}_4}{4 \text{ mol H}_2\text{O}} \right) = 1.0 \text{ mol Fe}_3\text{O}_4$
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20/5

16. Since H₂O produces smallest amount of product, H₂O is limiting and 1.0 mol Fe₃O₄ is the theoretical yield.
5.00 mol of Fe is reacted with 4.00 mol of H₂O. If the actual yield of Fe₃O₄ is 0.50 mol, what is the percent yield of the reaction?

$\% \text{ yield} = \frac{\text{actual}}{\text{theoretical}} \times 100 = \frac{0.50 \text{ mol}}{1.00 \text{ mol}} \times 100 = 50.0\%$
a) 10.0% b) 13% c) 29% d) 42% e) 50.0%

17/2
21/6

17. LiH is ionic (metal in a compound) so LiH has the highest boiling pt. Consider the compounds PH₃, CH₄, LiH, and NH₃. Rank these compounds in order of increasing boiling point (from lowest to highest boiling point).

Of the remaining covalent compounds, NH₃ can form H-bonding

- a) LiH < PH₃ < CH₄ < NH₃ b) PH₃ < LiH < CH₄ < NH₃
so it has the next highest boiling point. Between PH₃ and
c) NH₃ < LiH < PH₃ < CH₄ d) LiH < CH₄ < PH₃ < NH₃

CH₄, PH₃ has the larger molar mass so it will have stronger London dispersion forces and a higher b.p. than CH₄. Answer e is correct.

18/3
22/7

18. A binary compound consisting of an unknown element Z and oxygen contains 43.64% Z by mass. If the formula of the compound is Z₄O₁₀, what is the identity of element Z?

In 100.00 g compound, there are 43.64 g Z and 100.00 - 43.64 = 56.36 g O.

a) P b) C c) Se d) I e) Ni
 $\text{mol Z} = 56.36 \text{ g O} \left(\frac{1 \text{ mol O}}{16.00 \text{ g O}} \right) \left(\frac{4 \text{ mol Z}}{10 \text{ mol O}} \right) = 1.409 \text{ mol Z}$; molar mass Z = $\frac{43.64 \text{ g Z}}{1.409 \text{ mol Z}} = 30.97 \text{ g/mol}$

19/4
23/8

19. A balloon contains equal moles of SO₂(g) and He(g). If a small leak in the balloon occurs, which of the following statements (a-d) about gas escaping from this leak is true? Z = Phosphorus

molar mass SO₂ = 64 g/mol; molar mass He = 4 g/mol

F a) SO₂(g) leaks four times faster from the balloon as compared to the He(g).

F b) Only helium will escape from the balloon. $\frac{\text{rate He}}{\text{rate SO}_2} = \sqrt{\frac{M_{\text{SO}_2}}{M_{\text{He}}}} = \sqrt{\frac{64}{4}} = 4$

F c) He(g) leaks 16 times faster from the balloon as compared to the SO₂(g).

The rate that He leaks from the balloon will be 4 times faster
F d) SO₂(g) and He(g) leak at the same rate from the balloon.

then the rate that the larger SO₂ molecules leak. None of
e) None of the above statements (a-d) are correct.
the statements says this.

20/5
24/9

20. A 70.8 g-sample of N₂(g) reacts with excess O₂(g) to form a compound N_xO_y. The final product has a mass of 111.2 g. Assuming all of the nitrogen gas has reacted, which of the following could be the compound? mass O in compd = 111.2 - 70.8 = 40.4 g O

$70.8 \text{ g N}_2 \left(\frac{1 \text{ mol N}_2}{28.02 \text{ g N}_2} \right) \left(\frac{2 \text{ mol N}}{1 \text{ mol N}_2} \right) = 5.054 \text{ mol N}$ / 2.525 = 2 Empirical formula
a) N₂O b) NO c) NO₂ d) N₂O₂ e) N₂O₄ = N₂O₂

$40.4 \text{ g O} \left(\frac{1 \text{ mol O}}{16.00 \text{ g O}} \right) = 2.525 \text{ mol O}$ / 2.525 = 1 Compound could be N₂O or N₄O₂ or N₆O₃, etc.

21/6
25/10

21. What volume of 0.0521 M KOH is required to react completely with 14.20 mL of 0.141 M H₃PO₄? $\text{H}_3\text{PO}_4(\text{aq}) + 3\text{KOH}(\text{aq}) \rightarrow 3\text{H}_2\text{O}(\text{l}) + \text{K}_3\text{PO}_4(\text{aq})$
Only N₂O answer is possible.

- a) 115 mL b) 19.4 mL c) 57.6 mL d) 25.0 mL e) 38.4 mL

$\frac{0.01420 \text{ L} \times 0.141 \text{ mol H}_3\text{PO}_4 / \text{L}}{1 \text{ mol H}_3\text{PO}_4} \times \frac{3 \text{ mol KOH}}{1 \text{ mol H}_3\text{PO}_4} \times \frac{1 \text{ L KOH}}{0.0521 \text{ mol KOH}} = 0.115 \text{ L} = 115 \text{ mL KOH solution}$

Form
A/B
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All of these compounds can form H-bonding due to -OH group on compound. So difference in boiling points must be due to another type of intermolecular force (IMF). Notice as the more carbons

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6/1

22. Consider the following boiling point data:
- | Compound | Formula | Boiling Point |
|----------|--|---------------|
| methanol | CH ₃ OH | 65°C |
| ethanol | CH ₃ CH ₂ OH | 78°C |
| propanol | CH ₃ CH ₂ CH ₂ OH | 97°C |
| butanol | CH ₃ CH ₂ CH ₂ CH ₂ OH | 117°C |
| pentanol | CH ₃ CH ₂ CH ₂ CH ₂ CH ₂ OH | 138°C |
- point of the compound increases. London dispersion (LD) forces depend on molar mass.

So the increase in London dispersion forces in these compounds. The boiling points of these compounds increase steadily from methanol to pentanol.

Which type of intermolecular force is primarily responsible for the steady increase in boiling points from methanol to pentanol?

Increases as we go from methanol to pentanol, so the boiling points increase as we go from methanol to pentanol.

- a) Ionic forces
b) Hydrogen bonding forces
c) Dipole forces
d) London Dispersion forces

Cations present: NH₄⁺, Ag⁺, Na⁺, Ba²⁺; anions present: CO₃²⁻, SO₄²⁻, Br⁻, NO₃⁻

23/18
7/2

23. Aqueous solutions of (NH₄)₂CO₃, Ag₂SO₄, NaBr, and Ba(NO₃)₂ are mixed together. Several different colored precipitates form. Which of the following compounds did **not** form as a precipitate? NH₄⁺ and Na⁺ ions never form precipitates, the same is true for NO₃⁻. The only insoluble bromide salt that would form here is AgBr. BaBr₂ will not form. From the carbonate rule, Ag₂CO₃ and BaCO₃ will both form. From the sulfate rule, BaSO₄ will form.

- a) Ag₂CO₃ b) BaBr₂ c) BaCO₃ d) BaSO₄ e) AgBr

24/19
8/3

24. Which of the following statements is **false**?
- T a) More IMF are broken when water boils than when water melts, so for a typical covalent compound, the enthalpy of vaporization should be greater (more positive) than the enthalpy of fusion. ΔH_{vap} should be greater than ΔH_{fus}.

T b) The solid phase exhibits the strongest amount of intermolecular forces. At higher temps, more molecules have sufficient energy to break off from

T c) As temperature increases, the vapor pressure of a liquid increases. the liquid phase.

F d) The intermolecular forces between covalent compounds are stronger than the covalent bonds holding the atoms together within the compound. Intermolecular forces are much weaker than covalent bonds. If this wasn't the case, when

T e) Ideal gases are assumed to exert no intermolecular forces. water heat is added to water, H₂O(g) and O₂(g) would form. If doesn't, water just boils as temp increases

25/20
9/4

25. An organic compound contains only carbon, hydrogen, and oxygen. Combustion of 3.50 g of the compound produced 4.80 g of CO₂ and 1.31 g of H₂O. What is the mass percent of oxygen in the organic compound?

$$\text{mass C in 3.50g compd} = 4.80 \text{ g CO}_2 \left(\frac{1 \text{ mol CO}_2}{44.01 \text{ g}} \right) \left(\frac{1 \text{ mol C}}{12.01 \text{ g}} \right) = 1.310 \text{ g C}$$

$$\text{mass H in 3.50g compd} = 1.31 \text{ g H}_2\text{O} \left(\frac{1 \text{ mol H}_2\text{O}}{18.02 \text{ g}} \right) \left(\frac{2 \text{ mol H}}{2.016 \text{ g}} \right) = 0.1466 \text{ g H}$$

$$\text{mass O in 3.50g compd} = 3.50 - 1.310 - 0.1466 = 2.043 \text{ g O}$$

$$\text{mass \% O} = \frac{2.043 \text{ g O}}{3.50 \text{ g compd}} \times 100 = 58.4\% \text{ O}$$

Form

Let $x = \text{mass H}_2 = \text{mass He}$ A/B
C/D

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$$\text{moles H}_2 = \frac{x}{2.0}, \text{ moles He} = \frac{x}{4.0}$$

$$\frac{\text{moles H}_2}{\text{moles He}} = \frac{\frac{x}{2.0}}{\frac{x}{4.0}} = 2.0$$

Consider the following information for the next 2 problems. A 50.0 L rigid container holds a certain mass of $\text{H}_2(\text{g})$ and the same mass of $\text{He}(\text{g})$ (mass of hydrogen gas = mass of helium gas). The total pressure in the container is 3.0 atm at 25°C . At constant V and T , $P \propto n$.

Since we have twice the number of moles of H_2 as we have of

26. What is the partial pressure of $\text{H}_2(\text{g})$ in this container?

He, the partial pressure of H_2 will be twice the partial pressure

a) 0.50 atm b) 1.0 atm c) 1.3 atm d) 1.7 atm e) 2.0 atm

of He. $P_{\text{tot}} = P_{\text{H}_2} + P_{\text{He}}$, $3.0 \text{ atm} = 2P_{\text{He}} + P_{\text{He}}$, $P_{\text{He}} = 1.0 \text{ atm}$

$$P_{\text{H}_2} = 3.0 - 1.0 = 2.0 \text{ atm}$$

27. The container is heated to 125°C . Calculate the total pressure in the container at 125°C ?

$\frac{P_1 V_1}{n_1 T_1} = \frac{P_2 V_2}{n_2 T_2}$; total moles of gas is constant, volume is constant.

a) 15 atm b) 4.0 atm c) 1.2 atm d) 1.7 atm e) 6.0 atm

$$\frac{P_1}{T_1} = \frac{P_2}{T_2}, P_2 = P_1 \left(\frac{T_2}{T_1} \right) = 3.0 \text{ atm} \left(\frac{398 \text{ K}}{298 \text{ K}} \right) = 4.0 \text{ atm}$$

28. Which of the following four (I-IV) statements is/are **not** postulates of the kinetic molecular theory?

yes I. The volume of each individual gas particle is assumed to be negligible (zero).

yes II. Gas particles are assumed to exert no forces on each other; they are assumed to neither attract nor repel each other.

yes III. The average kinetic energy of a collection of gas particles is assumed to be directly proportional to the Kelvin temperature of the gas. $KE_{\text{ave}} = \frac{3}{2} RT$

NO IV. At a constant temperature, all gas particles are assumed to move at the same average velocity. At constant T , the lighter gas molecules must be moving with a faster average velocity in order for the kinetic energy to be equal to each other.

a) II only b) I and IV c) IV only d) II and III e) III and IV

29. Which of the following statements about electrolytes is **false**?

Acids are either weak electrolytes (weak acids) or strong electrolytes (strong acids).

T a) Acids dissolved in water are either strong electrolytes or weak electrolytes.

T b) Soluble ionic compounds are all strong electrolytes.

F c) Covalent compounds are all nonelectrolytes. -acids, which are covalent compounds, are either weak or strong electrolytes.

T d) Weak acids in water are all weak electrolytes.

T e) Strong electrolytes are either strong acids or soluble ionic compounds.

30. My answers for this Chemistry 102 exam should be graded with the answer sheet associated with:

a) Form A

b) Form B

c) Form C

d) Form D

e) Form E