Mole Practice Test [Answer on a separate sheet.]

1. What is an empirical formula? The lowest whole number ratio of a compound.

2. Which of the following are empirical formulas? $\text{H}_2\text{O}$, $\text{H}_2\text{O}_2$, $\text{C}_6\text{H}_{12}\text{O}_6$, $\text{CH}_2\text{O}$

3. Convert this molecular formula into an empirical formula. $\text{C}_5\text{H}_{10}$ $\text{CH}_2$

4. What is the percent composition of Hydrogen in $\text{C}_5\text{H}_{10}$? Show work.

$$\begin{align*}
\text{C} &= 12.01 \times 5 = 60 \text{ g} \\
\text{H} &= 1.0079 \times 10 = 10 \\
60/70 &= 86% \\
10/70 &= 14%
\end{align*}$$

5. A compound is found to contain 63.52 % iron and 36.48 % sulfur. Find its empirical formula. Show your work.

$$\begin{align*}
\text{Fe} &= 1.14 \text{ moles} \\
\text{S} &= 1.14 \text{ moles}
\end{align*}$$

6. A compound is 85.7 % carbon and 14.3 % hydrogen. Calculate the empirical formula. Show your work.

$$\begin{align*}
\text{C} &= 7.14/7.14 = 1 \text{ mole C} \\
\text{H} &= 14.30/7.14 = 2 \text{ moles H}
\end{align*}$$

7. A 68 g sample of a liquid is found to contain 4 g of Hydrogen and 64 g of Oxygen. What is the percent composition of Hydrogen and Oxygen? Is this compound water? How do you know? Empirical Formula is $\text{H}_2\text{O}$

$$\begin{align*}
\text{H} &= 4 \text{ g}/68 \text{ g} = .059 = 5.9% \text{ H} \\
\text{O} &= 64 \text{ g}/68 = .94 = 94% \text{ O}
\end{align*}$$

8. A 68 g sample of a liquid is found to contain 4 g of Hydrogen and 64 g of Oxygen. What is the percent composition of Hydrogen and Oxygen? Is this compound water? How do you know? Empirical Formula is $\text{H}_2\text{O}$

$$\begin{align*}
\text{H} &= 4 \text{ g} \times 1 \text{ mole} / 1 \text{ g} = 4 \text{ moles H} \\
\text{O} &= 64 \text{ g} \times 1 \text{ mole} / 16 = 4 \text{ moles O}
\end{align*}$$
9. Is the compound in question 8 water? No How do you know? It is a one to one ratio.
What is the empirical formula for this liquid? __________ Show your work.
4/4 = 1 and 4/4 = 1

<table>
<thead>
<tr>
<th></th>
<th>Moles</th>
<th>Liters (STP)</th>
<th>Mass (g)</th>
<th>Molecules</th>
</tr>
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<tbody>
<tr>
<td>CO₂</td>
<td>6</td>
<td>134.4</td>
<td></td>
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<td></td>
<td></td>
<td>134.4 L X 1 mole = 6 moles 22.4 L</td>
<td>6 moles X 44 g = 264 grams 1 mole</td>
<td>6 moles X 6 x 10^23 = 3.6 x 10^24 1 mole</td>
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<tr>
<td>CH₄</td>
<td>.25</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>.25 moles X 22.4 L = 5.6 Mole 1 mole</td>
<td>4 g X 1 mole = .25 moles 16 g</td>
<td>.25 moles X 6 x 10^23 = 1.5 x 10^23 1 mole</td>
</tr>
<tr>
<td>C₂H₆</td>
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<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>3.5 moles X 22.4 L = 78.4 L 1 mole</td>
<td>3.5 moles X 30 g = 105 g 1 mole</td>
<td>2.1 x 10^24</td>
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<tr>
<td>H₂</td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td>2 moles X 22.4 L = 44.8 L 1 mole</td>
<td>4 g X 1 mole = 2 moles 2 g</td>
<td>2 moles x 6 x 10^23 = 1.2 x 10^24 mole</td>
</tr>
</tbody>
</table>
Mole Practice Test [Answer on a separate sheet.]

1. What is an empirical formula?

2. Which of the following are empirical formulas? $H_2O$, $H_2O_2$, $C_6H_{12}O_6$, $CH_2O$

3. Convert this molecular formula into an empirical formula. $C_5H_{10}$

4. What is the percent composition of Hydrogen in $C_5H_{10}$? Show work.

5. A compound is found to contain 63.52 % iron and 36.48 % sulfur. Find its empirical formula. Show your work.

6. In the laboratory, a sample is found to contain 1.05 grams of nickel and 0.29 grams oxygen. Determine the empirical formula. Show your work.

7. A compound is 85.7 % carbon and 14.3 % hydrogen. Calculate the empirical formula.

8. A 68 g sample of a liquid is found to contain 4 g of Hydrogen and 64 g of Oxygen. What is the percent composition of $H=$ $O=$

9. Is the compound in question 8 water? ______ How do you know?
What is the empirical formula for this liquid? ______ Show your work.

10. |     | Moles | Liters (STP) | Mass (g) | Molecules |
    |-----|-------|-------------|----------|-----------|
    | $CO_2$ |       | 134.4       |          |           |
    | $CH_4$ |       |             | 4        |           |
    | $C_2H_6$ | | | $2.1 \times 10^{24}$ | |
    | $H_2$ |       |             | 4        |           |