Happy Tuesday!!!

Agenda:
1. Unit 3A Review Answers
2. Unit 3A Practice Test

HW: Study for Test
1. Name several fuels obtained from crude petroleum.
   
   **Natural gas, gasoline, kerosene, fuel oil, diesel fuel**

2. List four household items made from petroleum.
   
   **plastic containers, fibers (clothing), medicines, detergents, adhesives, cosmetics**

3. Refer to Table 3.2. Which possible mixture of two listed substances would be the easiest to separate by distillation? Explain your reasoning.

   **Possible Components of Distillation Mixture**

<table>
<thead>
<tr>
<th>Substance</th>
<th>Formula</th>
<th>Boiling Pt. (°C)</th>
<th>Appearance with I₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-Propanol (rubbing alcohol)</td>
<td>C₃H₇O</td>
<td>82.4</td>
<td>Bright yellow</td>
</tr>
<tr>
<td>Acetone</td>
<td>C₃H₆O</td>
<td>56.5</td>
<td>Yellow to brown</td>
</tr>
<tr>
<td>Water</td>
<td>H₂O</td>
<td>100.0</td>
<td>Colorless to light yellow</td>
</tr>
<tr>
<td>Cyclohexane</td>
<td>C₆H₁₂</td>
<td>80.7</td>
<td>Magenta</td>
</tr>
</tbody>
</table>

**Acetone and Water**

4. Referring to Table 3.2 sketch a graph of the distillation of a mixture of aceton and water features.
4. Referring to Table 3.2 sketch a graph of the distillation of a mixture of acetone and water. Label its key features.
5. How does fractional distillation differ from a simple distillation?
Simple distillation is a batch process that separates mixtures into individual components. Fractional distillation is a continuous process that separates mixtures into fractions, mixtures of hydrocarbons of like BP's

6. Where in a distillation tower—top, middle, or bottom—would you expect the fraction with the highest boiling point range to be removed? Why?
   At the bottom, because this fraction requires the most energy both to vaporize and to travel upward (due to the higher molecular weight of its components and stronger IMF)

7. Use the general molecular formula \( (C_nH_{2n+2}) \) to write the molecular formula for an alkane containing
   a. 9 carbons.  \( C_9 H_20 \)
   b. 16 carbons.  \( C_{16} H_{34} \)
   c. 10 carbons.  \( C_{10} H_{22} \)
   d. 18 carbons.  \( C_{18} H_{38} \)

8. Calculate the molar mass of each alkane listed in Question 7.
   a. \( C_9 H_{20} \times 12.01 = 108.09 \)
   Ex: \( C_{10} H_{22} \times 1.01 = \frac{20.2}{128.29} \) g/mol

9. What is the shortest-chain alkane that can demonstrate isomerism?
   Butane - \( C_4 H_{10} \)
10. An unbranched hydrocarbon molecule can be represented as a linear chain or as a zigzag chain. Explain in what way both representations are correct.

Both show the arrangement of atoms.

11. Are the following three molecules isomers of one another? Explain your answer.

\[
\begin{align*}
&\text{CH}_3 \quad \text{CH}_3 \quad \text{CH}_3 \\
&| \quad \ | \quad |
\\
&\text{CH}_2-\text{CH}_2-\text{CH}_2 \quad \text{CH}_2 \\
&| \quad \ | \\
&\text{CH}_2-\text{CH}_2-\text{CH}_3
\end{align*}
\]

No, they are just bent versions of the same straight chain alkane.