Answer all the questions below then check your answers

1. True or False: The boiling points of alkanes increase as the molecules get larger.

2. Fill in the Blank: As the length of the carbon chain in an alkane increases, its flammability _____.

3. Which of the following alkanes would be the most volatile?

   A) Methane

   B) Ethane

   C) Propane

   D) Butane

4. Why does the melting point of alkanes generally increase as the number of carbon atoms increases?

5. Describe the trend in volatility of alkanes as you move down the homologous series. Explain this trend in terms of intermolecular forces.

6. The flammability of methane and octane. Explain your answer with reference to the size of the molecules and the completeness of combustion.

7. You are given samples of liquid pentane, hexane, and octane.

Design a simple experiment to investigate the trend in boiling points.

Describe your expected results and explain how they support the trend.

Answers

1. True or False: The boiling points of alkanes increase as the molecules get larger.

   True- large hydrocarbon molecules have highest boiling points than smaller molecules die to an increase in intermolecular bonding and an increase in molecular mass.

2. Fill in the Blank: As the length of the carbon chain in an alkane increases, its flammability _____.

   Decreases- smaller molecules are more volatile and so evaporate in the gaseous state more readily and so are more flammable

3. Which of the following alkanes would be the most volatile?

   A) Methane

   B) Ethane

   C) Propane

   D) Butane

   Answer: A – methane is the smallest molecule so most volatile and flammable.

4. Why does the melting point of alkanes generally increase as the number of carbon atoms increases?

   Larger alkanes have stronger intermolecular bonding between the molecules, requiring more energy to overcome and melt.

5. Describe the trend in volatility of alkanes as you move down the homologous series. Explain this trend in terms of intermolecular forces.

   Volatility decreases down the group. This is because larger alkanes have stronger intermolecular bonding, making it harder for them to escape into the gas phase.

6. The flammability of methane and octane. Explain your answer with reference to the size of the molecules and the completeness of combustion.

   Methane is more flammable than octane. There will be many more of the smaller methane molecules present in the air at any given temperature so they will mix better with air and combust more completely, releasing more energy. There will be far less of the larger octane molecules present in the gaseous state at any given temperature so they will not mix as well and tend to undergo incomplete combustion as they require more oxygen to burn completely.

7. You are given samples of liquid pentane, hexane, and octane.

   Design a simple experiment to investigate the trend in boiling points.

   Describe your expected results and explain how they support the trend.

   Possible answer

   Heat each sample gently in separate test tubes using a water bath.

   Record the temperature at which each alkane starts to boil.

   Expected results: Pentane will boil first (lowest temperature), then hexane, then octane (highest temperature).

   This supports the trend of increasing boiling point with increasing molecular size due to intermolecular bonding.