

Fractional Distillation of Crude Petroleum Worksheet

CALCULATIONS:

1. Calculate density for the crude oil and each of its fractions.
2. Calculate by weight the percent represented by each fraction relative to the crude oil sample distilled.

QUESTIONS:

1. What requirement must be met if two compounds are to be separated by the process of fractional distillation?
2. Judging from the results of the laboratory demonstration, what general relationship exists between molecular weight and volatility?
3. From everyday experience, cite evidence tending to show that the viscosity of a liquid changes with change in temperature.
4. Among the products of the distillation of crude petroleum, is there any apparent relationship between boiling range and viscosity? Explain.
5. How is the boiling range or viscosity of a substance – the structure at a bulk scale – related to the strength of electrical forces between particles?
6. Based on boiling range and viscosity, which fraction do you think has the strongest electrical forces between particles? Which fraction do you think has the weakest electrical forces between particles? Explain your reasoning.

Fractional Distillation of Crude Petroleum Worksheet - *Suggested Answers*

CALCULATIONS:

1. Calculate density for the crude oil and each of its fractions.
2. Calculate by weight the percent represented by each fraction relative to the crude oil sample distilled.

QUESTIONS:

1. What requirement must be met if two compounds are to be separated by the process of fractional distillation?
The two compounds must have different boiling points.
2. Judging from the results of the laboratory demonstration, what general relationship exists between molecular weight and volatility?
Lower molecular weights are associated with higher volatility.
3. From everyday experience, cite evidence tending to show that the viscosity of a liquid changes with change in temperature.
Many possible examples: honey, molasses, oil.
4. Among the products of the distillation of crude petroleum, is there any apparent relationship between boiling range and viscosity? Explain.
Yes. Items that have a higher boiling point tend to be more viscous.
5. How is the boiling range or viscosity of a substance – the structure at a bulk scale – related to the strength of electrical forces between particles?
Substances with higher boiling points and higher viscosity tend to have stronger electrical forces holding the particles together. Therefore, more thermal energy is required to overcome these electrical forces and change the state of the substance from a liquid to a gas.
6. Based on boiling range and viscosity, which fraction do you think has the strongest electrical forces between particles? Which fraction do you think has the weakest electrical forces between particles? Explain your reasoning.
The fraction that was distilled at the lowest temperature has the weakest electrical forces between particles. The fraction that was distilled at the highest temperature has the strongest electrical forces between particles. I think this because I know more thermal energy was required to convert it to a gas.