

## **CHEM 221 lab 2: Simple distillation: identification of a petroleum hydrocarbon – boiling point and refractive index**

**Objective:** Identifying an unknown hydrocarbon sample (either cyclopentane, hexane or cyclohexane) by purifying it through simple distillation and then identifying with three physical properties (density, boiling point and refractive index)

### **Procedure:**

#### **Simple distillation**

1. Approximately 20 mL of unknown hydrocarbon in a glass vial.
2. Set up simple distillation apparatus.
3. Verify with TA prior to heating.
4. Adjust thermostat setting to 80°C and start magnetic stirrer.
5. Observe ring of condensation.
6. Record temperature when first drop of distillate is collected. Discard first 2-3 drops (considered as minor impurities)
7. Make observations of the temperature change and distillation rate as the distillation proceeds.
8. Stop collection when vial is about 2/3 full or when there's less than 5mL in the round bottom flask. (whichever comes first).
9. Cap and label the distillate.

#### **Identification by density**

1. Weight and record mass of empty 20 mL glass vial (with the cap) in a fume hood.
2. Using a pipet, transfer 5 mL of unknown hydrocarbon into vial.
3. Record mass of the vial (with the cap).

#### **Identification by refractive index**

1. Turn on refractometer, clean and calibrate.
2. Verify that the instrument is in index mode NOT index-TC mode.
3. Raise upper prism and apply drops of sample.
4. Gently lower prism to spread sample evenly.
5. Allow sample to reach temperature equilibration.
6. View through eyepiece to observe the shadowline alignment view. Rotate focusing eyepiece to bring into focus.
7. If a non-distinct shadowline containing colour is seen, rotate the colour dispersion correction wheel.
8. Rotate the shadowline adjustment knob to bring the centre of X pattern to line up.
9. Press read, record refractive index and the measured temperature.
10. Calculate the raw refractive index.

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