



Evaporation of alcohols

Teacher Notes

CHEMISTRY
State of matter

Driving Questions:

How does the molecular mass of an evaporating alcohol affect the rate of evaporation?

Applied Technology: Data-logging

Student Level: Middle School Level

Duration: 1 lesson period

Recommended Settings: Student Investigations

Learning Objectives

- To understand the factors which influence the cooling effect of evaporation.
- To relate rate of evaporation with molecular mass.

Didactical Approach

In this activity students investigate process evaporation. They use a temperature sensor to record temperature changes during evaporation of alcohols. They investigate how the molecular mass of evaporating alcohol affects the rate of evaporation.

Concepts learnt in this activity:

- Evaporation, rate of evaporation, molecular mass.

Materials

In your investigations you will use:

- Data-logger e.g. CMA VinciLab,
- 1 to 3 Temperature sensors,
- Tissue paper or cotton wool,
- Pipette,
- Methanol CH_3OH , ethanol $\text{C}_2\text{H}_5\text{OH}$, 1-propanol $\text{C}_3\text{H}_7\text{OH}$ (and 1-butanol $\text{C}_4\text{H}_9\text{OH}$).

Because several of these liquids are highly volatile, keep the room well ventilated. Close the test tubes or bottles at times when the experiment is not being performed. The experiment should not be performed near any open flames.

Procedure

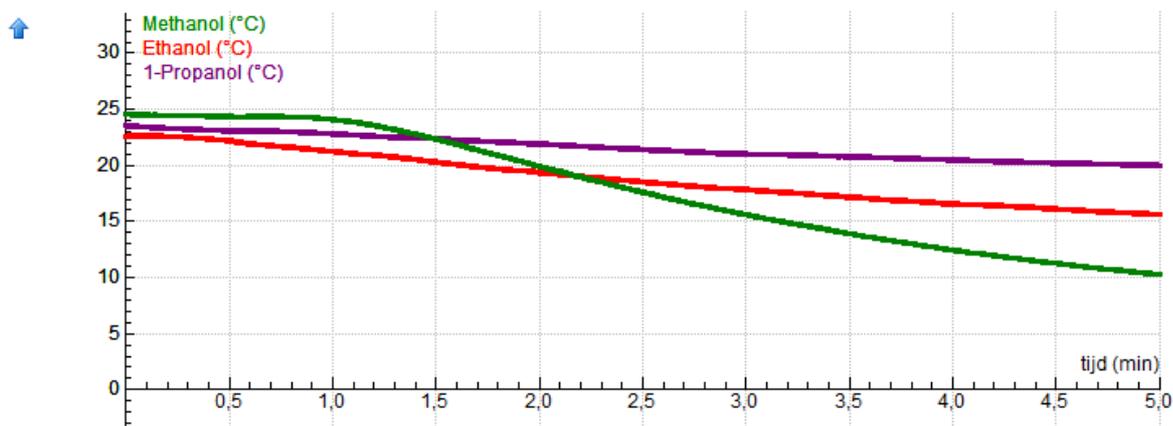
- Connect the temperature sensors to the input 1 of your interface.
- Open Coach Activity 'Evaporation of alcohols'.
- Let the students setup the experiment and perform the investigations.

Questions and Assignments

- What is the temperature change during evaporation of each type of alcohol?
- Which of the alcohols has the strongest intermolecular forces of attraction? The weakest intermolecular forces?
- Knowing the temperature changes ΔT for these three alcohols predict the temperature change for 1-butanol C_4H_9OH .
- Consider the relationship between molecular weight and rate of evaporation for the alcohols in this study. Is rate of evaporation directly or inversely related to molecular weight?

Data Analysis

The resulting data suggest that as the molar mass of the alcohol increases, the rate of evaporation decreases. See the figure below for an example of the results.



Resources

Coach 6 Activity: Evaporation of alcohols.cma

Coach 6 Result: Evaporation of alcohols.cmr

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