

TEL ACTIVITY PLAN

Name: Dr. Nkem Azike

Grade/Course: HNDII Analytical Chemistry (Semester 1)

LENGTH OF ACTIVITY: 90 minutes

Lesson Description:

Students will review the operational techniques and basic principles of chromatography, identify the different components of High Performance Liquid Chromatography (HPLC) and Gas Chromatography (GC) and how HPLC differs from GC.

Intended Learning Outcomes:

- Students will learn the different types of chromatography, understand the operational techniques applicable to HPLC and GC and be able to identify similarities and differences between them. (*This topic had been taught in the past without the students seeing first-hand how these equipment operate*).

Resources/Technology:

Student laptop/smartphone with data to access the internet, WhatsApp and a functional email address (Gmail preferably).

STUDENT ACTIVITIES:

Read, review, respond, explore and self-assessment activities are listed below

READ

<https://edu.rsc.org/resources/chromatography/11333.article> (Use internet explorer/fire fox browser to observe the animations)

<https://edu.rsc.org/resources/chromatography-techniques/4010255.article> (Use internet explorer/fire fox browser to observe the animations)

[https://chem.libretexts.org/Bookshelves/Analytical_Chemistry/Supplemental_Modules_\(Analytical_Chemistry\)/Instrumental_Analysis/Chromatography/V. Chromatography/C. High Performance Liquid Chromatography \(HPLC\)](https://chem.libretexts.org/Bookshelves/Analytical_Chemistry/Supplemental_Modules_(Analytical_Chemistry)/Instrumental_Analysis/Chromatography/V._Chromatography/C._High_Performance_Liquid_Chromatography_(HPLC))

[https://chem.libretexts.org/Bookshelves/Analytical_Chemistry/Supplemental_Modules_\(Analytical_Chemistry\)/Instrumental_Analysis/Chromatography/V. Chromatography/D. Gas-Liquid Chromatography](https://chem.libretexts.org/Bookshelves/Analytical_Chemistry/Supplemental_Modules_(Analytical_Chemistry)/Instrumental_Analysis/Chromatography/V._Chromatography/D._Gas-Liquid_Chromatography)

REVIEW

Review the operational techniques and the basic principles of HPLC and GC

<https://youtu.be/eCj0cRtJvJg>

<https://youtu.be/EMH05xYLoNc>

<https://youtu.be/PV4NYBUaUrQ>

<https://youtu.be/1YamgoqX53o>

RESPOND

What are the similarities and distinctions between HPLC and GC? Share your findings with your other group members on the group chat (WhatsApp).

EXPLORE

Use online search engine to find additional resources on the operational techniques of HPLC and GC.

See the following links below. Find others.

<https://youtu.be/ZpPzImDSfqc>

<https://www.thoughtco.com/gas-chromatography-4138098>

<https://youtu.be/ZN7euA1fS4Y>

ASSESS YOUR OWN LEARNING

Go to quizziz.com, sign in and challenge at least 9 of your course mates to join in and play a few games on chromatography with you (see useful links below). Share your scores on the group chat.

<https://quizziz.com/admin/quiz/5dad25e32e7fe9001ba5fe0a/chromatography>

<https://quizziz.com/admin/quiz/5e93ca2468e4d4001cd4d659/introduction-to-chromatography>

<https://quizziz.com/admin/quiz/5c1a6255d9740f001b950d53/chromatography>

<https://quizziz.com/admin/quiz/5de0d63e175d5e001b891d52/uv-vis-and-hplc>

<https://quizziz.com/admin/quiz/5dad25e32e7fe9001ba5fe0a/chromatography>

Student Assessment

The class is divided into 4 groups and given a unique code to join and play the Homework quiz at joinmyquiz.com. Download your completed assessment sheet and email to me at nkekris07@gmail.com

Note that this is part of your continuous assessment for the semester.

Please see below for the quizzes that students will take. A pdf copy of the created quiz is also attached with the answer key.

Basic Principles of Chromatography and Operational techniques of HPLC and GC

Name: _____

Class: _____

Date: _____

1. Which of the following techniques can be used to separate gaseous substances into their individual components in a calibrated column?
 - a) Thin layer chromatography
 - b) High pressure liquid chromatography (HPLC)
 - c) Gas liquid chromatography (GC)
 - d) Column chromatography
2. Characteristic feature of any type of chromatography:
 - a) Involves use of molecules that are soluble in water
 - b) Always involves the use of carrier gas
 - c) Involves the use of mobile and stationary phases
 - d) Can determine the retardation factor for separated components.
3. The amount of time taken for a separated analyte to pass through the column to reach the detector:
 - a) Retention time
 - b) Dead time
 - c) Selectivity factor
 - d) Relative time
4. Detectors used in Gas Chromatography GC
 - a) Photoionization detectors
 - b) Refractive index detector
 - c) Electrochemical detectors
 - d) None of the above
5. Factors that influence separation of components in GC
 - a) Carrier gas flow rate
 - b) Column length/column temperature
 - c) Amount of material injected
 - d) All of the above
6. Isocratic elution in HPLC
 - a) Mobile phase composition is varied during the separation process
 - b) Stationary phase and mobile phase compositions are kept constantly during separation process
 - c) Mobile phase composition is kept constant during the separation process
 - d) None of the above
7. All chromatographic techniques are used to separate, identify and quantify separated analytes in a mixture. Is this statement **True or False?**

8. Which of the following best describes packed column in GC?
 - a) Stationary phase is coated in the inner wall of the column
 - b) Mobile phase is coated on the column
 - c) Stationary phase is coated directly in the column
 - d) None of the above
9. Low retention time of separated components in liquid chromatography implies that:
 - a) Components have more affinity to the mobile phase
 - b) Components have more affinity to the stationary phase
 - c) Components interact more with the stationary phase
 - d) All of the above
10. Reverse phase HPLC:
 - a) Stationary phase is polar and mobile phase is nonpolar
 - b) Stationary phase is nonpolar and mobile phase is moderately polar
 - c) Hydrophobic analytes are less retained
 - d) More polar analytes are more retained
11. Common detector(s) used in HPLC
 - a) Refractive index detector
 - b) Flame Ionization Detector
 - c) Ultra Violet-Visible detector
 - d) (a) and (c)
12. The number of peaks in a chromatogram indicates
 - a) How well components in the mixture has been separated
 - b) How efficient the column is
 - c) Number of components in the mixture
 - d) All of the above
13. Which of the following is (are) mobile phases in GC?
 - a) He
 - b) Nitrogen
 - c) Argon
 - d) All of the above
14. Modes of gas inlet in GC:
 - a) Split
 - b) Inject port
 - c) Splitless
 - d) (a) & (c)
15. In liquid chromatography the amount of separated components on a chromatogram can be determined from:
 - a) Retention time
 - b) Peak area
 - c) Peak width
 - d) Base of peak
16. One major distinction between HPLC and GC
 - a) Presence of injection port
 - b) Presence of column
 - c) Presence high pressure pump
 - d) All of the above**