# GAS CHROMATOGRAPHY

Stefania Della Sciucca

# CLIL Module Plan:

| | |
|---|---|
| **School** | ITET Mantegna - Mantova |
| **School year** | 5° |
| **Subject** | Analisi Chimica e Strumentale |
| **Topic** | Gas Chromatography |
| **CLIL Language** | English |
| **Module lenght:** 16 hours | **Unit 1 – 3 hours**<br>Introduction to Gas Chromatography (GC); how GC works; the chromatogram. A brief mention of Gas Chromatography Mass Spectrometry (GC-MS); block diagram of the instrument |
| | **Unit 2 – 5 hours**<br>GC fundamentals: type of columns (packed *vs*. capillary), stationary phase selectivity and mechanism of GC separation |
| | **Unit 3 – 4 hours**<br>Van Deemter equation: Eddy diffusion, longitudinal diffusion mass transfer; the concept of the theoretical plate and the Van Deemter polt |
| | **Unit 4 – 3 hours**<br>Split/Splitless mode and FID |
| | **Unit 5 – 1 hour**<br>Online summative assessment |

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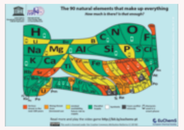


Course Options

- Materials
- Updates
- Gradebook
- Grade Setup
- Badges
- Attendance
- Members

Access Code
2BHN-2W9S-6VZTB
Reset

Chimica Analitica e Strumentale: 5AA

## CLIL - Gas Chromatography

Add Materials

**Gas Chromatography. How GC instrument works. The Chromatogram**
An introductive video from the Royal Society of Chemistry on Gas Chromatography using a flame ionisation detector (FID) with a brief mention of Gas Chromatography Mass Spectrometry (GCMS).
Follow ...
· Due Friday, December 18, 2020 at 8:00 am

**GC BLOCK DIAGRAM**
· Due Tuesday, December 8, 2020 at 11:59 pm

**GC block diagram**
· Due Friday, December 18, 2020 at 8:20 pm

**GC text reconstruction - Homework**
· Due Monday, January 11, 2021 at 10:00 am

**GC text reconstruction - In class activity**
Compare your text with the one given by the teacher. Correct mistakes, add the missing sections and prepare a worksheet with the underlined words and the corresponding meaning.
· Due Monday, January 11, 2021 at 10:45 am

**Key vocabulary**
Post your Key voucabulary list and check.
· Due Friday, January 8, 2021 at 8:00 pm

**Word Puzzle Task**
Form two groups: the Even group and the Odd group (according to our class register).
The Even group will use the Puzzle A and the Odd group the Puzzle B.
In your own group write a definition or

**Fundamentals of GC**

**Objective N°1 and N°2 - Task 1**
Watch the video "Fundamentals of GC" and complete the table attached

**Objective N°1 and N°2 - Task 2**
Check your answers using the file attached and write an assay in which you describe and compare the GC columns.
Upload the assay in the Submission section on the right.

**How separation occurs in GC column**

**Objective N°3 - Cut and past - Task 1**
Watch again the video "Fundamentals of GC" and with EdPuzzle (or any other video editing application, even with your smartphone) cut and past all the sections related to the objectiveN°3: How...

**Objective N°3 - Stationary phase selectivity and mechanism of GC separation - Task 2**

**Objective N°4 - Van Deeemter equation - Visual dictation - Task 1**
Complete in pairs the table accached

**Objective N°4 - Van Deemter equation**

**Spettrometro di massa**

**SPLIT/SPLITLESS MODE AND FID DETECTOR**

**SPLIT/SPLITLESS MODE and FID**

**GC test**
· Due Friday, February 26, 2021 at 11:59 pm

Chimica Analitica e Strumentale: 5AA

CLIL - Gas Chromatography

# Gas Chromatography. How GC instrument works. The Chromatogram

**Due: Friday, December 18, 2020 at 8:00 am**

An introductive video from the Royal Society of Chemistry on Gas Chromatography using a flame ionisation detector (FID) with a brief mention of Gas Chromatography Mass Spectrometry (GCMS).

Follow steps 1 - 4:

1- watch the video once (no more than 10 min) focusing on the words related to the GC instrument sections;

2- complete the quiz;

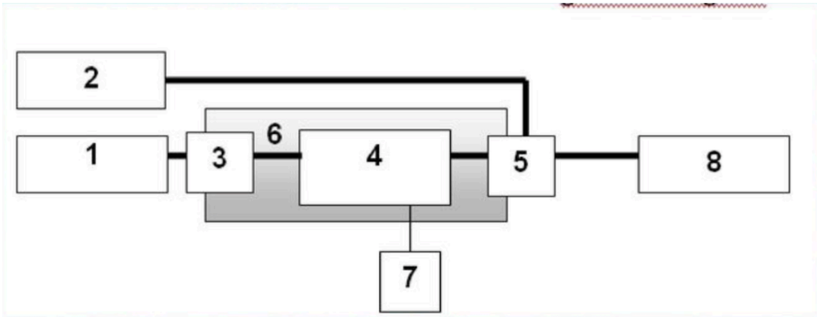
3 - draw a block diagram of a GC and upload it on the Discussion section (no more than 5 min); then add a post to one classmates' block diagram (no more than 5 min);

4 - on your own rewatch the video, take notes, reconstruct the text and upload it on the Assignment section (no more than 25 min).


## GC BLOCK DIAGRAM

· Due Tuesday, December 8, 2020 at 11:59 pm

1 GC BLOCK DIAGRAM




1. _
2. _
3. _
4. _
5. _
6. _
7. _
8. _

**Fill in the Blank** - 8 points

# How separation occurs in GC column

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CLIL - Gas Chromatography

## Fundamentals of GC

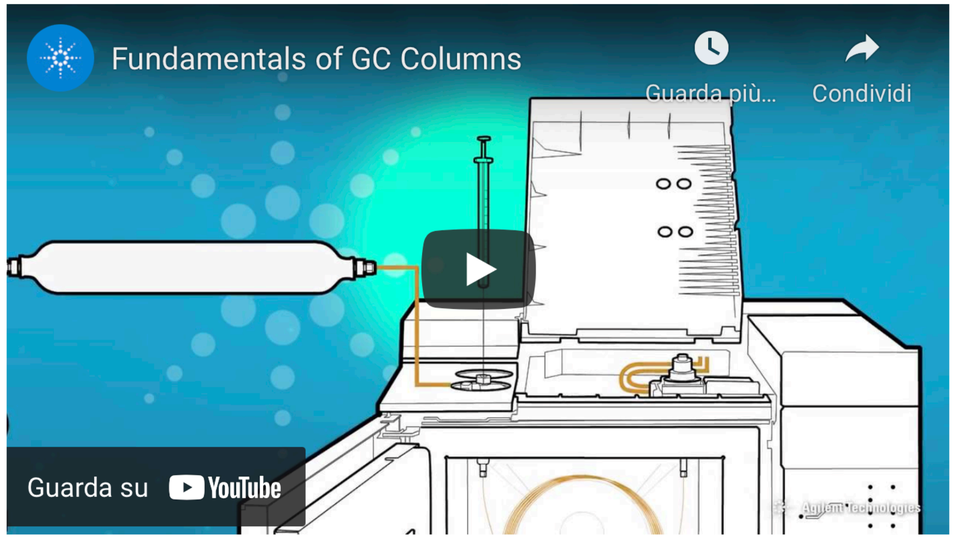
In this video you will expolre the theory of GC columns and the separations. The objectives follow:

1. identify packed vs. capillary column

2. describe the features and differencies of a packed vs. capillary column

3. describe how peaks separation occurs in a GC column

4. apply the concept of the theoretical plate and the Van Deemter polt to the GC method set-up

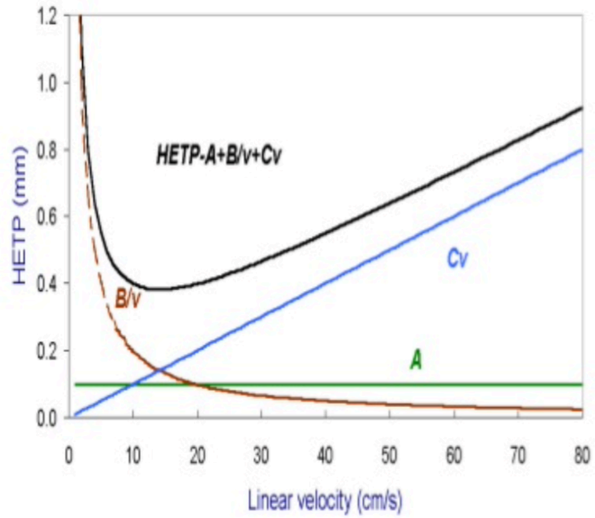



edpuzzle

Students used Edpuzzle
to
cut from Fundamentals
of GC video
the section of interest.

# Visual Dictation:

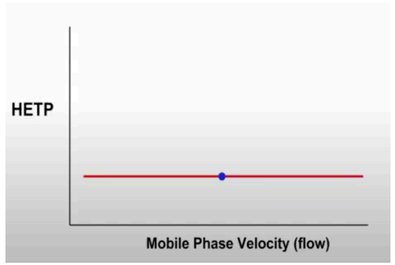
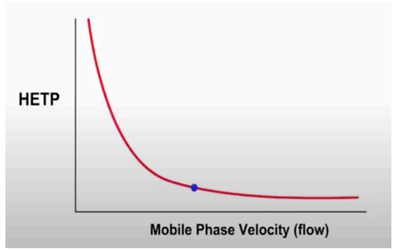
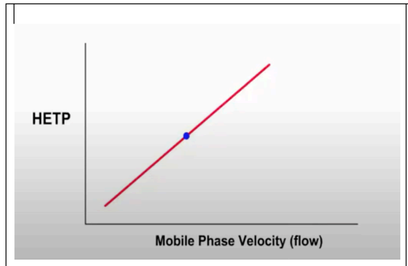
## Van Deemter Plot




- The term 'A' is independent of flow rate of the mobile phase
- The term B/u decreases drastically in the beginning with increase in the flow rate of mobile phase. Increase in the flow rate beyond particular value, leads to slow decrease in the value of B/u.
- The term Cu increases with increse in the flow rate

Posted Thu Dec 31, 2020 at 7:44 pm

- Eddy diffusion term
- Longitudinal diffusion
- Mass transfer
- HETP vs flow velocity - Eddy diffusion
- HETP vs. flow velocity - longitudinal diffusion
- HETP vs. flow velocity - mass transfer

| | Answer the questions |
|---|---|
|  | 1. What is the name of the prossess displaied and which is the corresponding term in Van Deemter equation?<br>2. Give a brief description of the process.<br>3. Does it have any effect in GC separation? In which way? |
|  | 1. What is the name of the prossess displaied which is the corresponding term in Van Deemter equation?<br>2. Give a brief description of the process.<br>3. Does it have any effect in GC separation? In which way? |
|  | 1. What is the name of the prossess displaied and which is the corresponding term in Van Deemter equation?<br>2. Give a brief description of the process.<br>3. Does it have any effect in GC separation? In which way? |
| Plot the overall Van Deemter graph | 1. Write the Van Deemter equation.<br>2. How is the average linear velocity defined?<br>3. Describe the Van Deemter plot and Explain how is it used for? |

# Self assessment test: