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MEMORIA FINAL

Actuaciones Avaladas para la Mejora Docente, Formación del Profesorado y Difusión de Resultados
Modalidad B

Identificación de la actuación	
Código:	AAB_13_009
Título:	Teaching analytical chemistry in English.

Responsable	
Apellidos y nombre:	Rodríguez Dodero, M. Carmen
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Departamento:	Química Analítica

1. Incluya el calendario de actividades realizadas.

De acuerdo a la planificación prevista, el trabajo se organizó en sesiones semanales (tabla adjunta). Dos de ellas de organización, al inicio y al final del curso. 18 clases de 2 horas cada una, 13 de las cuales se basaron en simulaciones de clases sobre temas de Química Analítica, dirigidas en cada sesión por un miembro del equipo de trabajo. Sobre cada temática seleccionada, se trabajaron: vocabulario, pronunciación, recursos didácticos, etc., estando todos ellos recopilados en el espacio que se abrió al efecto en el Campus Virtual de la Universidad (EXT_pcl13486_01 English for Analytical Chemistry, 5ª Edición). Las restantes sesiones se centraron en la práctica de situaciones habituales en la práctica docente, y fueron conducidas por los profesores del curso. Se adjunta una muestra de los materiales generados.

Las actividades no presenciales han incluido la preparación de las sesiones temáticas, así como la realización de las actividades propuestas por los profesores.

SESSION	TOPIC	RESPONSIBLE	FECHA
1	Course organization	Work team	15th February
2	Introduction to CLIL	Teachers	1st March
3	Icebreakers	Teachers	8th March
4	Chocolate tasting	Ángel Olachea	15th March
5	Sampling and sample pretreatments for metal analysis in sediments (I)	Carolina Mendiguchía Martínez	22th March
6	Sulphur dioxide and wine	Remedios Castro Mejías	5th April
7	Collecting environmental samples	José Antonio López López	12th April
8	Extraction techniques for biological compounds in plants	Gerardo Fernández Barbero	19th April

SESSION	TOPIC	RESPONSIBLE	FECHA
9	Anodic Stripping Voltammetry for the analysis of heavy metals in water	Estrella Espada Bellido	26th April
10	Chromatography	Mª Dolores Granados Castro	3rd May
11	Sampling and sample pretreatments for metal analysis in sediments (II)	José Antonio López López	10th May
12	Analysis of heavy metals in environment. Principles of solid phase extraction.	Margarita Díaz de Alba	17th May
13	Chemistry of the astringency	M. Carmen Rodríguez Dodero	24th May
14	Introduction to Green Chemistry	Laura Cubillana Aguilera	31th May
15	Extraction methodologies for the chemical analysis of solid samples	Widiastuti Setyaningsih	7th June
16	Flux Analysis Methods	Mª Victoria Mánuel Delgado	14th June
17	CLIL session	Teachers	21th June
18	CLIL session	Teachers	28th June
19	CLIL session	Teachers	5th July
20	Conclusions	Work team	8th July

2. Indique los participantes que han recibido la formación incluyendo el porcentaje de asistencia de cada uno de ellos a las actividades realizadas.

Uno de los miembros que formaban parte inicialmente del equipo de trabajo solicitó abandonar el proyecto antes de su comienzo, mientras otros dos compañeros del Dpto. se unieron al mismo a tiempo para participar en la totalidad de las actividades. Con estas modificaciones, el grupo estuvo constituido por:

DNI/NIE	APELLIDOS	NOMBRE	% ASISTENCIA
31667557F	Castro Mejías	Remedios	95%
75747304R	Cubillana Aguilera	Laura	90%
48966518R	Díaz de Alba	Margarita	90%
X-8454760-Y	El Moussaoui	Najoua	70%
48900839X	Espada Bellido	Estrella	90%
75789305G	Fernández Barbero	Gerardo	80%
31338470G	Granado Castro	Mª Dolores	90%
48899474W	López López	José Antonio	95%
75889550S	Manuel Delgado	Victoria	95%
34006513R	Mendiguchía Martínez	Carolina	90%
9900371085	Olachea Arce	Ángel	80%
44025860L	Rodríguez Dodero	M. Carmen	80%
Y-1304700-Q	Setyaningsih	Widiastuti	80%

3. Informe sobre el nivel de satisfacción con la actividad y sobre las incidencias que haya podido acontecer en el transcurso de la actuación.

El nivel de satisfacción con el curso se estima muy elevado, a juzgar por la declarada intención de los miembros del equipo de continuar con el trabajo durante el curso 2013-14, siempre que sigamos contando con el apoyo de la Unidad de Innovación.

No queremos dejar pasar la ocasión de confirmar que el trabajo con nuestros profesores del CSLM, Antonio Brenes y Candela Contero ha sido, como siempre, motivador y de gran aplicabilidad, y esperamos poder contar con ellos en el futuro.

VOCABULARY AND PRONUNCIATION

Word	Pronunciation
Agape	/ə'geɪp/
Agate	/' ægeit/
Aiding	/eɪdɪŋ/
Bottom	/'bɒtəm/
Centrifuge	/'sentri fju:dʒ/
Conductive	/kən'dʌktɪv/
Coring	/kɔ:rɪŋ/
Cylinder	/'sɪlɪndəʳ/
Deployment	dɪ'plɔɪmənt/
Disaggregate	/dis'ægrɪgeɪt/
Efficient	ɪ'fɪʃənt/
Exchangeable	/ɪks'tʃeɪndʒəbl/
Fauna	/'fɔ:nə/
Flora	/'flɔ:rə/
Grab	/græb/
Gravel	/'grævəl/
Heat	/hi:t/
Hoist	/hɔɪst/
Homogeneous	/hɒmə'dʒɪ:nɪəs/
Homogenize	/hə'mɒdʒənaɪz/
Jaw	/dʒɔ:/
Layer	/'leɪəʳ/
Localized	/'ləʊkəlaɪzd
Lower	[/ləʊəʳ/
Minimize	/'mɪnɪmaɪz/
Mobilize	/'məʊbɪlaɪz/
Mortar	/'mɔ:təʳ/
Oxidizable	/ɒksɪ'daɪzəbl/
Pestle	/'pesl/
Pressure	/'preʃəʳ/
Process	/'prəʊses/
Readiness	/'redɪnɪs/
Reagent	/ri:'eɪdʒənt/
Reducible	/rɪ'dju:səbl/
Residual	rɪ'zɪdjʊəl/
Sieve	/sɪv/
Surface	/'sɜ:fɪs/
Temperature	/'temprɪtʃəʳ/
Tension	/'tenʃən/
Towards	[tə'wɔ:dz/
Volatile	/'vɒlətaɪl/
Winch	/wɪntʃ/
Wire	/'waɪəʳ/

EXTRACTION TECHNIQUES

VOCABULARY AND PRONUNCIATION

Word	Pronunciation
Aminoacid	/əmi:nəʊ'æsɪd/
Analyte	/'ænəlaɪt/
Analyzer	/'ænəlaɪzəʳ/
Anthocyanin	/ænθɒ'saɪənɪn/
Array	/ə'reɪ/
Blood	/blʌd/
Cancerinogenic	/kɑ:sərɪnə'dʒenɪk/
Capsaicinoids	/kæsə'i:sɪnoɪdz/
Carotenoid	/kə'rɒtənɒɪd/
Cholesterol	/kə'lestərɒl/
Circulation	/sɜ:kjʊ'leɪʃən/
Compound	/'kɒmpaʊnd/
Consumption	/kən'sʌmpʃən/
Correlate	/'kɒrɪleɪt/
Detector	/dɪ'tektəʳ/
Enzymatic	/'enzɪmætik/ - /'enzaɪmætik/
Fluid	/'flʊ:ɪd/
Fluorescence	/flʊə'resns/
Fungal	/'fʌŋgl/
Inflammatory	/ɪn'flæmətri/
Maceration	/'mæsəreɪʃən/
Magnifying	/'mægnɪfajiŋ/
Melatonin	/melə'tɒnɪn/
Microbial	/maɪ'krəʊbɪəl/
Peptide	/'peptaid/
Photodiode	/'fəʊtəʊ 'daɪəʊd/
Polyphenol	/pɒlɪ'fi:nəl/
Pressurized	/'preʃəraɪzd/
Tumoral	/'tjʊ:morəl/ US /'tʊ:morəl/

ANODIC STRIPPING VOLTAMMETRY

VOCABULARY AND PRONUNCIATION

Word	Pronunciation
Absorbance	/əbˈzɔːbəns/
Accurate	/'ækjərɪt/
Adequate	/'ædɪkwɪt/
Analyte	/'ænəlaɪt/
Anodic	/ə'nɒdɪk/
Applicable	/ə'plɪkəbəl/
Auxiliary	/ɔːg'zɪljərɪ/
Bismuth	/ˈbɪzməθ/
Cadmium	/ˈkædmɪəm/
Calomel	/'kæləmel/
Capability	/keɪpə'bɪlɪtɪ/
Cathodic	/kə'ɵɒdɪk/ /kə'ɵəʊdɪk/
Cobalt	/ˈkəʊbɒlt/
Coil	/kɔɪl/
Degas	/'diːgæs/
Deposited	/dɪ'pɒzɪtid/
Determination	/dɪˌtɜːmɪˈneɪʃən/
Digested	/'daɪdʒestid/
Electrolyte	/ɪˈlektrəʊˌlaɪt/
Excess	/ɪk'ses/
Excitation	/ɪkˈsaɪteɪʃən/
Fundament	/'fʌndəment/
Linear	/'lɪnɪəʳ/
Maintenance	/ˈmeɪntɪnəns/
Persistence	/pə'sɪstəns/
Platinum	/ˈplætɪnəm/
Report	/rɪˈpɔːt/
Selenium	/sɪˈliːnɪəm/
Speciation	/'spɪːʃieiʃən/
Stirrer	/stɜːrə/
Stripping	/stripɪŋ/
Threat	/ɵret/
Varied	/ˈvɛərɪd/
Voltammetry	/vəʊl'tæmetri/
Voltammogram	/vəʊl'tæmɒgrəm/

SULPHUR DIOXIDE AND WINE

VOCABULARY AND PRONUNCIATION

Word	Pronunciation
Acetaldehyde	/’æsitəldi’haid
Anthocyanin	/’ænθɒ’saɪənin/
Antimicrobial	/ ‘æntimaɪ’krəʊbɪəl/
Antioxidasic	/ ‘æntiəʊksidazik/
Aqueous	/'eɪkwɪəs/
Artificial	/ɑ:tɪ'fɪʃəl/
Bacteria	/bæk'tɪərɪə/
Bind	/baɪnd/
Bond	/bɒnd/
Bound	/baʊnd/
Brettanomyces	/bretənɒ'maiziz/
Carbonyl	/’kɑ:bənil/
Chlorine	/'klɔ:rɪ:n/
Delicate	/’delɪkɪt/
Dicarbonate	/daɪ'kɑ:bənɪt/
Dimethyl	/dai’meθɪl/
Dioxide	/daɪ’ɒksaɪd/
Disinfectant	/dɪsɪn’fektənt/
Dissociation	/dɪ'səʊsɪeɪʃən/
Fumigant	/’fju:mɪgənt/
Fungus	/'fʌŋgəs/
Histamine	/’hist əmin/
Hydrogensulphite	/’haidrɒdʒən’sʌlfaɪt /
Illegal	/ɪ’li:gəl/
Ionic	/aɪ’ɒnɪk/
Strength	/streŋθ/
Ketoglutaric	/’kitəglu’t ærik/
Lysozyme	/’lais əʊ'zaim/
Microorganism	/maɪkrəʊ’ɔ:gənɪzəm/
Molecular	/məʊ'lekjʊlə^{r}/
Natural	/'nætʃərəl/
Petroleum	/pɪ’trəʊlɪəm/
Polyphenoloxidases	/pɒlifi:nəl’ ɒksideisiz/
Preservative	/prɪ’zʒ:vətɪv/
Pungent	/’pʌndʒənt/
Pyruvic	/’pairuvik/
Substance	/’sʌbstəns/
Sulphate	/’sʌlfeɪt/
Sulphite	/’sʌlfaɪt/

HANDOUT 9 – PART 1:

The University of Oxford

Christopher Francis Patten is the chancellor of the university of Oxford. The chancellor in Oxford, **who** is elected for life, is the chief officer of a collegiate body. In other Universities such as Cambridge, The Chancellor is appointed for a term of five years, **which** is renewable.

The Chancellor, **whose** duties are:

- Ceremonial - at graduations, receptions etc.
- Pastoral - an interest in students and staff.
- Scholarly - a commitment to the world of learning, teaching and 'culture'.

The Chancellor is the ambassador of the University around the world

PROCEDURE:

1. Introducing the topic
2. Playing a Game: "Describe it"
3. Reading and grammar: Relative pronouns
4. Debating: Good jobs at the university
5. Role plays: Sorry I don't understand
6. Listening: An Erasmus student at the airport
7. Phrasal verbs
8. Pronunciation: intonation practice

GIVING DEFINITIONS

Describe the items on the screen, using relative pronouns, to help your colleague guess the item.

GRAMMAR
RELATIVE PRONOUNS

Complete the informal description of the Vice-chancellor of Oxford using relative pronouns.

Andrew Hamilton is the Vice-chancellor of the University of Oxford. He comes from a humble family. He has two older brothers, neither of ..... went to the university.
Andrew Hamilton, ... mother is Indonesian, has gone back to live in Jakarta. For this reason, she sold the family home in England, ... his family had lived for over 20 years.

DEBATING

Do you think working in the university as a chancellor is a good job? Let's talk about more jobs and compare them. What qualities should people have to work as a...?

Jobs	Qualities	why?
Chancellor	confident	
Professor	patient	
Politician	persuasive	
Lecturer	understanding	
Primary teacher	polite	
Secondary teacher	helpful	
Secretary	organised	
Caretaker	political	
Administrative		

Is it....?
Exciting
Rewarding
Demanding
Well paid
Boring
Tiring
Depressing
Stressful

ROLE-PLAY (1)

1. **Student A:** There are some Erasmus students who normally attend you classes. You want to know how they are getting on, why they chose Cadiz, what they think about our classes, our culture, our food. You know their Spanish level is low, so decide to invite them to a meeting with you in English.

   Students B & C: You are Erasmus students, and your level of Spanish is quite low. Your tutor, who speaks English, has asked to have an informal meeting with you. You see this as a good opportunity to clear up some doubts you have about classes, courses, places, people...

ROLE-PLAY (2)

2. **Student A:** You are a new professor in Scotland and you don't speak English fluently. You have read some important letters but there are some words you can't understand. Ask one of your colleagues for help.

   Student B: A new teacher (Spanish) has started to work in your faculty. He seems to be a little lost. Give him/her a hand.

   Words you don't understand:

   Scholarship / students' loan / mentor / court (sport) / brand / foreign / citizen

LISTENING

An Erasmus student traveling around the world.

1. Where (city) is Eric at the moment?
2. Where is he going??
3. Why is he at the airport yet?
4. What does he know about the flight?
5. Does Paula give him any piece of advi

PHRASAL VERBS

Sorry I have chosen the wrong preposition! Can you help me?

1. Can I borrow you dictionary to look after the meaning of this word?
2. He usually looks for (read quickly) the newspaper while he is having breakfast.
3. The police are looking up the crime (investigate)
4. John is looking for his neighbour's cat: He feeds the cat, washes him...
5. I can't find my wallet. Can you help me to look forward to it?
6. James Parker was brought down by his grandparents (raised)
7. My computer broke into yesterday while I was submitting my project.
8. I am trying to bring my classmates under to my point of view.
9. Thieves broke up Natlay's Bank yesterday
10. I don't earn enough money. I can't get over on the money I earn. I need an extra job.
11. Please, Let's stop speaking and get up with the homework, we have to give it to the teacher tomorrow.
12. My sister is ill and she doesn't seem to be getting away. I am very worried.

PRONUNCIATION

Phone call: Reservations

Reservations clerk: — Northwind Airways, good morning. May I help you?

Mary Jones: — Yes, do you have any flights to Sydney next Tuesday afternoon?

Reservations clerk: — One moment, please... Yes. There´s a flight at 16:45 and one at 18:00.

Mary Jones: — That´s fine. Could you tell me how much a return flight costs? I´ll be staying three weeks.

Reservations clerk: — Economy, business class or first class ticket?

Mary Jones: — Economy, please.

Reservations clerk: — That would be €346.

Mary Jones: — OK. Could I make a reservation?

Reservations clerk: — Certainly. Which flight would you like?

Mary Jones: — The 16:45, please.

Reservations clerk: — Could I have your name, please?

Mary Jones: — My name is Mary Jones, that´s M-A-R-Y J-O-N-E-S.

Reservations clerk: — How would you like to pay, Ms. Jones?

Mary Jones: — Can I pay at the check-in desk when I pick up my ticket?

Reservations clerk: — Yes, but you will have to confirm this reservation at least two hours before departure time.

Mary Jones: — I see.

Reservations clerk: — Now you have been booked, Ms. Jones. The flight leaves at 16:45, and your arrival in Sydney will be at 9:25 a.m., local time. The flight number is NWA 476.

Mary Jones: — Thank you.

HANDOUT 8 – PART 1:
SUGGESTING

University of Manchester Staff Life

The Staff Life section aims to bring together a range of activities that may interest you outside of your working life. We've got information on Health and Fitness courses (in your lunch hour or out of hours), clubs and societies (both work and non-work related) and all you need to know about what we're doing to keep the University green.

University of Manchester Staff Association

Relax at lunchtime in the Staff House lounge, enjoy tasty treats, the daily papers or take advantage of the Games Room for pool or darts. There's much more on offer, including discounts off organised trips to the theatre.

MANCHESTER 1824

PROCEDURE:

1. Introducing the topic
2. Quiz: Are you stressed out
3. Useful phrases: Suggesting- Accepting/Refusing
4. Role plays: Suggesting practical solutions
5. Listening: Sunday
6. Grammar: Expressing Likes and Preference
7. Writing: An essay
8. Pronunciation: the - /θ/ / thing - /ð/

READING: WORK LIFE BALANCE & QUIZ

Everyone faces the issue of time management at one point or another, but as more and more people deal with demanding careers, fighting long commutes, managing a household, attending school or other training, raising one or more children, responding to increasing work and time pressures of the shrinking workplace, and dealing with aging parents, the days often seem to last long into the night and vacation and leisure time seem to be consumed with issues other than relaxation and personal fulfilment.

In fact, a recent study of more than 50,000 employees from a variety of manufacturing and service organizations found that two out of every five employees are dissatisfied with the balance between their work and their personal lives. The lack of balance "is due to long work hours, changing demographics, more time in the car, the deterioration of boundaries between work and home, and increased work pressure," says the study's author, Bruce Katcher, president of the Discovery Group, a management consulting firm.

How much is work invading your personal life, and how much of your personal life is affected by the stress of trying to balance all the many responsibilities in your life?

Take our Work/Life Balance Quiz and see for yourself.

Directions: Answer true or false to each statement below.

I find myself spending more and more time on work-related projects. □**True** /□**False**

I often feel I don't have any time for myself -- or for my family and friends. □**True** /□**False**

1.
No matter what I do, it seems that often every minute of every day is always scheduled for something.
□**True** /□**False**

2.
Sometimes I feel as though I've lost sight of who I am and why I chose this job/career. □**True** /□**False**

I can't remember the last time I was able to find the time to take a day off to do something fun -- something just for me. □**True** /□**False**

3.
I feel stressed out most of the time. □**True** /□**False**

4. I can't even remember the last time I used all my
5. allotted vacation and personal days. □**True** / □**False**

6.
It sometimes feels as though I never even have chance to catch my breath before I have to move on to the next project/crisis. □**True**□/ **False**

I can't remember the last time I read -- and finished -- a book that I was reading purely for pleasure. □**True** /□**False**

I wish I had more time for some outside interests and hobbies, but I simply don't. □**True** /□**False**

I often feel exhausted -- even early in the week. □
True /□False

7.
I can't remember the last time I went to the movies or visited a museum or attended some other cultural event. **True /□False**

8.
I almost always bring work home with me. □**True /□False**

Scoring system: Count up the number of ´True´ answers you have circled.

If your score is between 0 and 4, chances are you are non-productive or your life lacks stimulation.

A score between 5 and 7 designates a good balance in your ability to handle and control stress.

If you tallied up a score ranging between 8 and 10, your stress level is marginal and you are bordering on being excessively tense.

If your total number of points exceeds 10, you may be a candidate for heart disease.

SPEAKING: SUGGESTING HOW TO PUT SOME IDEA INTO PRACTICE

You have received some advice from the university staff counselling service about how to have a better work / life balance. The problem is you don´t really know how to put the advice into practice. So you decide to ask some of your work-mates to help you come up with practical ideas related to the advice. Below is the advice. Work in groups to come up with practical advice on the original advice.

Create variety: do old things in new ways. ☐

Make your work/study area more stimulating ☐

Learn to be detached from problems. ☐

Ask others for positive feedback. ☐

Spend time doing active family activities. ☐

Suggesting some practical solutions

- How about (ing)…?
- Would you be up for (ing)?
- What about …(ing)?
- You could (inf)
- You could try (ing)
- Why don't you (inf)?

Accepting/Refusing the advice

- I'd love to.
- It's a good idea.
- It sounds great.
- I'm afraid I can't do that, because…
- It´s good advice, but I don't particularly like …
- I'd really rather not…
- Thank you, but I don´t know that that will work.

ROLE PLAYS – Let´s act it out!

Lets act it out!

LISTENING

http://www.elllo.org/english/0251/296-Adrienne-Sunday.htm
Listen to Adrianne telling Todd what she likes to do on a Sunday morning.

1) What does she like doing?

a) Getting up early
b) Sleeping in late
c) Neither

2) What does Todd like to do?

a) Get up early
b) Get up early
c) Neither

3) What does she put in her omelets?

a) Mushrooms
b) Cheese
c) Both

4) Where was she last Sunday?

a) Minneapolis
b) Chicago
c) Houston

5) How did she try to do on the plane?

a) Work
b) Study
c) Sleep

GRAMMAR: EXPRESSING LIKES & DISLIKES

How do you express likes & dislikes in English. Have a look at the following table…

LIKE			
I Love	I Like	I enjoy	I adore
I am keen on	I am mad about	I am crazy about	I am interested in

NEUTRAL		
I don´t mind	I can take or leave…	

DON´T LIKE		
I dislike I prefer	I avoid	I hate I can´t stand

All of the above are followed by VERB in ING form:

- I am keen on playing tennis
- I can take or leave visiting museums
- I love doing curves on my motorbike
- I enjoy doing absolutely nothing.

Note though that like and love can be followed by TO + INFINITIVE

- I like to sleep all morning
- I love to get up early and go for a jog along the beach

What do you like to do on a Sunday afternoon?

WRITING

Write an essay on what you like to do on holiday.

PRONUNCIATION

Listen and put the words into the correct columns:

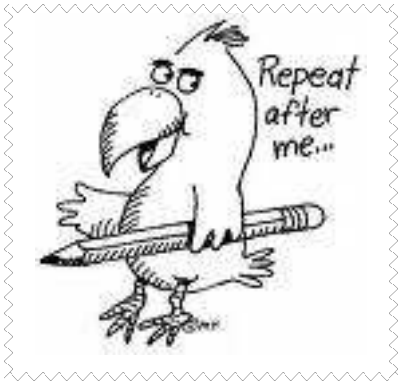
Thing	the	three
these	that	them
this	think	thanks
Therefore	thirty	thief

ð	θ
the	thing

Listen and repeat:

1. **Therefore, I think it´s over there.**
2. **This is just the thing I need!**
3. **Put them over there with that one.**
4. **I´d like these three things thanks.**
5. **The theme of his theory was very thoughtful.**
6. **I think that the thief was thirty.**

Are we ready for a pronunciation competition?



Activities for a CLIL Lesson of Analytical Chemistry

1. Multiple choice game as a pre-task for refreshing vocabulary learnt during previous lessons. During this activity, students also have the chance of practicing the passive and active voice.
2. Join an analytical technique with its characteristics using arrows. This activity can be carried out once the definition of the technique has been given to students.
3. Make students creating the definition of a concept from the description of a picture. This way, students have to make use of adjectives and structures to give their opinion. Some of these structures and also structures for other purposes can be found in http://www.ecenglish.com/learnenglish/lessons .
4. Filling the gaps of a definition or a procedure description with keywords that allow giving sense to the definition. Using this activity students practice comprehensive reading and must understand the meaning of the definition.
5. After explaining a concept, different fragments of a definition are given without ordering. The task of students is putting the fragments in order to create the conclusion.
6. The class is separated in groups and one student of each group takes a card with a concept. This student has to give the definition of the concept and the rest of students in the group have to discover the concept.
7. At the end of the lesson, students can watch a video showing the procedure of an analytical technique, and after watching it they have to summarize the key points of the procedure showed on the video.
8. For practice listening, students can listen an audio clip explaining a definition by a native English speaker, and at the end of it they have to identify what is the concept defined in the audio clip.

FINAL TASK

ENGLISH FOR ANALYTICAL CHEMISTRY (5ª EDITION)

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TEN (10) LINKS AS THE RESOURCES TO PREPARE MY CLIL CLASS

1. A number of PowerPoint presentations, at foundation and extension levels, provide an overview of the stages in food product development. http://www.foodafactoflife.org.uk/Sheet.aspx?siteId=19&sectionId=109&contentId=566

2. Useful information about starch to read by student http://www.food-info.net/uk/carbs/starch.htm

3. A multilingual Food Dictionary http://www.fooddictionary.eu/Default.aspx?lang=es

4. Online crossword puzzle maker http://www.puzzle-maker.com/CW/

5. For a brief discussion of Ethical Food Choices (theme: because your food choises can change the world) http://www.foodispower.org/ethical-food-choices/

TEN (10) LINKS AS THE RESOURCES TO PREPARE MY CLIL CLASS

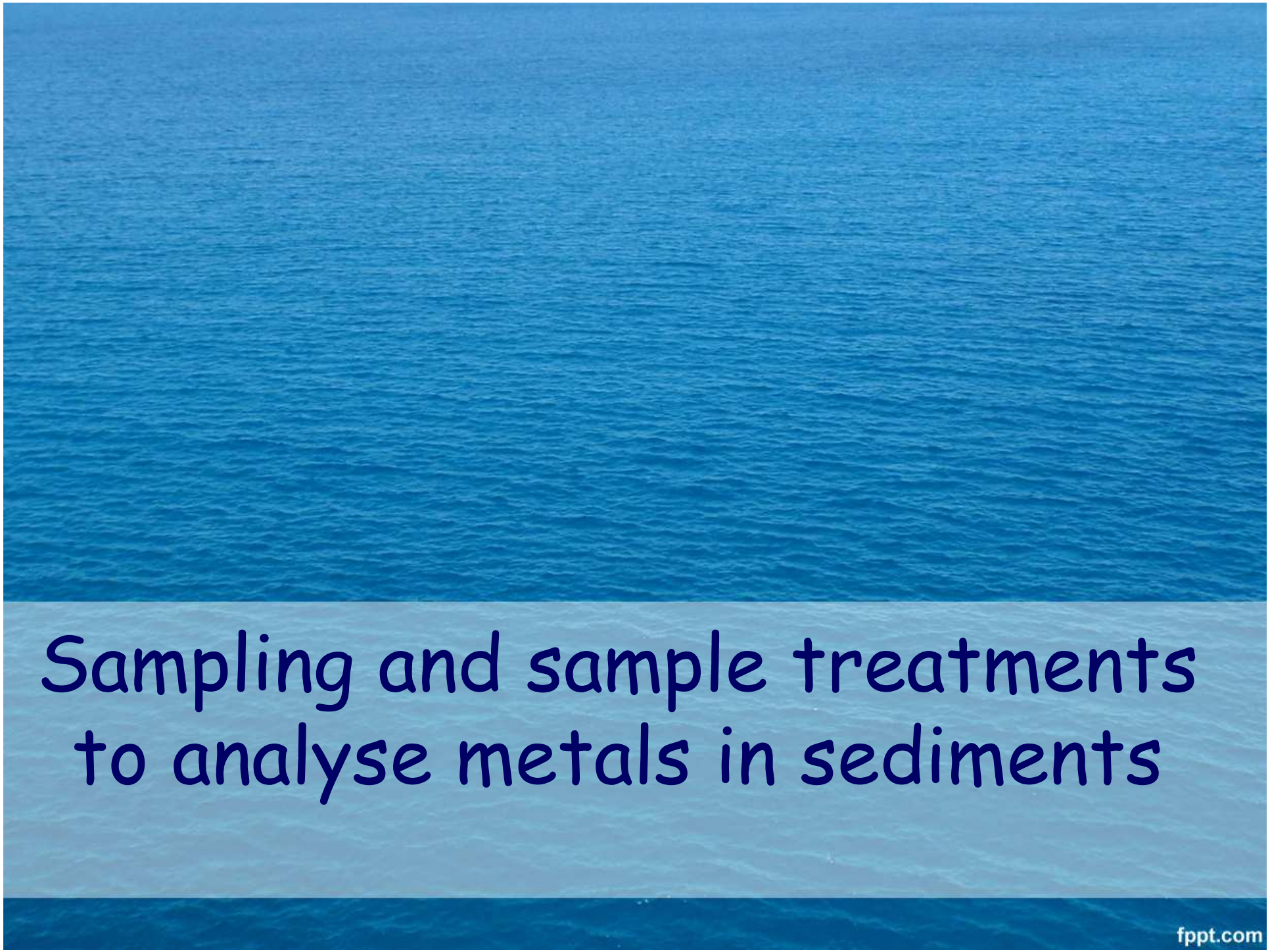
6. Video of History, Structure, and Ethics of Fast Food Industry
   http://www.youtube.com/watch?v=8k2I23pVMig

7. Video of How To Develop Healthy Eating Habits
   http://www.youtube.com/watch?v=WSWPgFkUUeU

8. Online tool to build anagrams
   http://wordsmith.org/anagram/

9. Resources for teachers, parents and students .
   http://www.discoveryeducation.com/

10. Reference for Testing Foods for Starch
    http://www.foodafactoflife.org.uk/attachments/92592385-dfb2-4ad6d61cf053.pdf


Sampling and sample treatments
to analyse metals in sediments
fppt.com

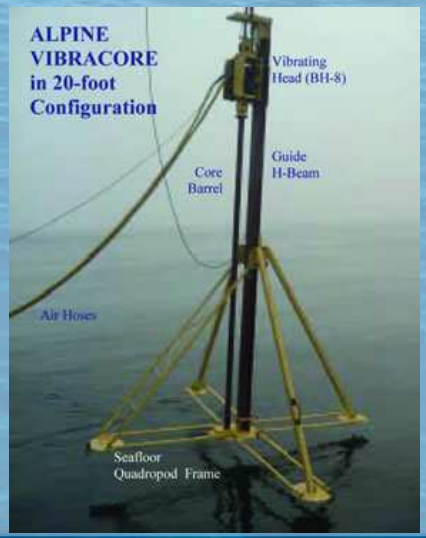
Sampling techniques

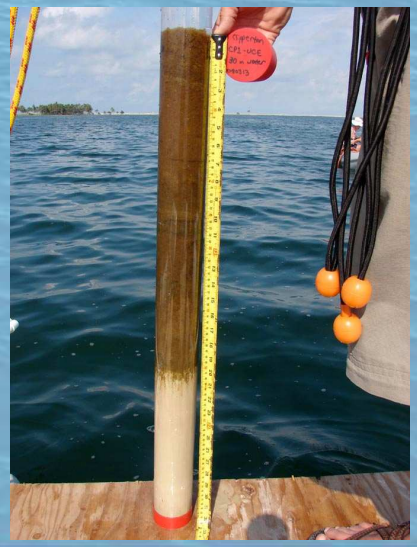
Collecting sediments

GRAB SAMPLING
collects surface and near surface sediments

CORING
collects a column of the subsurface sediment

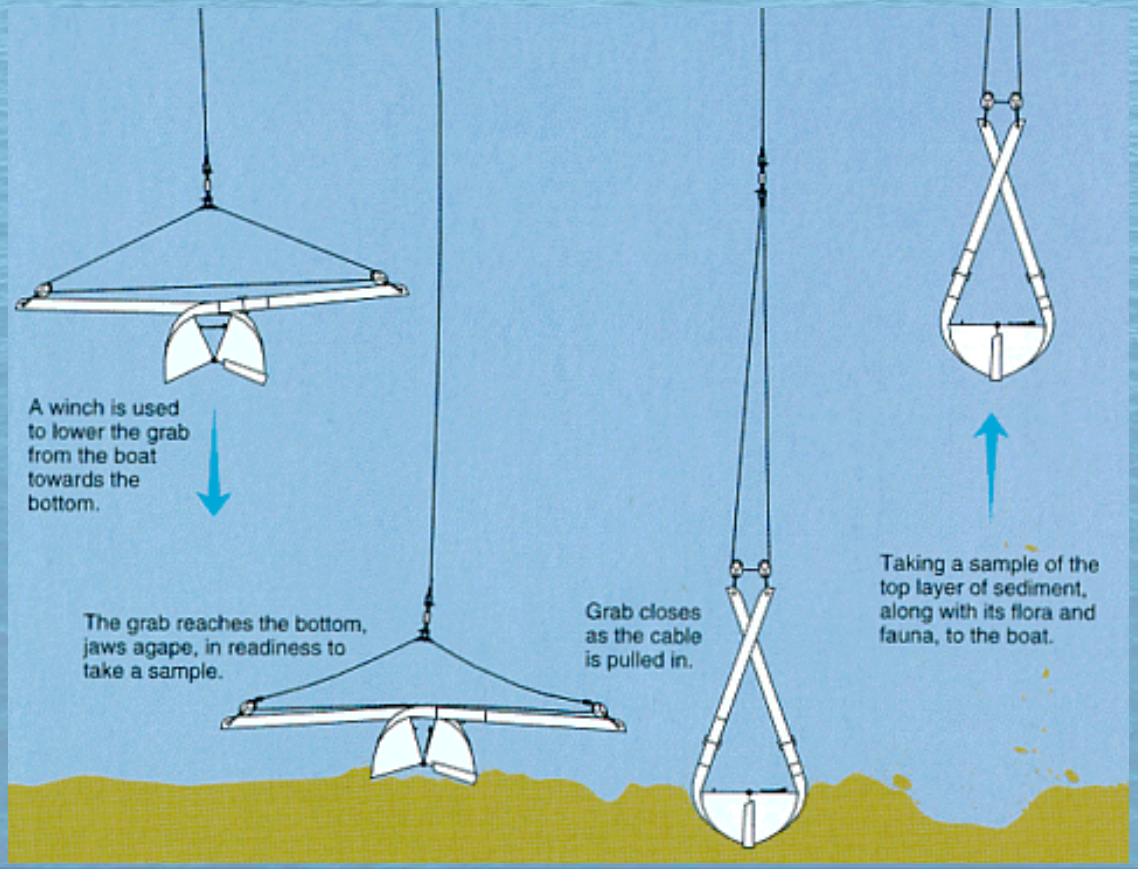
VAN VEEN GRAB





Sampling techniques

GRAB SAMPLING



Sampling Technique:

-Prior to deployment, the grab is cocked with the safety key in place.

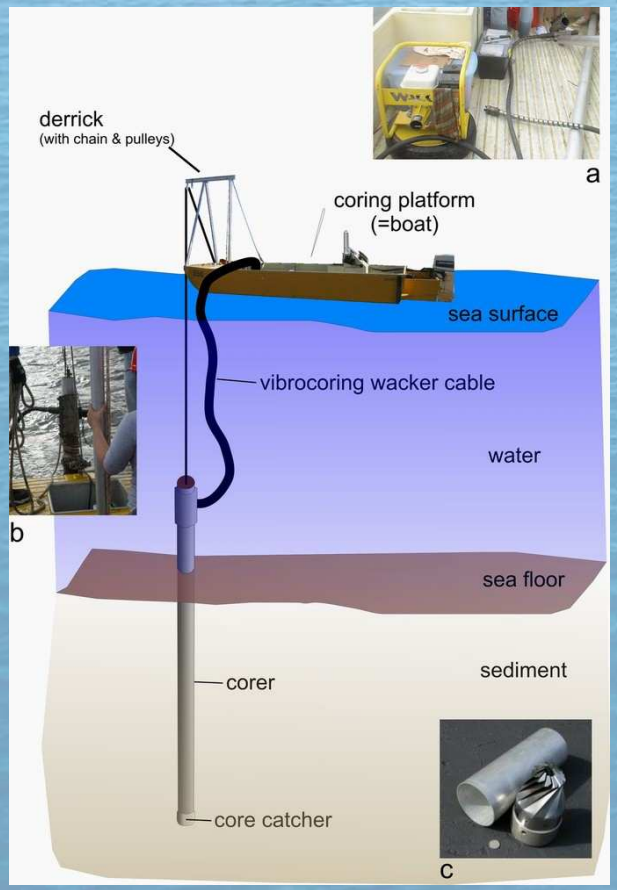
- The grab is then hoisted over the side, the safety key is removed, and the grab is lowered

-After bottom contact has been made (indicated by slack in the lowering wire), the tension on the wire is slowly increased, causing the lever arms to close the grab.

- Once the grab is back on board, the top doors are opened for inspection

Sampling techniques

CORING

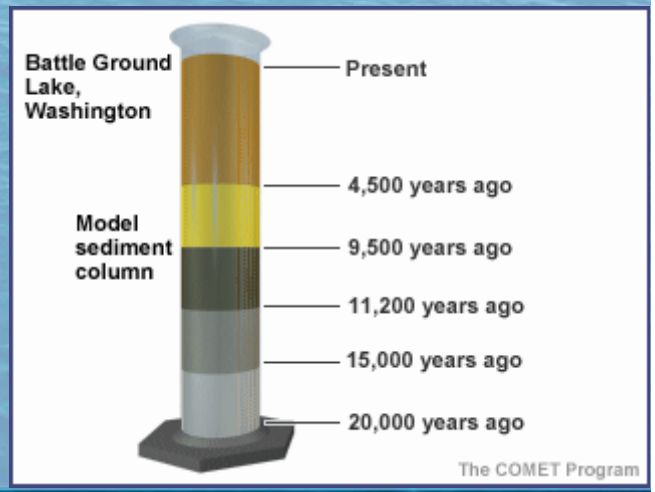


Sampling Technique:

-Core tube is driven into the sediment by the force of gravity, enhanced by vibration energy.

- Vibrations cause a thin layer near the inner and outer tube walls to mobilize, reducing friction and aiding in penetration

- Useful for deeper cores (>1m) OR where sediment consists of very compacted or large grain material (e.g. gravel)



Sampling techniques

Can you think in other alternatives to take sediments samples?

https://www.youtube.com/watch?v=zZShHdwyzqo

https://www.youtube.com/watch?v=QQ95rRh80ZA

Sample pretreatment

In your opinion, which is the order to perform these steps?
Are other alternatives posible?

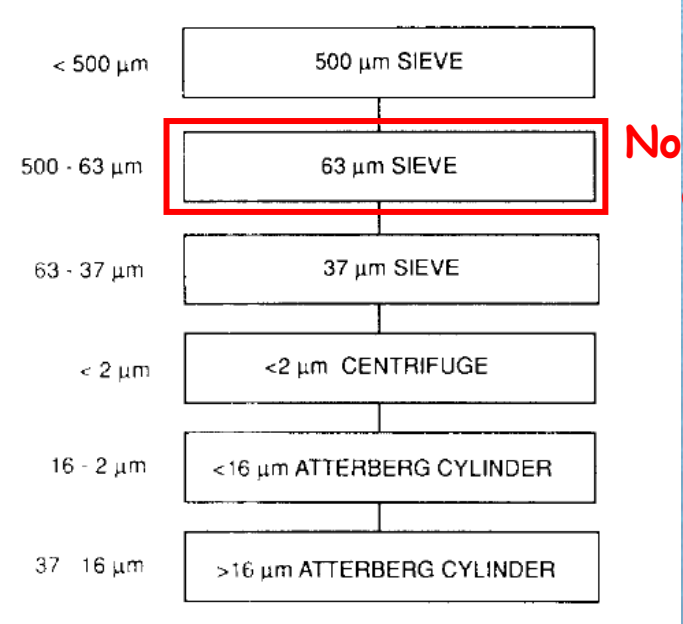
Drying sediments

Grind sediments

Grain size separation

Grain size separation

General scheme



Normalize data

Usually, metals are associated to the fine fraction

< 63 µm

Manual

Mechanical

Wet

Dry

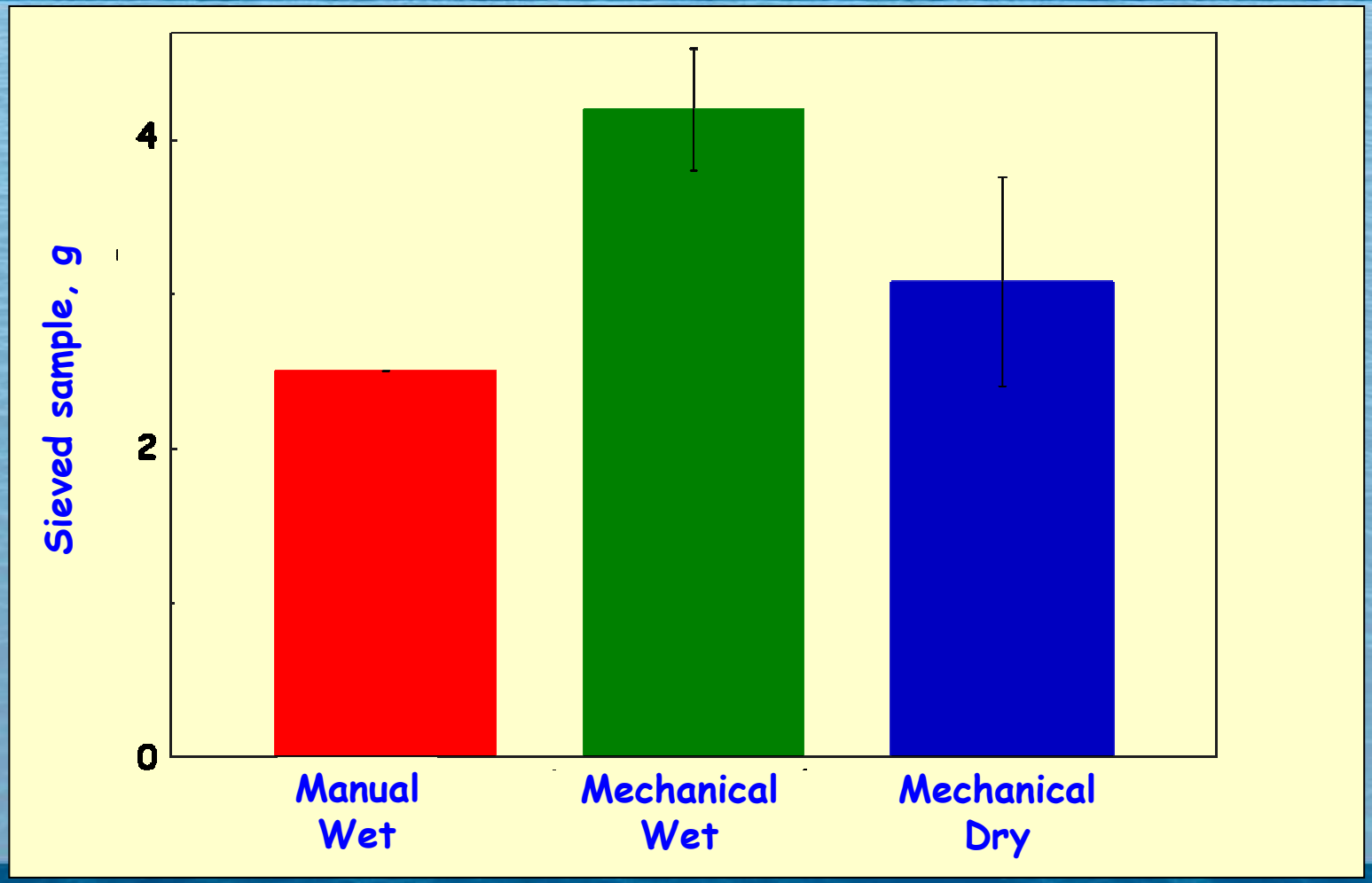
Grain size separation

Discuss the advantage and drawbacks of each sieving procedure.

- Time
- Cost
- Qualified staff
- Effort
- Efficiency

Which one gives the best results?

Grain size separation



Drying sediments

- ✓ Selection of temperature and drying time
  - Most usual: 105 °C until constant weight

Loss of volatile elements

As (70 °C) Hg (40 °C) → Reduce drying temperature

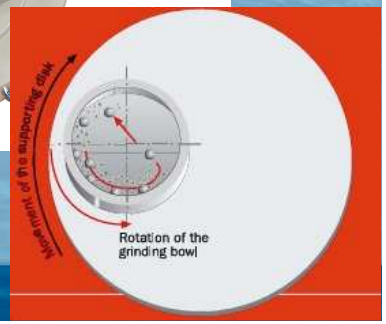
- ✓ Drying process form agregates → Grind sediments

Grind sediments

- Disagregate and homogenize dried sediments
- Increase contact surface for digestion process

Manual grind
Agate morter and pestle

Mechanical grind
Ball mill

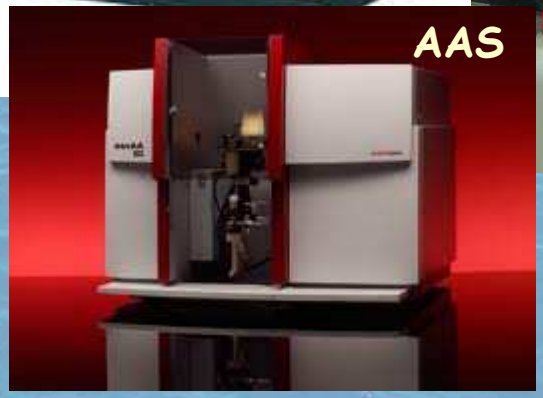


Instrumental techniques

Do you know the advantages of each one?

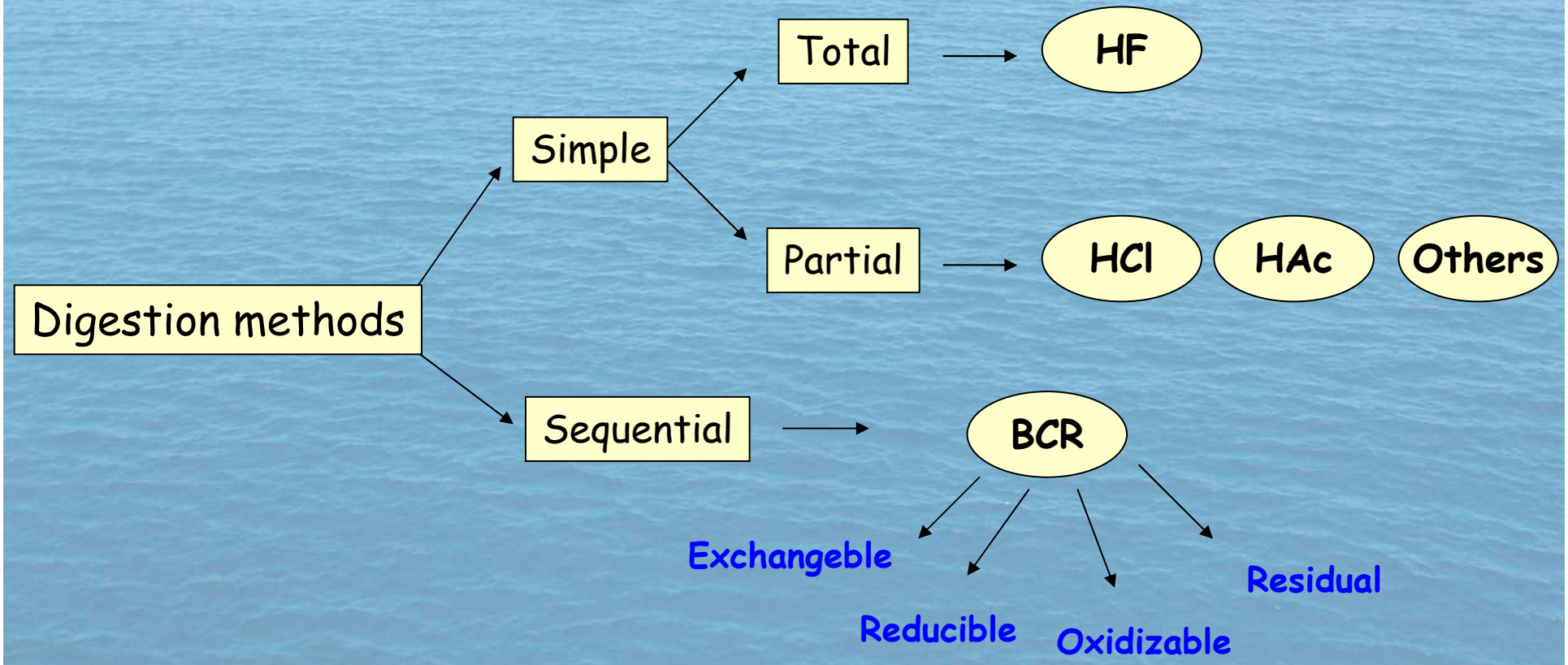
XRF

ICP-MS



Need a previos dissolution step

Digestion procedures



Digestion procedures

Open vessels

- ✓One of the oldest technique
- ✓Very inexpensive
- ✓Limited by a low maximum digestion temperature
- ✓Risk of contamination
- ✓Large amount of reagents
- ✓Loss of trace elements

Digestion procedures

Closed systems

- ✓Minimize contamination
- ✓Elevated temperature and pressure
- ✓More efficient than open systems
- ✓The loss of volatile elements is avoided

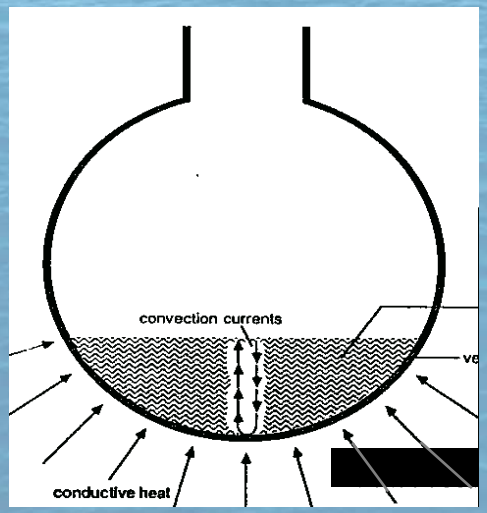
Low pressure digestion
<20 bar
Tª limited to 180 °C

High-pressure digestion
> 70 bar
Tª higher than 300 °C

Digestion procedures

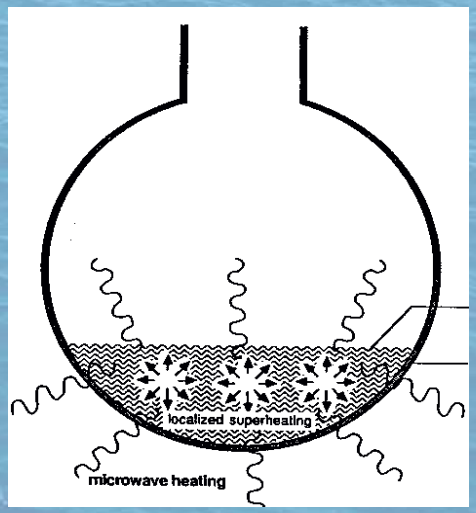
Conventional heating

- ✓High digestion times
- ✓Heating not homogeneous



Microwave heating

- ✓ Reduce digestion time
- ✓ Heating more homogeneous



English for Analytical Chemistry

Anodic Stripping Voltammetry for the analysis of heavy metals in water

By: Estrella Espada Bellido
May 2013

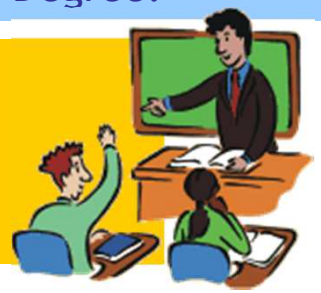
ORGANIZATION OF THE SUBJECT

Target audience:

- ✓ Students from 2nd year of Environmental Sciences.
- ✓ Students from 5th year of Environmental Sciences and Marine Sciences Degree.

Pre-task

- ✓ Attending the theoretical lessons of the subject.
- ✓ Reading scientific papers related to the topic.
- ✓ Homework and activities in class.



Tasks during the lesson

- ✓ Introducing and refreshing essential vocabulary.
- ✓ Previous activities to learn and assimilate concepts.
- ✓ Theoretical fundaments of Stripping Voltammetry.
- ✓ Interactice lab session using a computer.

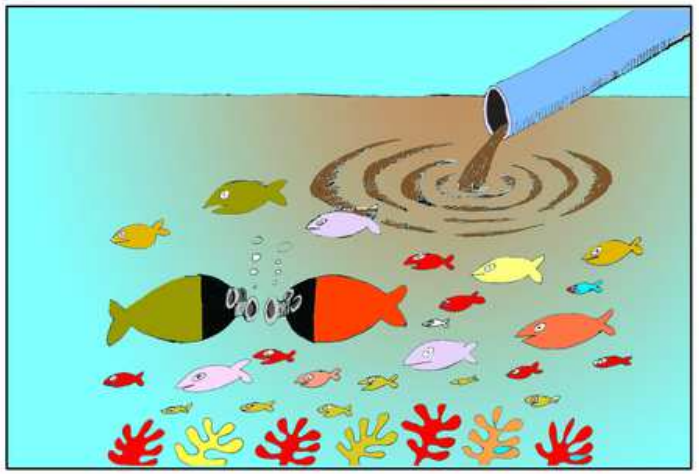
Post-task

- ✓ Lab session.
- ✓ Laboratory report.
- ✓ Questions about Anodic Stripping Voltammetry fundaments.

OBJECTIVES

- ✓ To refresh concepts related to Heavy metals and Voltammetry.
- ✓ To learn about the theoretical fundaments of the analytical technique: Anodic Stripping Voltammetry.
- ✓ To carry out the virtual practical session correlating with the theoretical concepts learned in class.
- ✓ To facilitate students the comprehension of the practical session.

FILLING THE GAPS



Concentrations

Cadmium

Toxic

environment

Copper

risk

Persistence

Metals

Heavy ..... are regarded as a very serious threat because of their ..... and harmful effects. Due to their toxicity, even at low ....., lead, ..., arsenic, mercury, aluminium or chromium are key elements, while metals such as ....., nickel, selenium, cobalt, bismuth or zinc in trace amounts, are essential to all organisms, to accomplish specific catalytic functions. However, the same metal becomes ..... when it is released into the ..... in sufficient quantities to constitute a ..... to human health.

FILLING THE GAPS

trace

sensitive

monitored

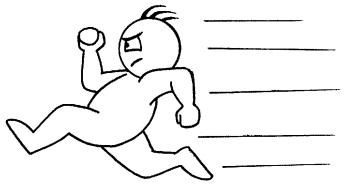
enrichment

legislación

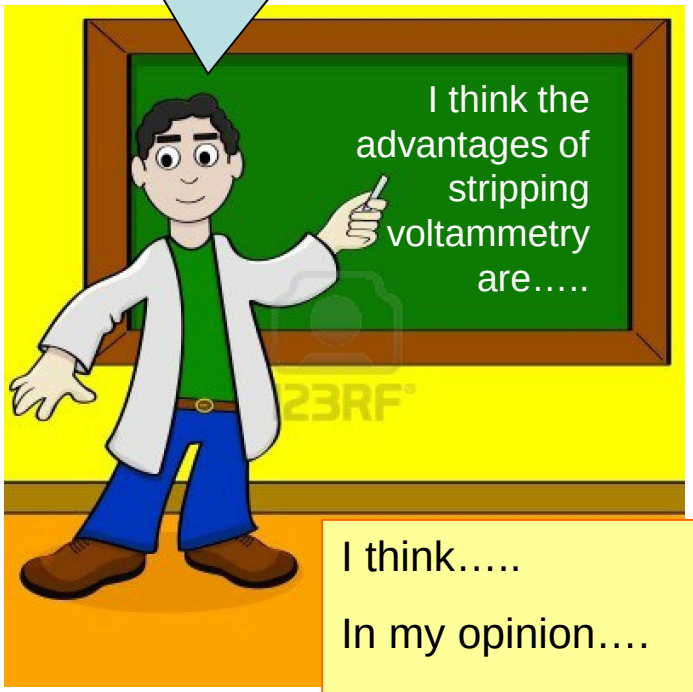
stripping

accurate

For this reason, sites contaminated with heavy metals must be ..... regularly.
Because of national, European and international ..... are reducing the allowable concentration of metals in the environment up to ..... levels, ... measurements of these elements represent an important task of modern analytical chemistry.
Electrochemical ..... analysis is one of the most powerful analytical methods and is certainly the most ..... electrochemical analytical method for the determination of heavy metals. This high detection capability is achieved by the use of an ..... step before the electrochemical determination itself.



Could you explain some of the advantages of Stripping Voltammetry?



- ✓ Low costs of instrumentation and maintenance
- ✓ Low detection limits and good selectivity
- ✓ Small equipment, portable, adequate for on-site analysis
- ✓ Simple and fast
- ✓ Distinguishes between oxidation states (speciation)
- ✓ Applicable to seawater samples
- ✓ A wide linear range of application
- ✓ Determination of multielement analysis

I think…..

In my opinion….

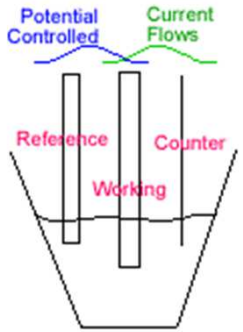
In my view….

As far as I am concerned….

From my point of view….

GIVING ADVANTAGES

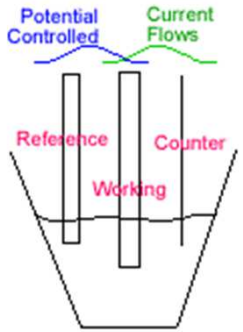
MATCHING



✹ **The voltammetric cell is made up of three electrodes immersed in a solution containing the analyte of interest and also an excess of a nonreactive electrolyte called a supporting electrolyte. Besides, there is a stirrer and a nitrogen bubbling tube in the voltammetric cell.**

Working electrode	whose potential is varied linearly with time
Stirrer	For removing oxygen of the voltammetric cell
Reference electrode	(which is often a coil of platinum wire) that conducts electricity from the signal source through the solution to the working electrode.
Auxiliary electrode	To facilitate the deposition step
Nitrogen bubbling tube	(commonly a saturated calomel or a silver-silver chloride electrode) whose potential remains constant throughout the experiment.

MATCHING



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Working electrode → whose potential is varied linearly with time

Stirrer → To facilitate the deposition step

Reference electrode → (commonly a saturated calomel or a silver-silver chloride electrode) whose potential remains constant throughout the experiment.

Auxiliary electrode → (which is often a coil of platinum wire) that conducts electricity from the signal source through the solution to the working electrode.

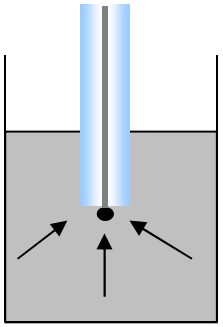
Nitrogen bubbling tube → For removing oxygen of the voltammetric cell

FINDING THE MISTAKES

STRIPPING STEP

The analyte is first deposited on a working electrode.

- From a non-stirred solution



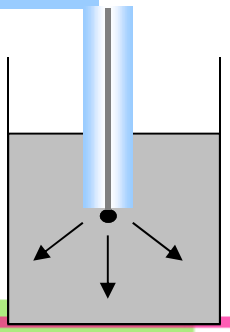
- A preconcentration is produced

The analysis in stripping voltammetry requires two steps:

PRECONCENTRATION O DEPOSITION STEP

The analyte is redissolved or stripped from the working electrode.

- In this step, the absorbance in the cell is recorded as a function of conductivity.



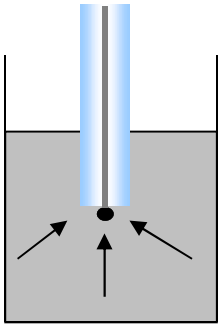
FINDING THE MISTAKES

PRECONCENTRATION O DEPOSITION STEP

The analyte is first deposited on a working electrode.

- From a stirred solution

- A preconcentration is produced

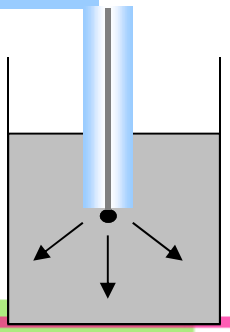


The analysis in stripping voltammetry requires two steps:

STRIPPING STEP

The analyte is redissolved or stripped from the working electrode.

- In this step, the current in the cell is recorded as a function of potential.



STRIPPING VOLTAMMETRY

There are different stripping techniques depending on the reaction occured during the two steps:

Deposition	Stripping
Electrolitic (Cathodic)	Anodic
	Cathodic
Electrolitic (Anodic)	
Non electrolitic (Adsorption)	

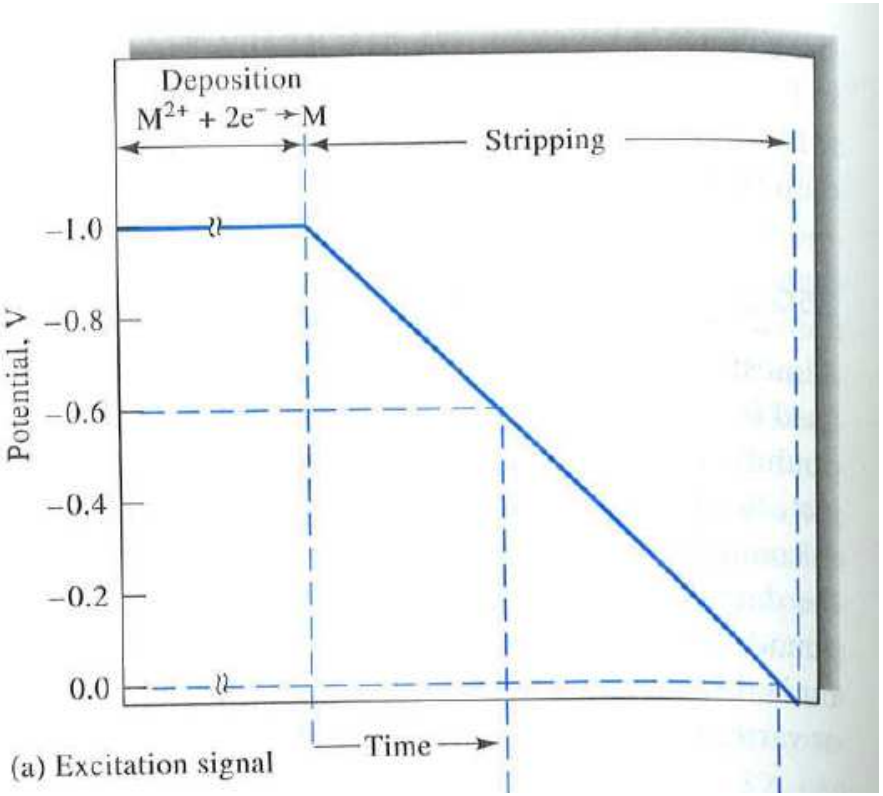
- Anodic stripping voltammetry (ASV)

Deposition: Cathodic
Stripping: Anodic

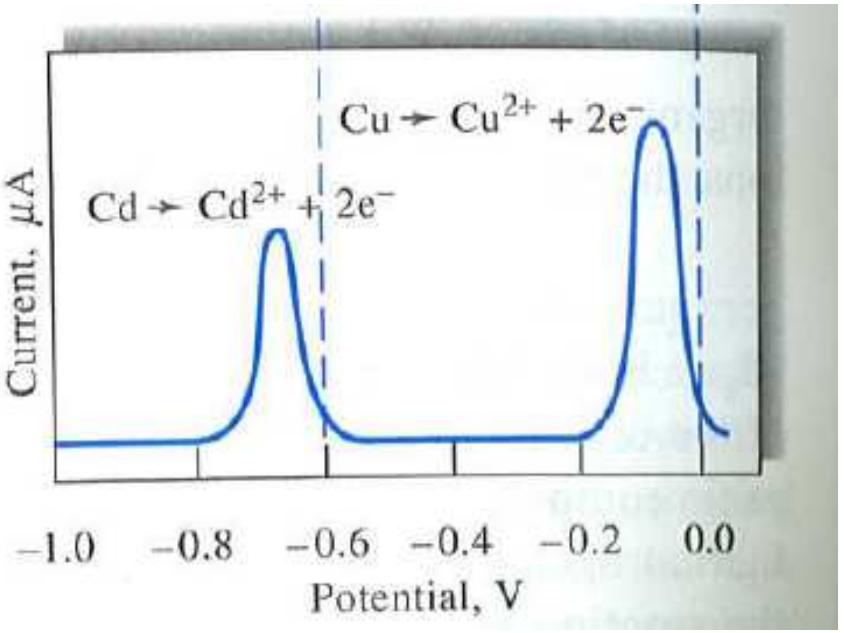
In anodic stripping methods, the working electrode behaves as a cathode during the deposition step and as an anode during the stripping step, with the analyte being oxidized back to its original form.

STRIPPING VOLTAMMETRY

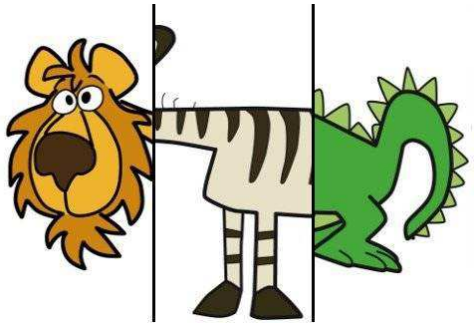
✹ Anodic stripping voltammetry (ASV)



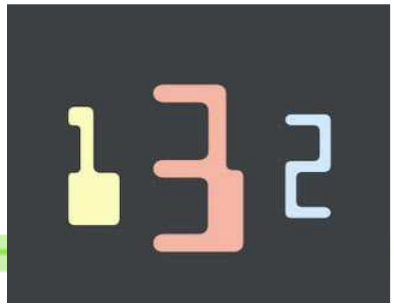
Excitation signal for stripping determination of Cd^{2+} and Cu^{2+}



Resulting stripping voltammogram of Cd^{2+} and Cu^{2+}



THE RIGHT ORDER



- Add 10 mL of digested water sample and 0.5 mL acetate buffer to the voltammetric cell.

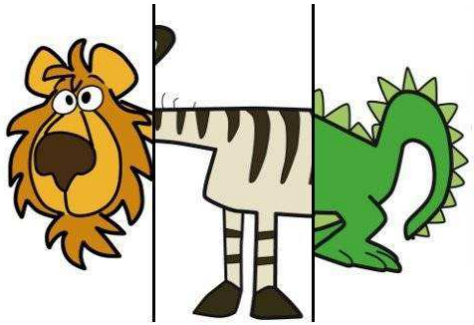
- Make three standard additions of small volumes of the standard prepared of Cd(II) and Cu(II)) and register the voltammograms after each addition.

- Register the voltammogram of the sample.

- The concentration of Cd(II) and Cu(II) in the water sample is calculated with the standard addition plot

- Degas the solution during 300 s to remove the oxygen of the cell.

- If water samples are going to be investigated then they should be filtered and subjected to a UV-digestion before the measurement.



THE RIGHT ORDER

1 3 2

- Add 10 mL of digested water sample and 0.5 mL acetate buffer to the voltammetric cell. 2

- Make three standard additions of small volumes of the standard prepared of Cd(II) and Cu(II)) and register the voltammograms after each addition. 5

- Register the voltammogram of the sample. 4

- The concentration of Cd(II) and Cu(II) in the water sample is calculated with the standard addition plot 6

- Degas the solution during 300 s to remove the oxygen of the cell. 3

- If water samples are going to be investigated then they should be filtered and subjected to a UV-digestion before the measurement. 1

INTERACTIVE PRACTICAL SESSION

rodin.uca.es

INTERACTIVE PRACTICAL SESSION

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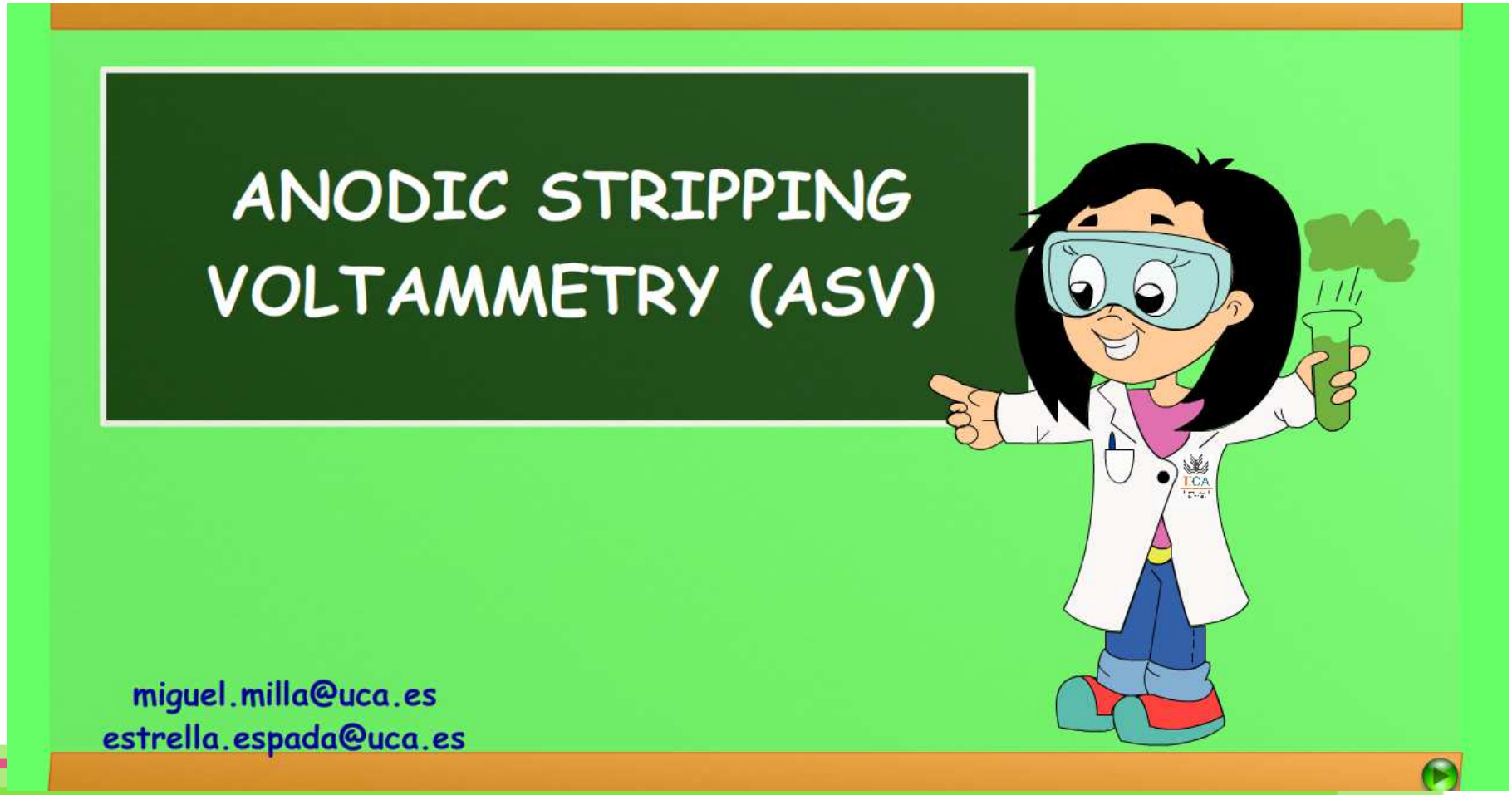

POST TASKS

NOW YOU ARE MORE THAN READY TO CARRY OUT THE PRACTICAL SESSION IN THE LAB!

You will be able to do the lab report!

And answer the questions related to the practical session!

SUMMARY

Thus, in this class….

- You have refreshed concepts related to Heavy metals and Voltammetry.
- You have realised about the importance of Stripping of Voltammetry in the analysis of trace metals.
- You have been able to follow an interactive lab practical session about Anodic Stripping Voltammetry.

English for Analytical Chemistry

IT HAS BEEN A PLEASURE!
THANK YOU SO MUCH INDEED!