



DQB-FCUL  
2<sup>nd</sup> Semester 2014/2015

**Aquatic Chemistry A**  
08/07/2015

**Time: 2,5 h.**

**Justify every answer.**

**2,0 points for each question.**

1 - Define atmospheric aerosols. What are the most likely sources of atmospheric aerosols in Lisbon and how do you classify them? Justify.

2 - What are the deposition processes you know and how do you characterize them?

3 - a) Define Alkalinity of a water. How is it possible to measure and evaluate it?

b) Write the chemical equations and the expressions of the equilibrium' constants corresponding to the balance of carbonate species in aqueous medium.

4 - "The solubility of a gas in water is influenced by several factors." Comment the statement and give examples.

5 - Name the water properties or characteristics that allow to explain the aqueous "dissolution" of such different substances as Sodium Chloride, Saccharose, Xenon and Propane, classifying each one of those processes with the appropriate name.

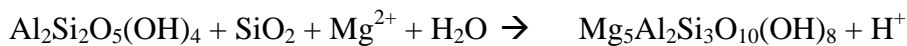
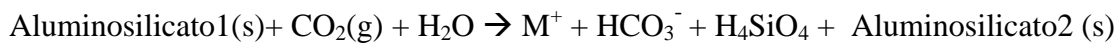
6 - Try to explain the following sentence "Large marine fish ingestion from within certain areas can cause severe intoxications", relating it with the significant toxic chemical species, the process of formation and its toxicity properties.

**7** – Consider an anaerobic aqueous matrix with pH=4.

a) Choose, to this matrix, a pE value that would be adequate, from the following: **-5, 0 and +10.**

b) With the selected value in the previous answer, and knowing that  $pE^{\circ} = +37,2 \text{ V}$  for the ionic pair  $\text{FeO}_4^{2-} / \text{Fe}^{3+}$ , find out, under these conditions, which one should be the predominant species.

**8** – a) Explain the meaning of the following chemical schemes, showing how they can be related:



b) How can we take advantage, from a business point of view, of the  $\text{Mg}^{2+}$  ion presence in the seawater?

**9** – Name the 3 common stages of a typical sewage and wastewater treatment system, summing up for each one, their major characteristics and purposes.

**10** - Which are the most relevant physico-chemical parameters in the eutrophication of a lake and how to manage the impact of a large city in the lake to where wastewater is discharged?