Chemistry and Introduction to Biochemistry

International School of Medicine (Corso F)
Academic Year 2016-2017 - 21st December 2017

Surname and Name ……..... Matriculation No. ….....

Multiple choice questions: select the correct answer (one) by crossing the corresponding box.
Formulas: draw all the atoms, bonds and charges (when applicable).
Quantitative exercises: briefly explain your chosen procedure and copy the final result(s) in the brackets at the end of the text.

1) The different isotopes of an element have:
- the same number of neutrons [ ]
- the same atomic weight [ ]
- different number of protons [ ]
- the same number of electrons [ ]

2) In isochoric conditions (V=const), an increase in temperature of a given gas will:
- exponentially increase the gas pressure [ ]
- double the gas pressure [ ]
- linearly increase the gas pressure [ ]
- leave the pressure unchanged [ ]

3) Which of the following compounds is a secondary alcohol?
- cyclohexanol [ ]
- 2-methyl-2-butanol [ ]
- 1-propanol [ ]
- none of the above [ ]

4) Which reaction takes places at the anode of a battery?
- oxidation [ ]
- uptake of electrons [ ]
- reduction [ ]
- depends on the electrode [ ]

5) Which is the molar concentration of H3O+ in a solution of potassium hydroxide 0.01 M?
- 10^{-2}M [ ]
- 0.02 M [ ]
- 10^{-14} M [ ]
- 10^{-12} M [ ]

6) Draw the chemical formula of each compound indicating all the atoms, bonds and charges (when applicable): *trans*-1,2-di-Cl-ethene, phosphoric acid, galactose, alanine.

7) Calculate the final concentration of a solution obtained by mixing 45ml of potassium sulphate 50% w/w (d=1.2g/ml) with 50ml of a 0.8 M solution of the same salt. [Answer: .....]

8) The osmotic pressure of an aqueous solution of a weak electrolyte ($AB \leftrightarrows A^+ + B^-$) is 3.2 atm at 20°C. Calculate the dissociation coefficient knowing that the concentration of the solution is 0.1 M. [Answer: .....]

9) 4.5 mol of H_2 and 4.5 mol of O_2 are mixed in a volume of 3 L at 450 °C. The following homogeneous reaction in the gas phase takes place: $2H_2 + O_2 \leftrightarrows 2\ H_2O$.
At equilibrium, the molar concentration of water is 0.5 M. Calculate the equilibrium constants Kc and Kp, indicating the units of measurements. [Answer: .....]

10) Calculate the pH of a solution obtained by mixing 160 ml of nitrous acid 0.05 M with 80 ml of sodium hydroxide 0.1 M. ($Ka = 4.9 \cdot 10^{-4}$ M). [Answer: .....]