Chemistry and Introduction to Biochemistry

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) 1) How is the solubility of gas in water?
- it is inversely related to the gas partial pressure [ ]
- it is directly related to the gas partial pressure [ ]
- it is directly related to temperature [ ]
- it is inversely related to water density [ ]

2) What are glucose and galactose?
- enantiomers [ ]
- geometrical isomers [ ]
- epimers [ ]
- all of the above [ ]

3) Which is the hybridization of C2 in propanone?
- sp^3 [ ]
- sp^2 [ ]
- sp [ ]
- it must be experimentally checked [ ]

4) Which of the following sentences is true when comparing two aqueous solutions: 0.2 M sucrose and 0.2 M lithium phosphate?
- they have a different freezing constant [ ]
- they have a different freezing point [ ]
- they have the same osmotic pressure [ ]
- they have the same vapour pressure [ ]

5) Upon titrating a weak base with a strong acid, the equivalence is reached when:
- pH = 7 [ ]
- pH > 7 [ ]
- pH < 7 [ ]
- only at very high acid dilutions [ ]

6) Draw the chemical formula of each compound indicating all the atoms, bonds and charges (when applicable): phosphoric acid, *cis*-2-butene, D-ribose, ethanoic acid.

7) 10 ml of hydrochloric acid at 21%(w/w) with density 1.22 g/ml are mixed with 300 ml of the same acid at 0.1 mol/L. Which is the molar concentration of the final solution? [Answer: .....]

8) Evaluate the absolute temperature (in K) at which an aqueous solution of Magnesium hydroxide 17.0 g/L generates an osmotic pressure of 10 atm. [Answer: .....]

9) Sulphuric anhydride dissociates into sulphurous anhydride and molecular oxygen according to the following homogeneous reaction in the gaseous phase: $2\ SO_3 \rightleftharpoons 2\ SO_2 + O_2$. Calculate the equilibrium constant K_C and K_P if 0,3 moles of SO_3 are introduced into a 3 L container and at equilibrium 0,1 moles of SO_2 are present (T=27C).
[Answer: .....]

10) Calculate the pH of an aqueous solution obtained by mixing 500 mL of ammonia 0.1 M and 0,02 moles of HCl (K_B of ammonia = $1{,}8 \cdot 10^{-5}$ M) [Answer: .....]