الجامعة اللبنانية

كلية الصحة العامة

مباراة الدخول 2020– 2021

مسابقة في الكيمياء – Series B

المدة : ٤٥ دقيقة عدد الصفحات: ٤

For each of the following questions circle <u>the right answer</u>. (Only one answer is correct)

1. We perform the oxidation of iodide ions I^- with the peroxydisulfate ions $S_2O_8^{2-}$, this reaction is slow and complete. (1pt)

$$2I^- (aq) + S_2O_8^{2} (aq) \rightarrow I_2 (aq) + 2SO_4^{2-} (aq)$$

a. The curve n $(I^-) = f(t)$ is ascendent.
b. The curve n $(I_2) = f(t)$ is descendent.
c. The curve n$(I_2) = f(t)$ is ascendent.
d. The curve n $(S_2O_8^{2-}) = f(t)$ is ascendent.

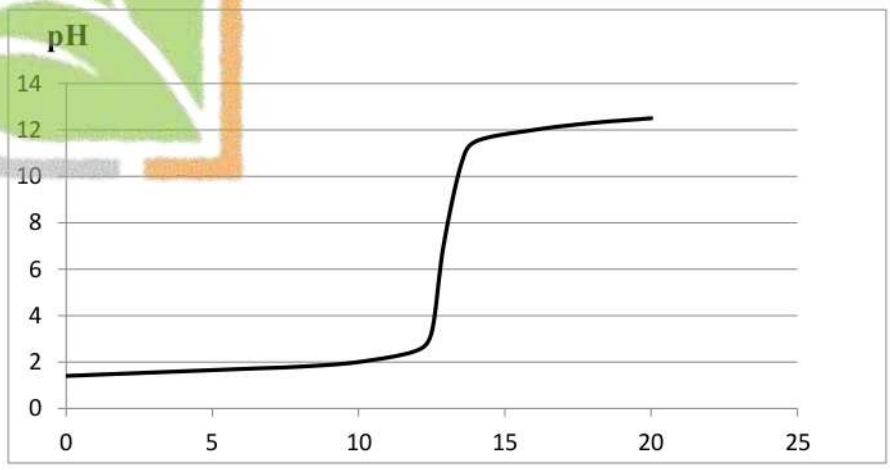
2. For the following equilibrium the forward reaction is exothermic: (1.5pt)

$$\mathbf{I_{2(g)} + H_{2(g)} \rightleftharpoons 2HI_{(g)}}$$

At a temperature $T_1<T_2$:

a. $\alpha_2< \alpha_1$.
b. $\alpha_2> \alpha_1$.
c. $\alpha_2= \alpha_1$.
d. None of the above.

3. A volume Va of a Ca (mol.L^{-1}) solution of sulfamic acid is taken and titrated with a solution of sodium hydroxide NaOH, the results obtained give the curve below: (1.5pt)



a. Sulfamic acid is a strong acid since the curve shows one inflection point and $pH_E = 7$.
b. Sulfamic acid is a strong acid since $Ca = 10^{-2} mol.L^{-1}$ and $pH_E = 7$.
c. Sulfamic acid is a weak acid since $Ca < 10^{-2} mol.L^{-1}$ and $pH_E > 7$.
d. Sulfamic acid is a weak acid since the curve shows two inflection point and $pH_E < 7$.

4. In the case of the colorimetric titration of a weak acid by a sodium hydroxide solution, it is necessary to choose an indicator whose change range zone is: (1.5pt)

a. Between 7 and 10.
b. Between 6 and 7.
c. Between 4 and 6.
d. Between 3 and 5.

5. Quantitative organic analysis of compound A formed of C, H and O gave the following mass percentages: C = 60% and H = 13.3%. Knowing that the molar mass of A is $60 g.mol^{-1}$, the molecular formula of A is: (1.5pt)

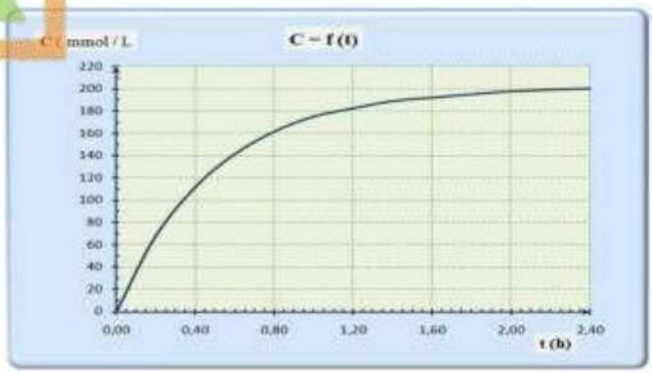
a. $C_4H_{10}O$.
b. C_3H_8O.
c. C_3H_6O.
d. $C_4H_8O_2$

Molar atomic mass in $g.mol^{-1}$: C=12, O=16 and H=1

6. A dilution is carried out by using a commercial hydrogen peroxide solution S_0 of molar concentration $C_0 = 7.5$ mol. L^1. The solution S_0 is diluted 125 times in order to prepare a solution S of volume 1 L. The glassware needed to achieve this dilution are: (1.5pt)

a. 10 mL graduated pipette and 1000 mL volumetric flask.
b. 10 mL volumetric pipette and 1L volumetric flask.
c. 5 mL graduated pipette and 1000 mL volumetric flask.
d. 8 mL graduated cylinder and 1L volumetric flask.

7. (1.5pt)



According to the curve:

a. The initial rate of the reaction is less than the rate of reaction at time t = 2 hours
b. The initial rate of the reaction is twice than the rate of reaction at time t = 2 hours
c. The initial rate of the reaction is equal to the rate of reaction at time t = 2 hours
d. The rate of the reaction at time t = 2 hours is equal to zero

8. The following carbohydrates are classified into monosaccharides, disaccharides and polysaccharides respectively: (1pt)

a. Glucose, sucrose and starch.
b. Lactose, galactose and glycogen.
c. Cellulose, maltose and fructose.
d. Dextrin, sucrose and glucose.

9. Lipids are classified into simple and complex. (1pt)

a. Phospholipids are simple lipids and triglycerides are complex lipids.
b. Oils are complex lipids and butters are simple lipids.
c. Phospholipids are complex lipids.
d. Simple lipids contain C, H and P, while complex lipids contain C, O, N, P and S.

10. Fatty acids are classified into: (1pt)

a. Carboxylic acid, sulfuric acid and amino acid.
b. Nucleic acid, oleic acid and alpha-amino acid.
c. Mineral (inorganic) acids and organic acids.
d. Saturated and unsaturated fatty acids.

11. Alpha amino acids are organic compounds containing the following groups: (1pt)

a. –COOH and $–PH_2$.
b. –COOH and $–NH_2$.
c. $–CH_2OH$ and $–NH_2$.
d. –CHOH and $–NH_2$.

12. Minerals and vitamins are: (1.5pt)

a. Organic compounds.
b. Inorganic compounds.
c. Chemical elements other than C, H, O and N (minerals) and organic substances (vitamins).
d. Synthesized by the body.

13. 100 g of milk contain: (x) g of carbohydrates, 3.8 g of lipids and 3.3 g of proteins. (1.5pt)
Knowing that 1 g of carbohydrates provides 4Kcal, 1 g of 9Kcal lipids and 1 g of 4Kcal proteins and the energy value of 100 g of milk is 66200cal.

a. X = 47g.
b. X = 4.7g.
c. X = 7.4g
d. X = 74g.

14. About roles of food additives: (1.5pt)

a. Preservatives are added to control the pH.
b. Antioxidants are flavor enhancers.
c. Colorants are used to make food more attractive.
d. Sweeteners are flavoring agents.

15. A balanced diet: (1.5pt)

a. Is rich in vitamins.
b. Is low in fat.
c. Contains carbohydrates, fats and proteins.
d. Contains the six food groups.

Good Luck