

مباراة الدخول 2020 – 2021

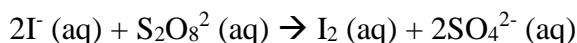
مسابقة في الكيمياء – Series B

عدد الصفحات: ٤

المدة: ٤٥ دقيقة

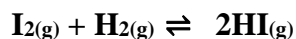
For each of the following questions circle the right answer. (Only one answer is correct)

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



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

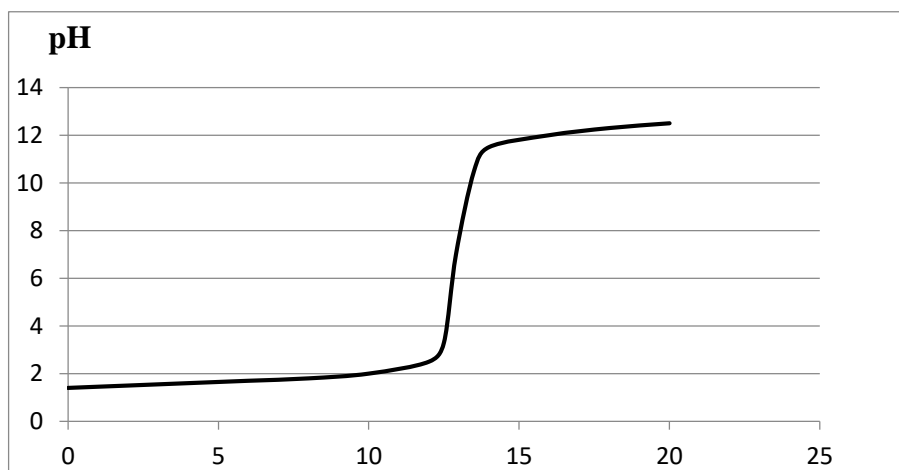
2. For the following equilibrium the forward reaction is exothermic: (1.5pt)



At a temperature $T_1 < T_2$:

- $\alpha_2 < \alpha_1$.
- $\alpha_2 > \alpha_1$.
- $\alpha_2 = \alpha_1$.
- None of the above.

3. A volume V_a 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 $\text{pH}_E = 7$.
b. Sulfamic acid is a strong acid since $C_a = 10^{-2} \text{mol.L}^{-1}$ and $\text{pH}_E = 7$.
c. Sulfamic acid is a weak acid since $C_a < 10^{-2} \text{mol.L}^{-1}$ and $\text{pH}_E > 7$.
d. Sulfamic acid is a weak acid since the curve shows two inflection point and $\text{pH}_E < 7$.
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 60g.mol^{-1} , the molecular formula of A is: (1.5pt)
- a. $\text{C}_4\text{H}_{10}\text{O}$.
b. $\text{C}_3\text{H}_8\text{O}$.
c. $\text{C}_3\text{H}_6\text{O}$.
d. $\text{C}_4\text{H}_8\text{O}_2$
- 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 $C_0 = 7.5 \text{ mol. L}^{-1}$. 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. $-\text{COOH}$ and $-\text{PH}_2$.
 - b. $-\text{COOH}$ and $-\text{NH}_2$.
 - c. $-\text{CH}_2\text{OH}$ and $-\text{NH}_2$.
 - d. $-\text{CHOH}$ and $-\text{NH}_2$.
- 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. $X = 47\text{g}$.
 - b. $X = 4.7\text{g}$.
 - c. $X = 7.4\text{g}$.
 - d. $X = 74\text{g}$.

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