

LIZARDI BHI	2008-09	Topics: Acid-base Redox	MARKS:
Chemistry	2nd term		
2009-February-18			

EXERCISE #1

In a lab there are two aqueous solutions: the first contains HCl and the second acetic acid. Both have the same volume and concentration: 15 mL and 0.05 M. Determine:

- The pH of the solution that contains hydrochloric acid and the number of moles of hydronium ion
- The pH of the solution that contains acetic acid and its dissociation percent
- The volume of water needed to add to HCl solution in order to have the same pH as the acetic acid solution

2 POINTS

Acidity constant of acetic acid: $K=1.8 \cdot 10^{-5}$

EXERCISE #2

Answer briefly the following questions about the acid rain issue:

- The compounds responsible for the problem
- The processes that form acid rain (you do not need to write complete equations, only relevant compounds)
- What relevant measures could be taken to fix the problem

1 POINT

EXERCISE #3

In order to determine the concentration of an acetic acid solution, that solution is titrated by using a NaOH 0.25 M solution. The volume of the acetic acid solution is 10 mL.

- Determine the concentration of acetic acid in g/L if 34 mL NaOH 0.25 M have been used to neutralize the acidic solution
- Determine, giving the reasons, if at the equivalence point the pH would be 7, more than 7 or less than 7.

2 POINTS

Atomic weights: C=12; H=1; O=16

EXERCISE #4

Iron (II) sulfate is converted into iron (III) sulfate when reacts with potassium permanganate in an acidic solution.

- Write the balanced chemical equation using the half-reactions method
- Identify the following: oxidizing, reducing, oxidized and reduced species
- Build up a battery based on the previous reaction
- Determine the standard electromotive force of that battery
- Determine the volume (in mL) of 0.52 M KMnO_4 that would be consumed in order to obtain 20 g of iron (III) sulfate

3 POINTS

$$E^0 (\text{MnO}_4^- / \text{Mn}^{2+}) = + 1.51 \text{ V}$$

$$E^0 (\text{Fe}^{3+} / \text{Fe}^{2+}) = + 0.77 \text{ V}$$

Atomic weights: Fe=56; S=32; O=16

EXERCISE #5

Molten aluminum chloride is used to obtain metallic aluminum by electrolysis.

- Write the half-reaction of the obtention of aluminum and determine (reasoning) the electrode in which will take place the obtention of aluminum.
- Determine the mass of aluminum produced in 1 hr if the electrical current is 10 A.

2 POINTS

Atomic weights: Al=27