

LIZARDI BHI	2009-10	Topics:	MARKS:
Chemistry	2nd. term	Acid-base	
2010-02-05		Redox	
NAME:			

EXERCISE #1

In a laboratory there are two 25 mL solutions: the first is a NaOH solution and the other an ammonia solution. The concentration in both cases is 0,1 M.

- Determine the pH of both solutions and the dissociation percent of ammonia
- Determine the volume of water we need to add to the most basic solution in order to get the pH of the other solution.

Ammonia dissociation constant: $K_b=1,8 \cdot 10^{-5}$

EXERCISE #2

We perform a titration in order to determine the concentration of an acetic acid solution. In that titration we use a 0.4 M NaOH solution. The volume of the acetic acid solution is 15 mL.

- Determine the concentration of the acetic acid solution in three ways (molarity, g/L and mass percent), if 37.5 mL of the NaOH solution are needed in the titration
- Determine and justify if the pH at equivalence point will be 7, higher than 7 or lower than 7.

Suppose that the density of the acetic acid solution is the same as the density of water.

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

EXERCISE #3

In a HCl acidic environment potassium permanganate ($KMnO_4$) converts (oxidizes) hydrogen sulfide (H_2S) into sulfur element (S). At the same time the permanganate ion is converted into Mn (II) ions (manganese (II) chloride, $MnCl_2$). In the reaction potassium chloride (KCl) and water are also produced.

- Balance the molecular equation
- Determine the following substances: oxidant, reductant, oxidized and reduced
- Determine the mass of sulfur produced when 200 mL 0,2 M potassium permanganate react if the yield (efficiency) of the reaction is %80.

Atomic weights: S=32

EXERCISE #4

A battery is based on the following pairs: Sn^{2+}/Sn ($E^0 = -0.15 \text{ V}$) and $\text{Fe}^{3+}/\text{Fe}^{2+}$ ($E^0 = +0.78 \text{ V}$).

a) Draw the battery and indicate the following components in the drawing: salt bridge, flow of electrons, anode, cathode, oxidation half-reaction and reduction half-reaction.

b) Determine the electromotive force of the battery

c) Explain what happens when tin metal is dipped into an acidic solution.

EXERCISE #5

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

a) Write the half-reaction of the obtention of aluminum and determine (give the reasons) the electrode in which will take place the obtention of aluminum.

b) Determine the mass of aluminum produced in 1 hr if the electrical current is 10 A.

Atomic weights: $\text{Al}=27$