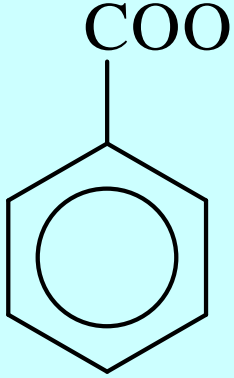
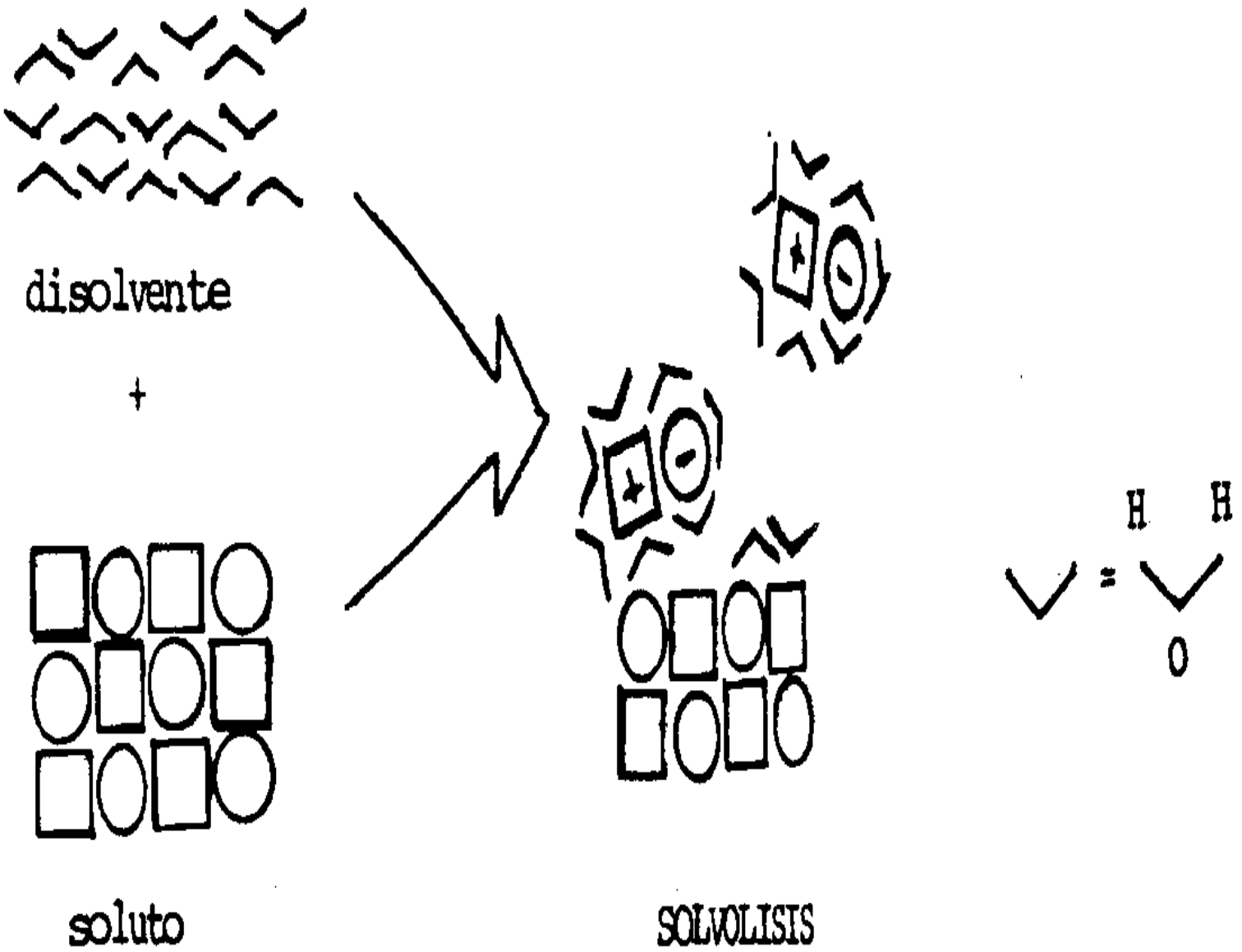
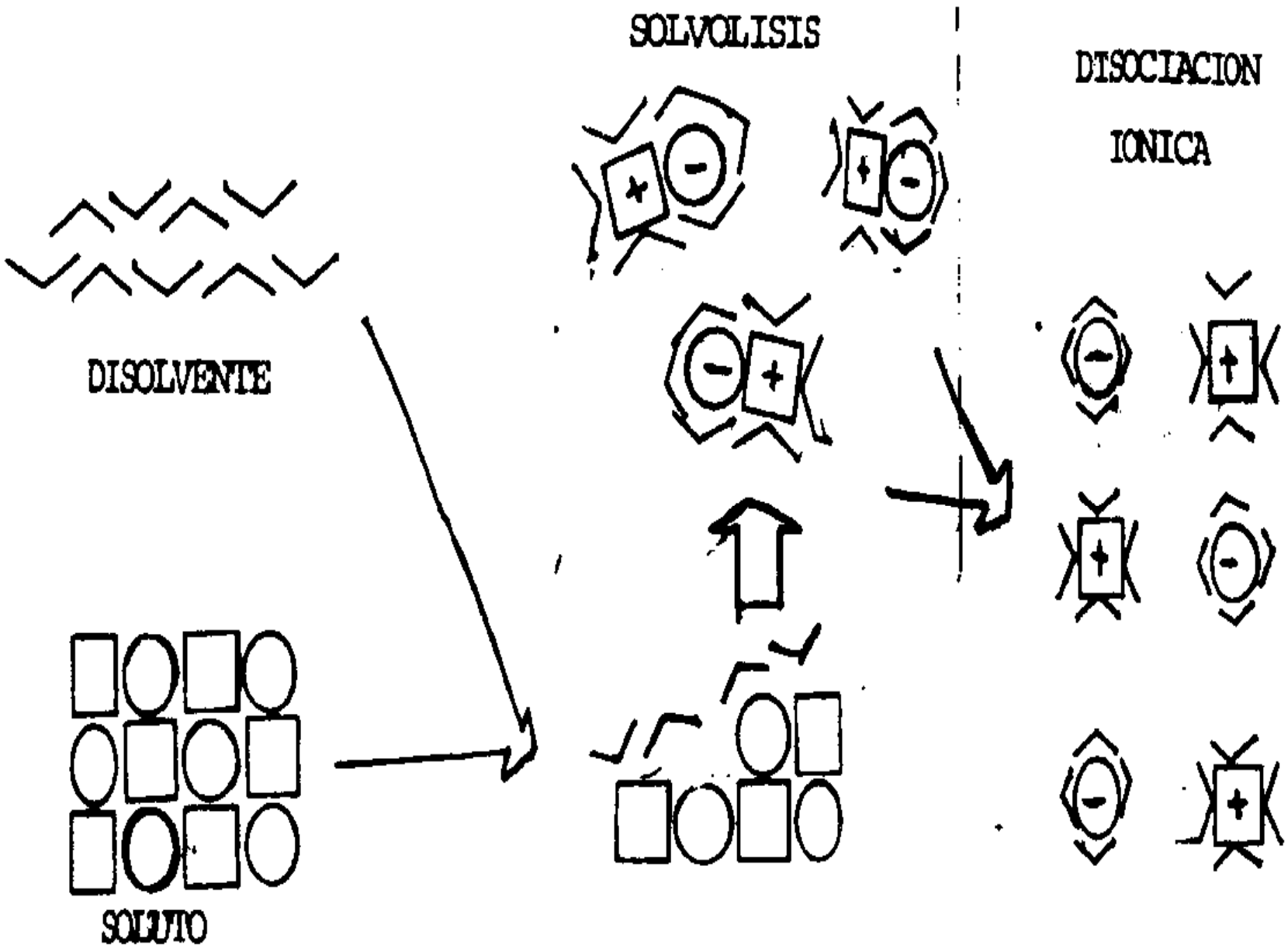
Equilibrios químicos de solubilidad y de distribución líquido-líquido:




disolvente
+
soluto
SOLVOLISIS
H
H
O


SOLVOLISIS
DISOCIACION
IONICA
DISOLVENTE
SOLUTO

En agua las posibles reacciones en la formación de una disolución se resumen en la tabla 1.1.A:

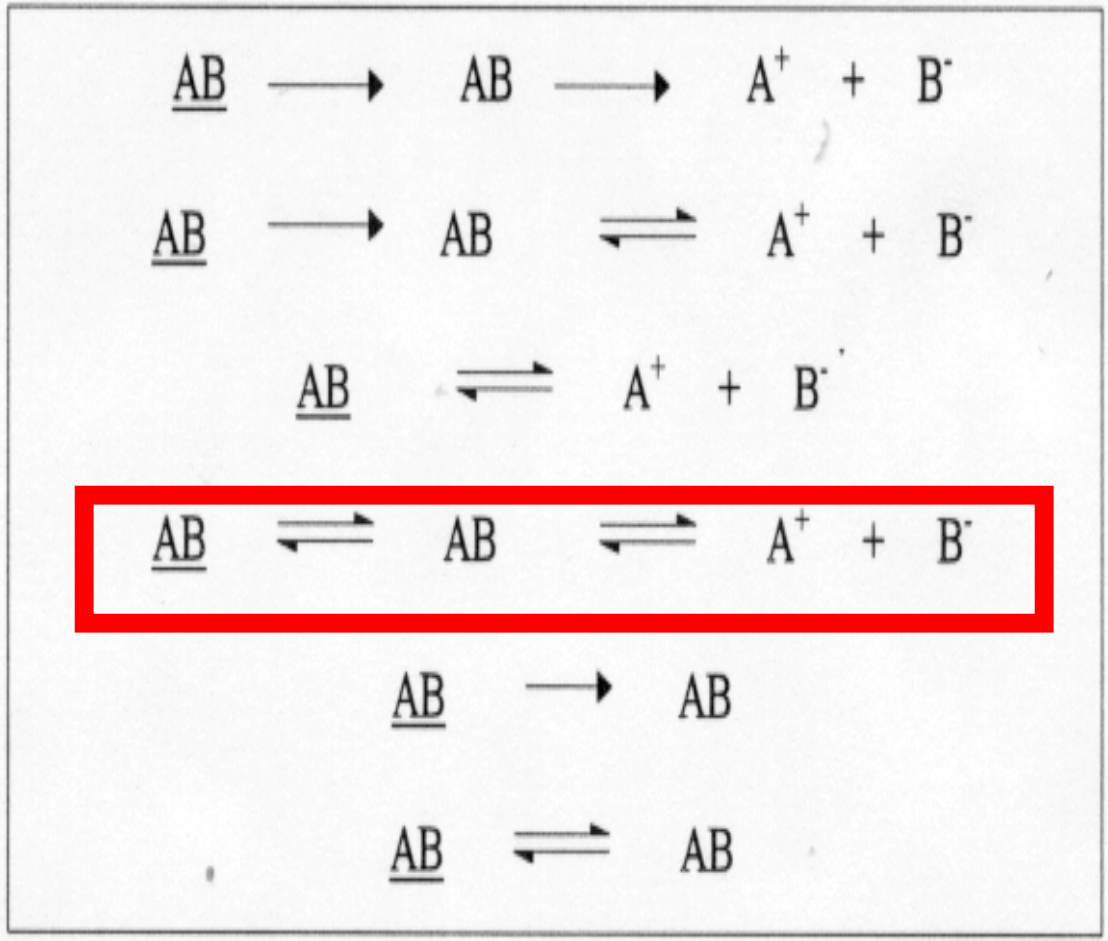
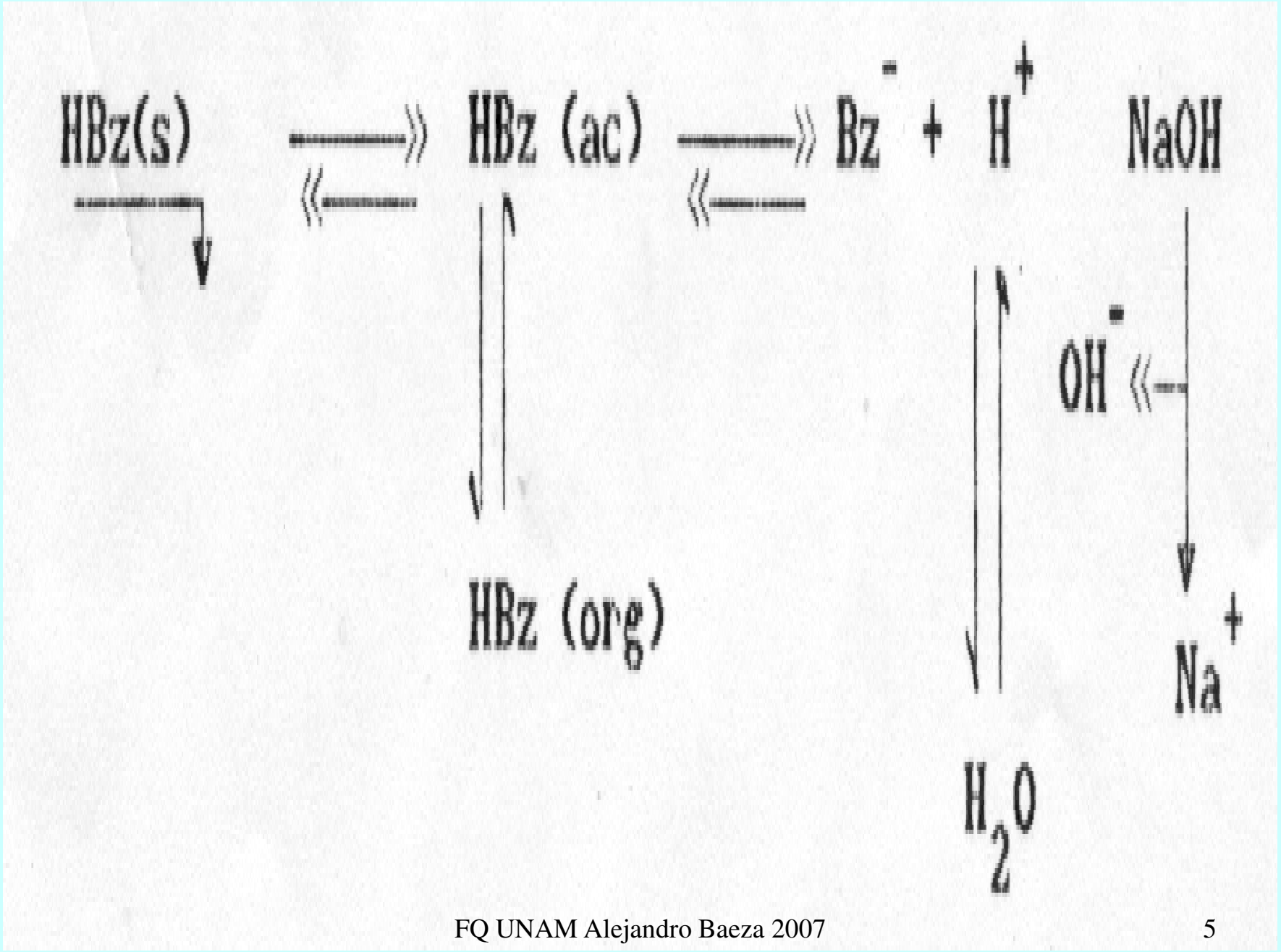


Tabla 1.1 A.


HBz(s)
HBz (ac)
Bz⁻ + H⁺
NaOH
HBz (org)
OH⁻
Na⁺
H2O

Estrategia Experimental.

ESTUDIO DE LOS EQUILIBRIOS DE SOLUBILIDAD

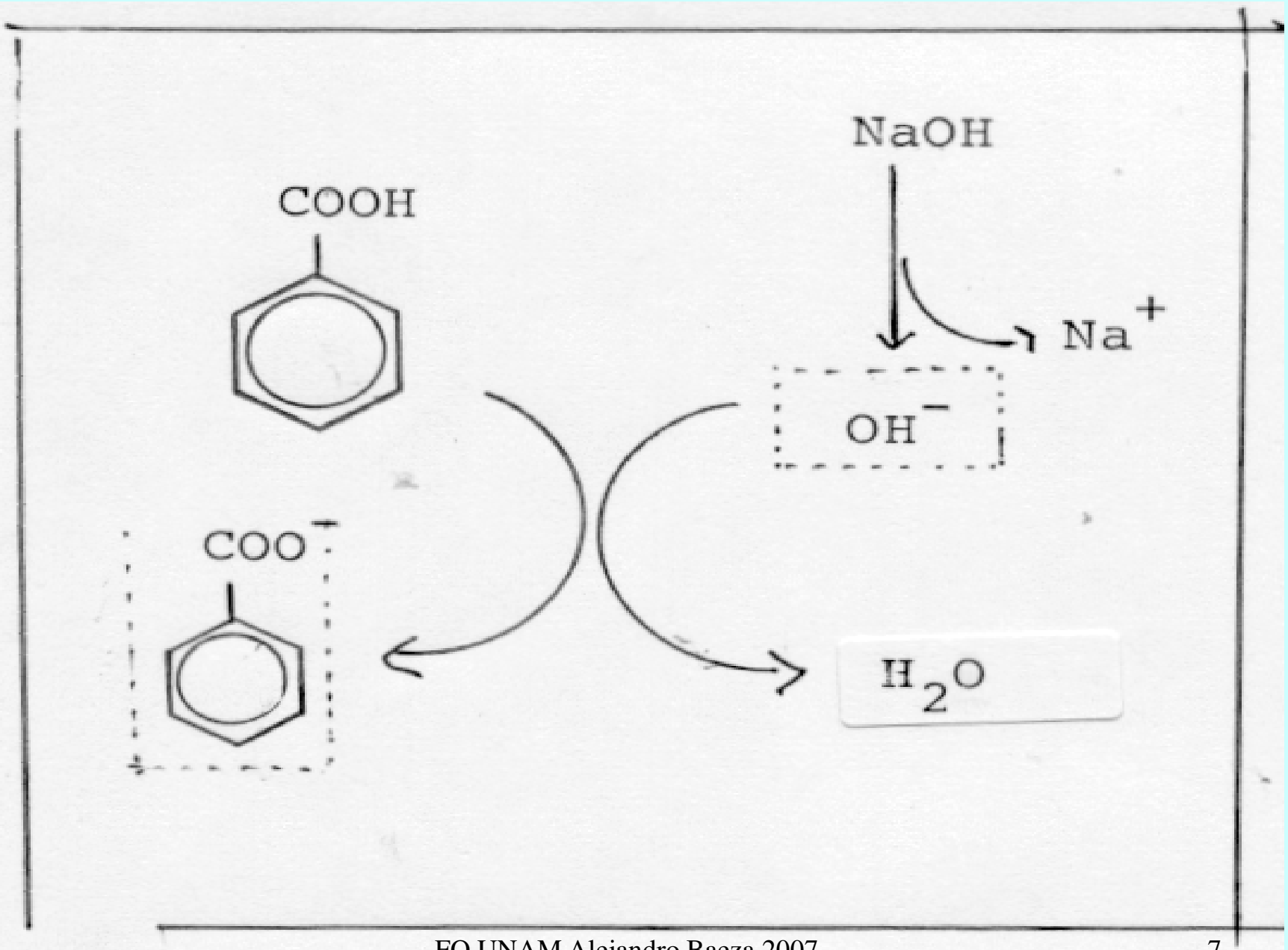
sintetizar NaBz a partir de HBz y NaOH

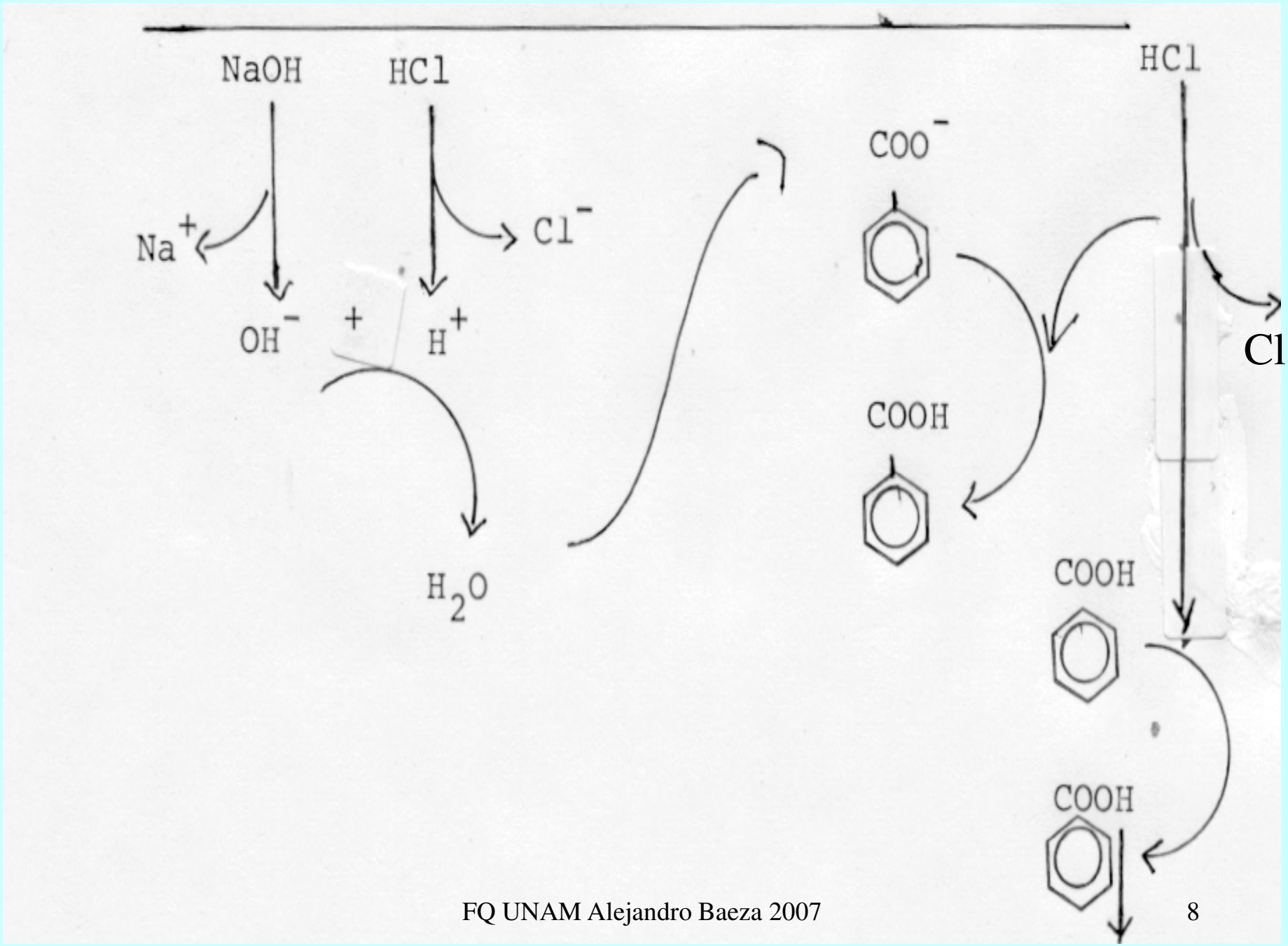
↓

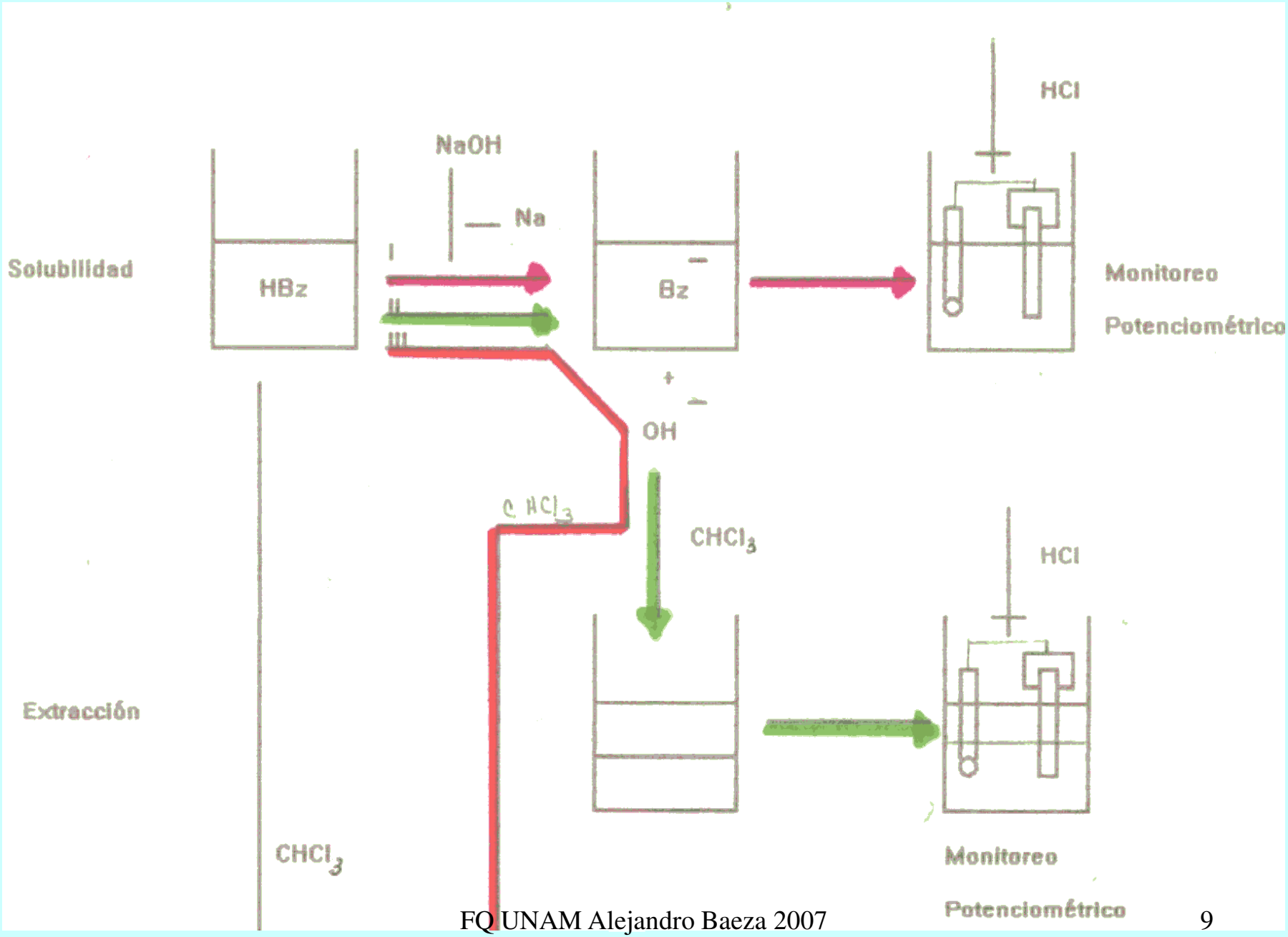
valorar con HCl en medio monofásico acuoso

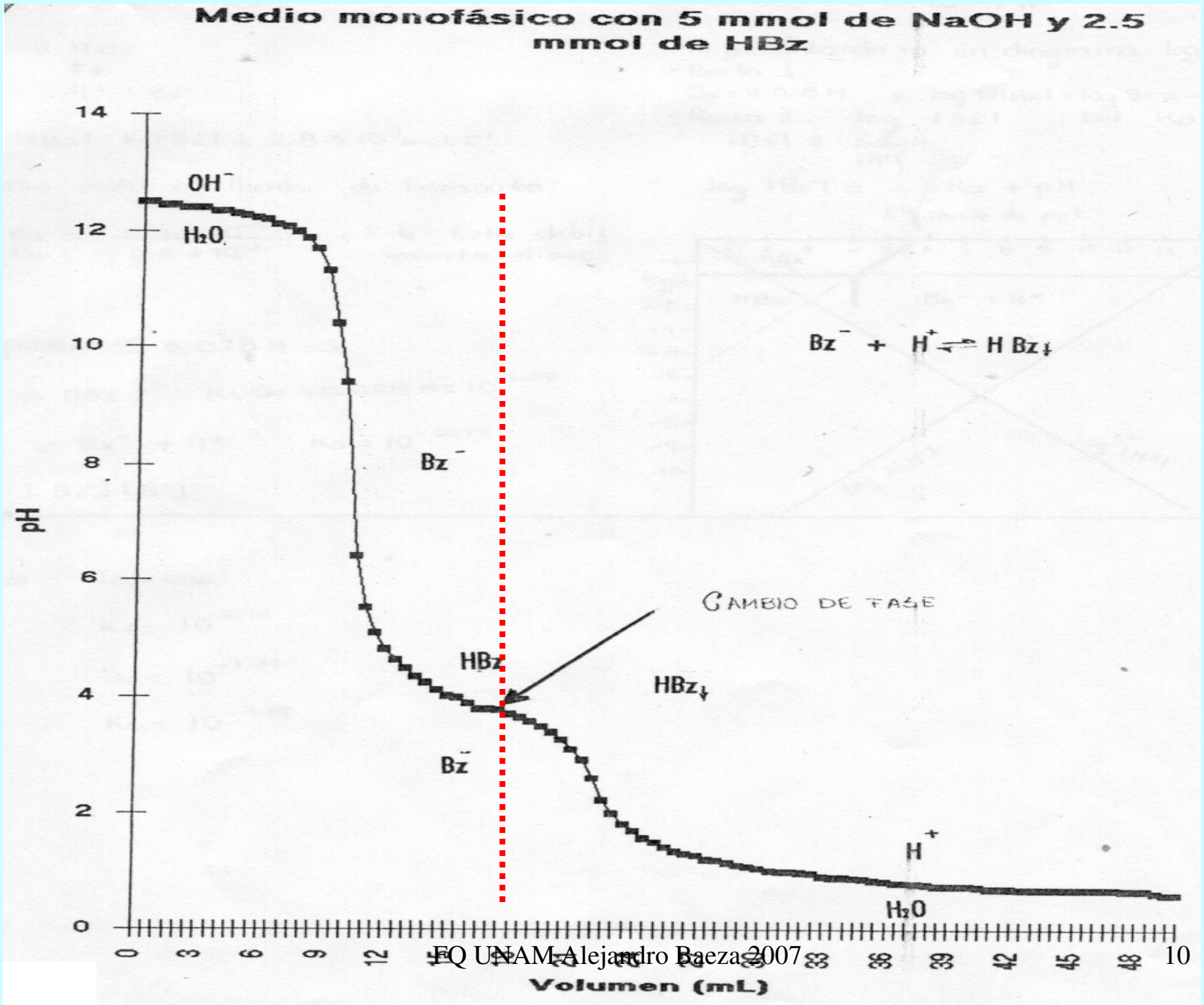
↓

monitorear el pH durante la operación de valoración


NaOH
COOH
Na+
OH−
COO−
H2O


NaOH
HCl
HCl
Na+
OH−
+
H+
Cl−
H2O
COO−
COOH
COOH
COOH
Cl-


HCl
NaOH
Na
Solubilidad
HBz
I
II
III
Bz
Monitoreo
Potenciométrico
OH
CHCl3
HCl
Extracción
CHCl3
Monitoreo
Potenciométrico


Medio monofásico con 5 mmol de NaOH y 2.5 mmol de HBz
pH
Volumen (mL)
OH⁻
H₂O
Bz⁻
HBz
HBz↓
Bz⁻
H⁺
H₂O
Bz⁻ + H⁺ ⇌ HBz↓
CAMBIO DE FASE

ESTUDIO DE LOS EQUILIBRIOS DE REPARTO

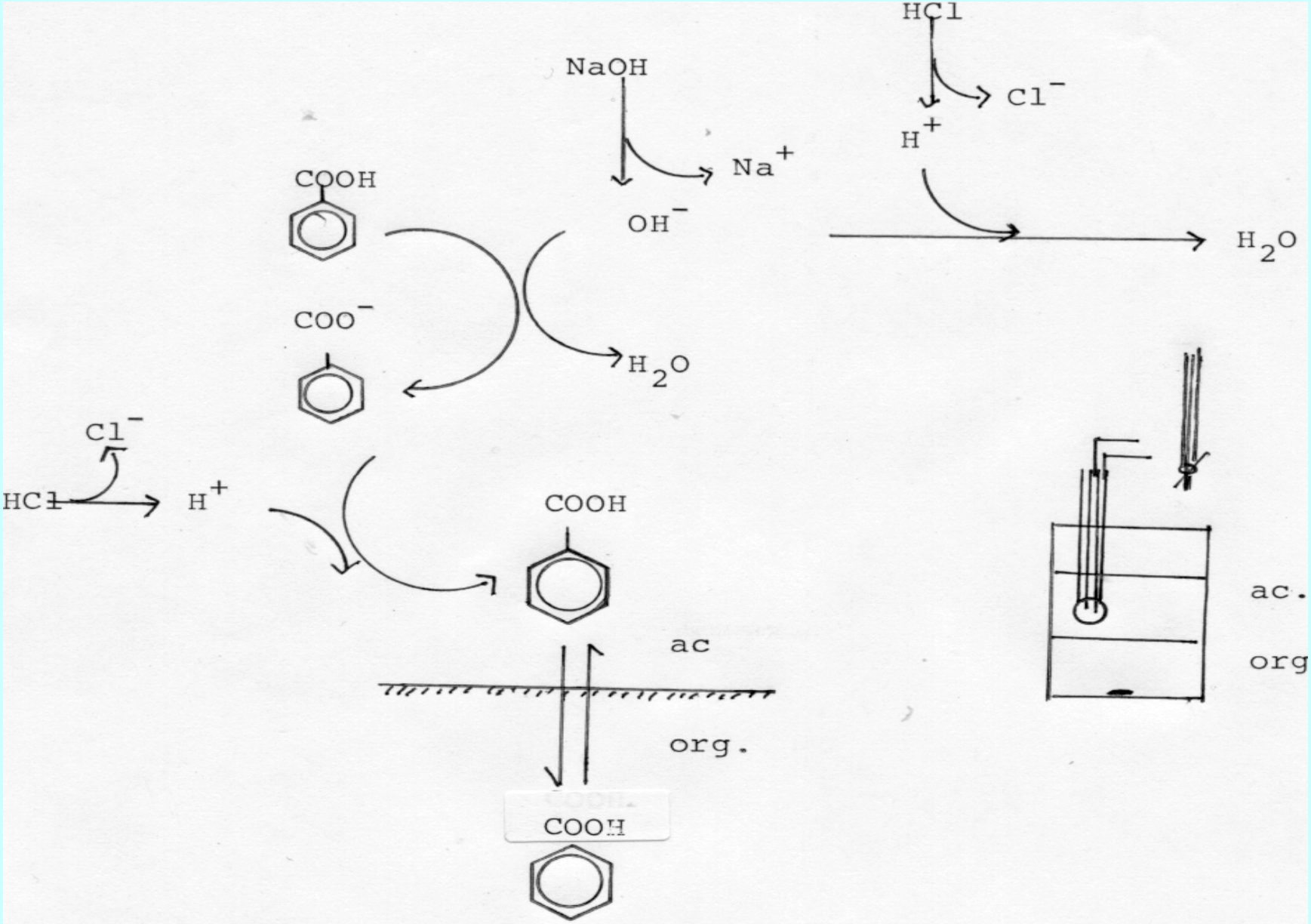
sintetizar NaBz a partir de HBz y NaOH

↓

valorar con HCl en medio bifásico agua-cloroformo
o agua-tetracloruro de carbono

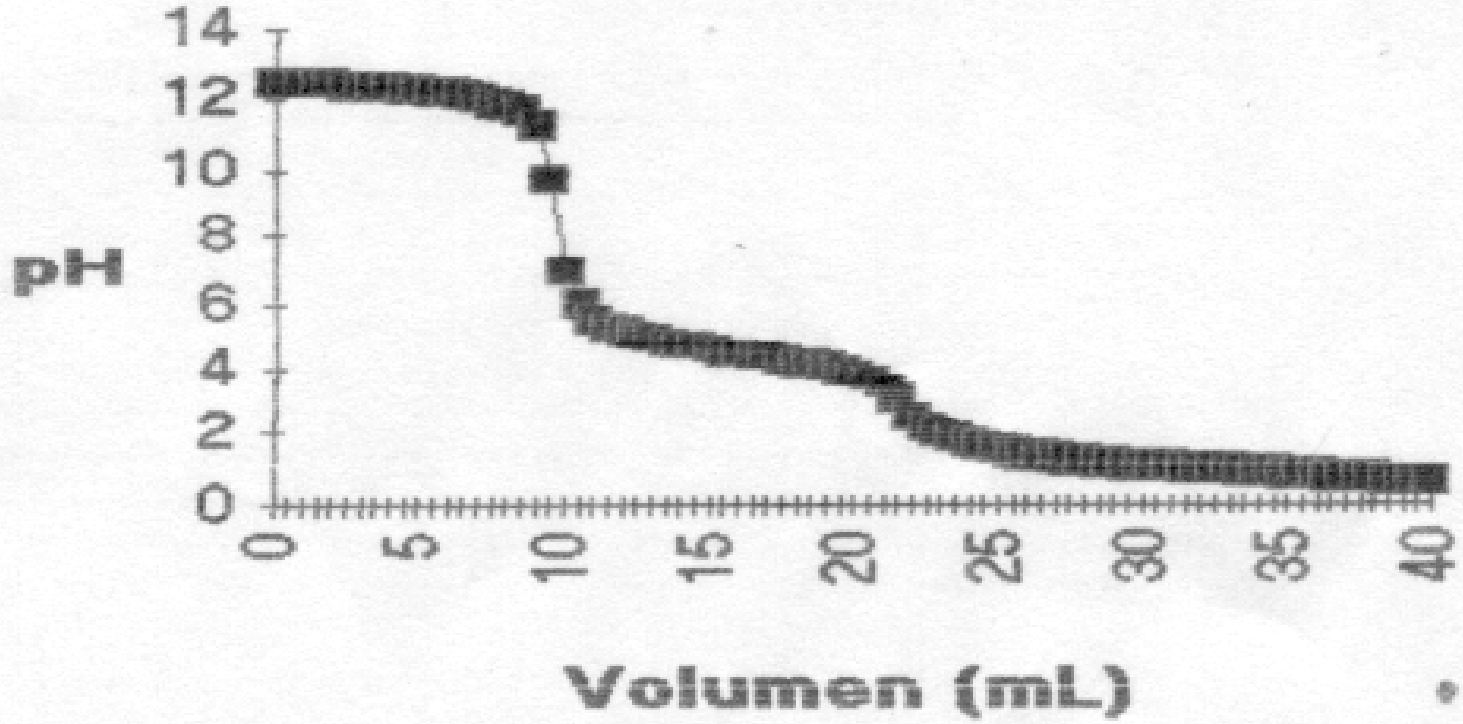
↓

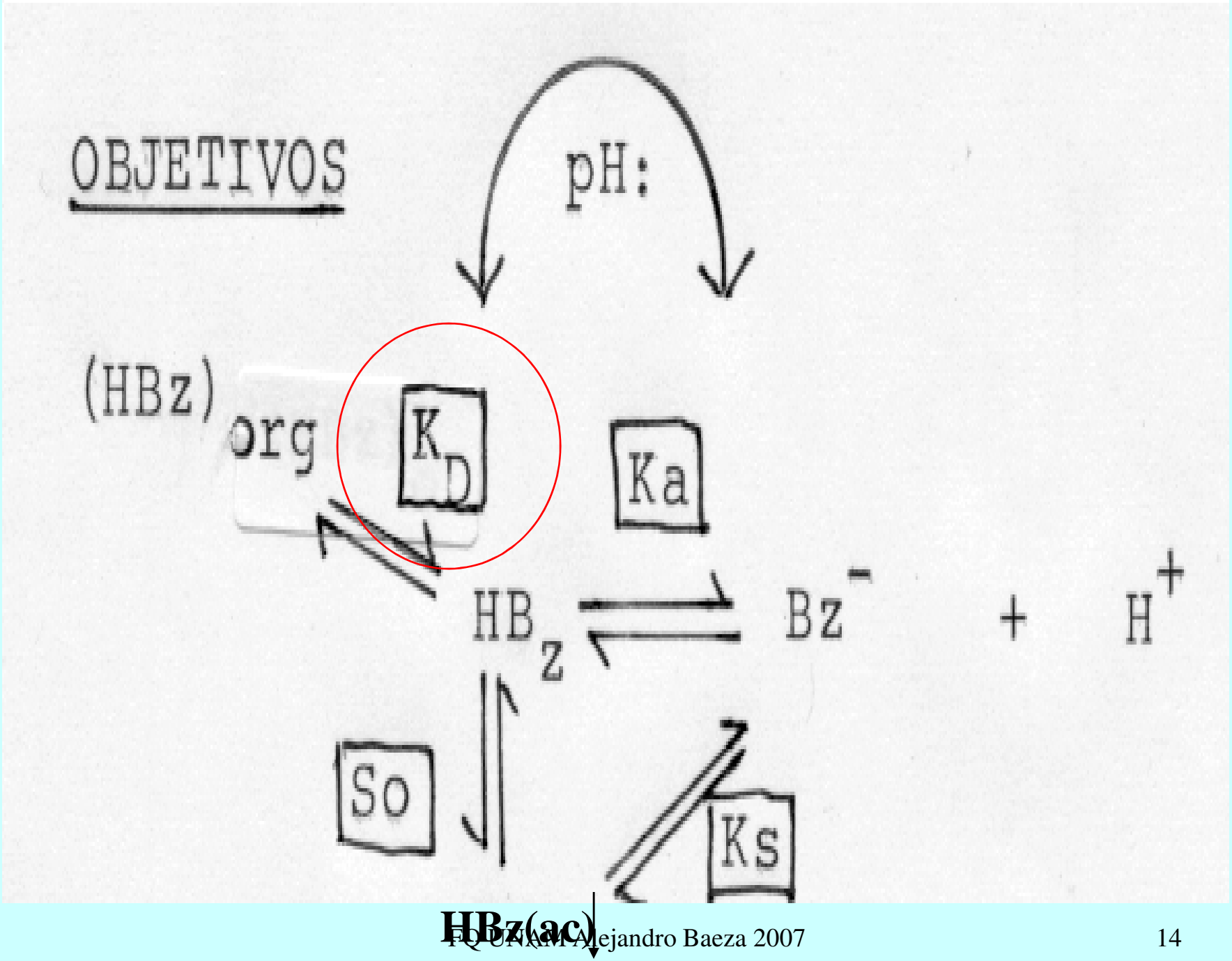
monitorear el pH en la fase acuosa durante la operación de valoración

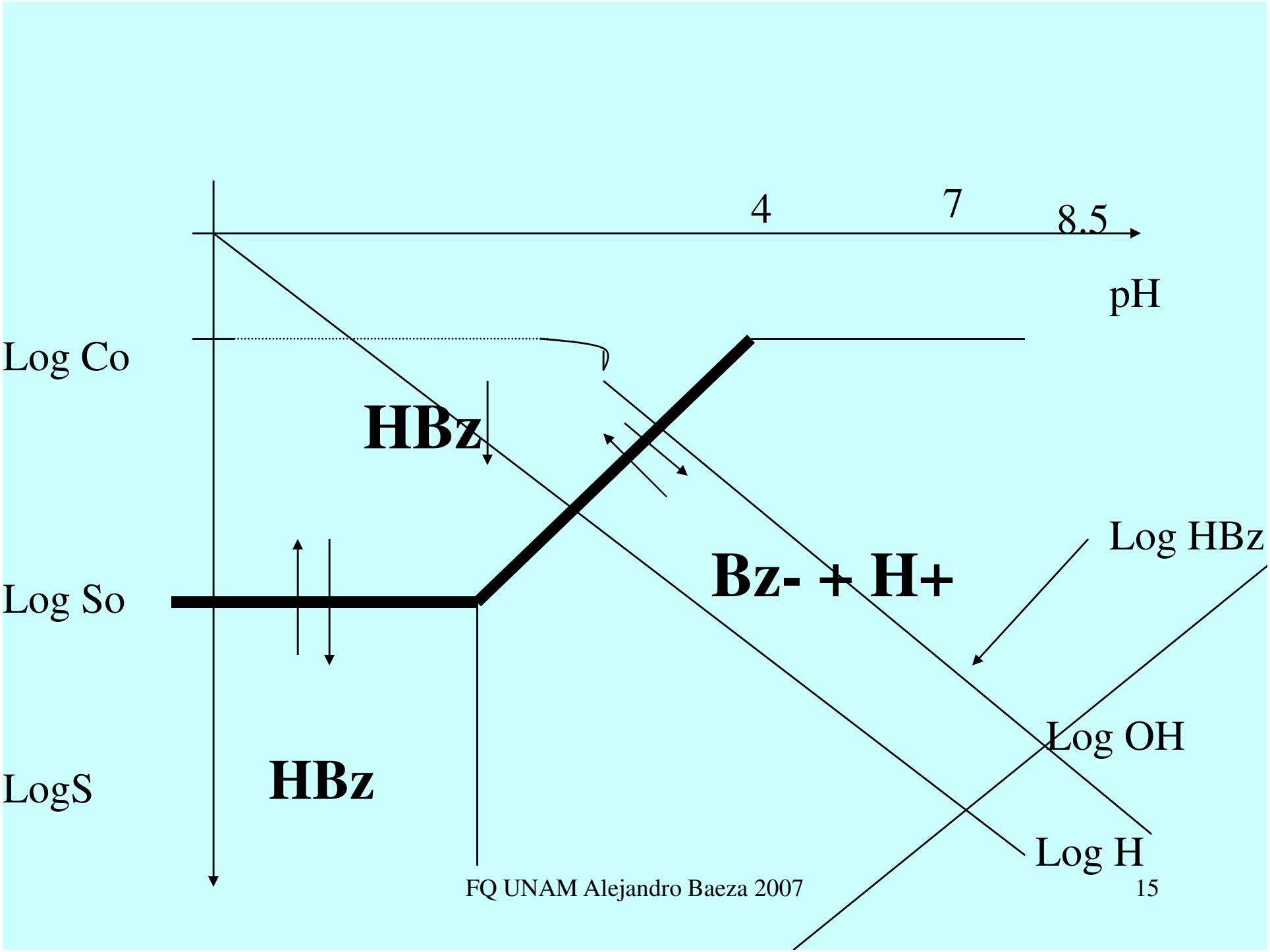

NaOH
Na+
OH−
COOH
COO−
H2O
HCl
Cl−
H+
H2O
HCl
Cl−
H+
COOH
ac
org.
COOH
ac.
org

II

Medio bifásico con NaOH 5 mmol y 2.5 mmol de HBZ



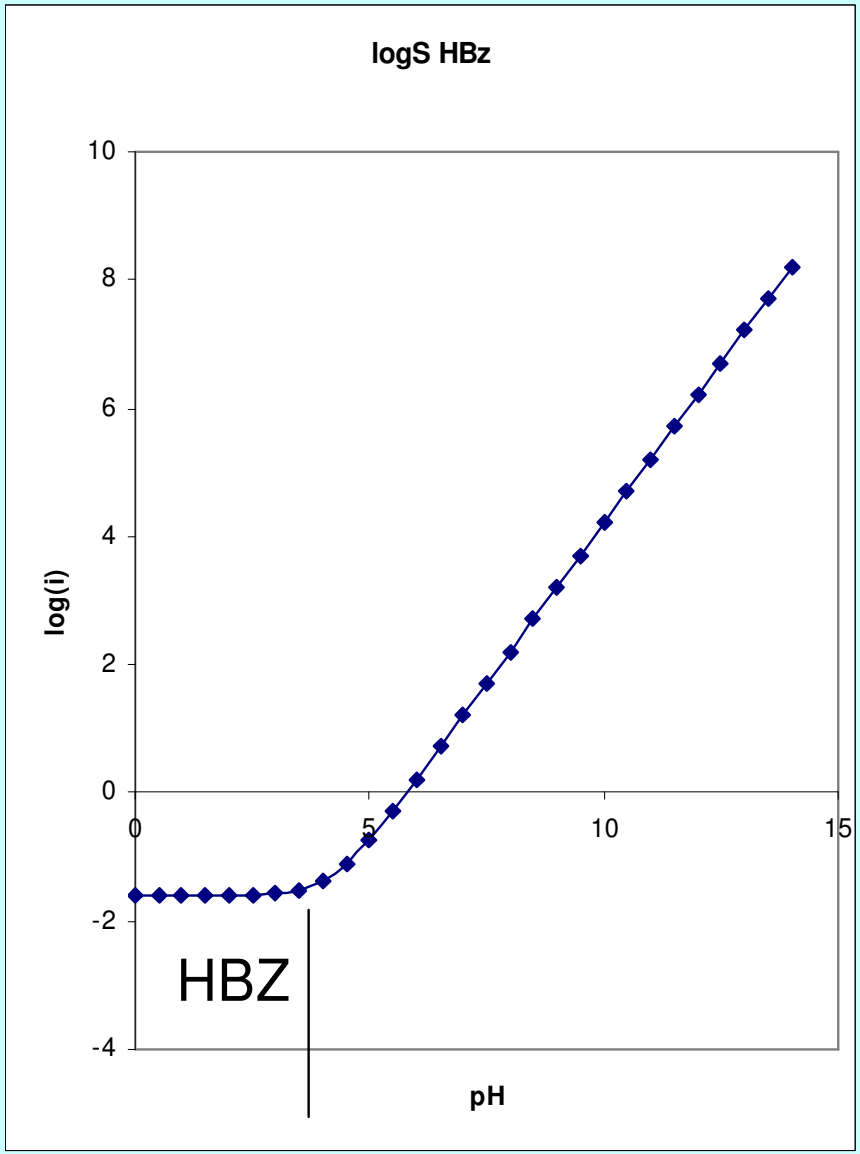

OBJETIVOS
pH:
(HBz) org
K_D
Ka
$HBz \rightleftharpoons Bz^- + H^+$
So
Ks
HBz(ac)

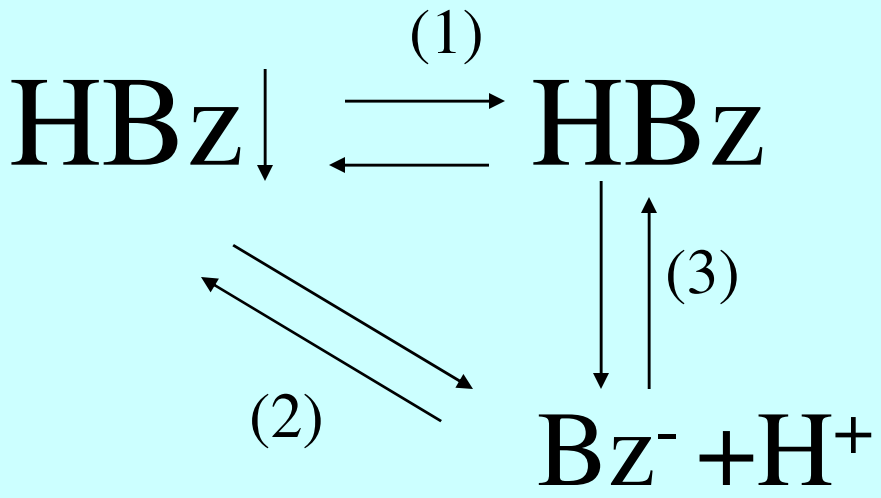

4
7
8.5
pH
Log Co
HBz
Log HBz
Bz- + H+
Log So
Log OH
LogS
HBz
Log H

$$\log S' = \log So + \log\left[1 + 10^{-pKa+pH}\right]$$

$$\log S' = \log(0.0264) + \log\left[1 + 10^{-4.19+pH}\right]$$

$$\log S' = -1.6 + \log\left[1 + 10^{-4.19+pH}\right]$$





(1) Solubilidad molecular

(2) Solubilidad iónica

(3) Disociación iónica

Cantidad disuelta = f(nivel de acidez en fase homogénea)

$S' = f(pH)$; $\log S' = f(pH)$

1) Definir Eq. Princ.: solubilidad molecular
2) Definir Eq. Colateral: ácido-base
3) Definir equilibrio generalizado:

$$(HBz)\downarrow \rightleftharpoons (HBz)'$$

4) Definir las especies generalizadas

$$(HBz)\downarrow = (HBz)'\downarrow$$
$$(HBz)' = (HBz) + (Bz^-)$$

5) Expresar los coeficientes de especiación: α

$$\alpha_{Hbz\downarrow} = 1$$

$$\alpha_{HBz(H)} = 1 + 10^{pH-pKa}$$

6) Para el equilibrio principal: $HBz\downarrow = HBz$

$$K = \frac{(HBz)}{1} = S_0$$ (solubilidad intrínseca)

$$(HBz)' = (HBz)\alpha_{HBz(H)}$$

$$(HBz)\downarrow' \rightleftharpoons (HBz)'$$

$$So = \frac{(HBz)'}{\alpha_{HBz(H)}}$$

In	n_0
Equi	$n_0(1-f)$

$$\frac{fn_0}{V_0} = S'$$

$$S' = So\,\alpha_{HBz(H)}$$

$$\boxed{\text{Log } S' = \log S_0 + \log \alpha_{HBz(H)}}$$

7) Analizar función : a) zonas predominio DUZP combinado

b) excell