# Separation Methods Based on Distributions in Discrete Stages (9/20/13)

1. Chemical Separations: The Big Picture

   Classification and comparison of methods

2. Fundamentals of Distribution Separations

3. Separation Methods Based on Distributions in Discrete Stages

   Such as solvent extraction and distillation

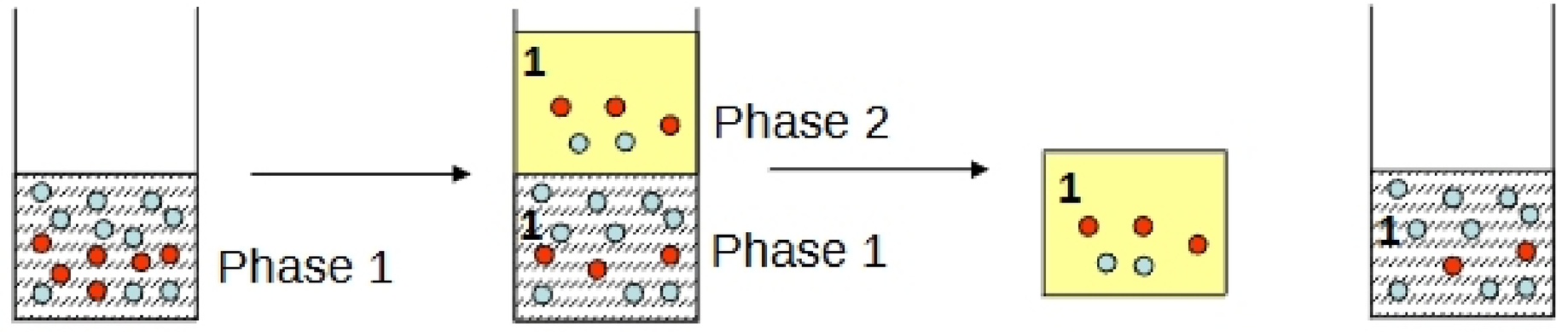
4. Introduction to Distribution Separations in chromatographic methods. The plate theory, the rate theory; van Deemter's equation.

# Counter-Current Extraction

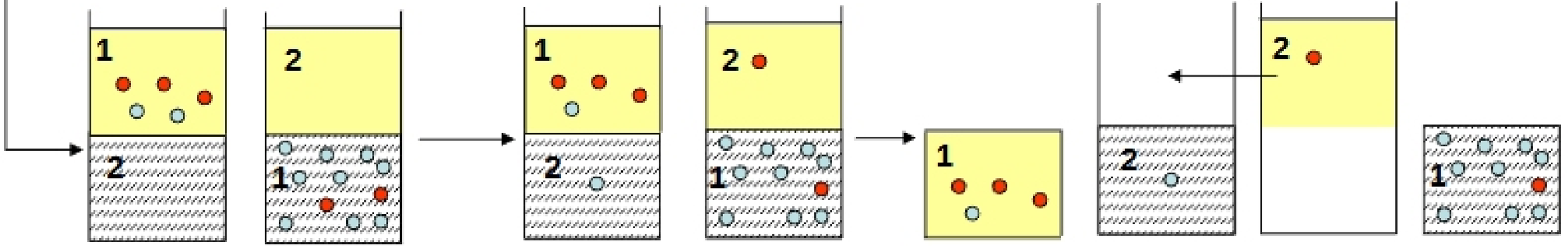
- [A] = 0.01 M
- [B] = 1 M

$V_1=V_2=10$ mL

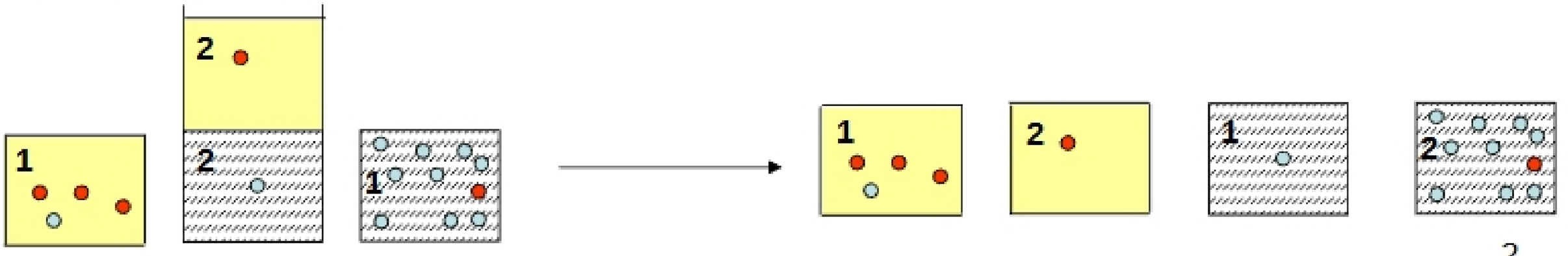
$D_{cA}= 10$, $D_{cB}=0.1$




**Extraction 1** **Separation of phases**




**Addition of fresh phases to Both phase 1 and 2** **Extraction 2** **Separation of phases**



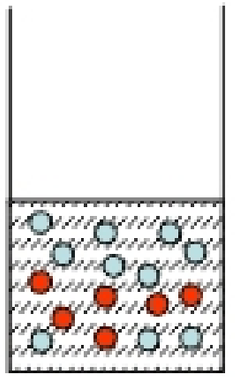

**Extraction 3**

# Counter-Current Extraction

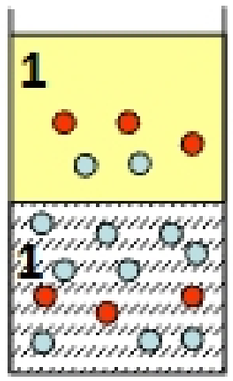
- [A] = 0.01 M
- [B] = 1 M

$V_1=V_2=10$ mL

$D_{cA}= 10$, $D_{cB}=0.1$



Phase 1



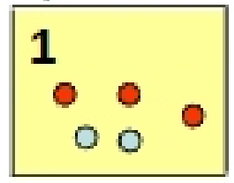

Phase 2

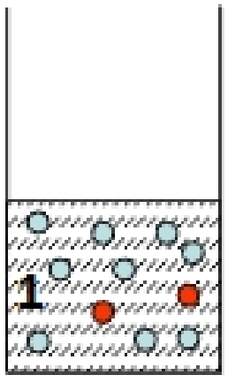
Phase 1

**Extraction 1**

$f_{A2,1}=0.909$

$f_{B2,1}=0.091$

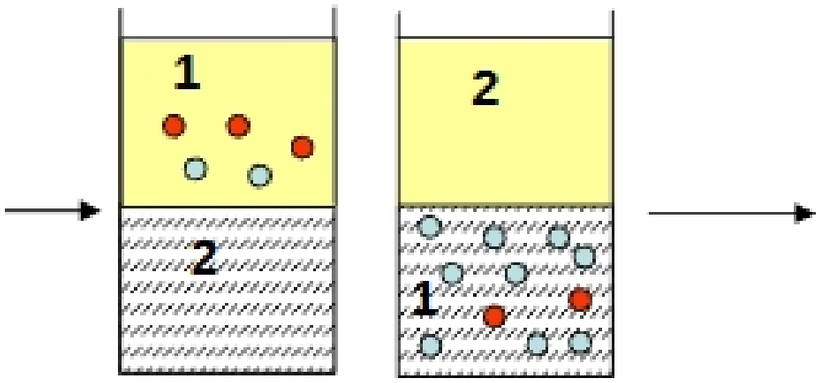



$f_{A1,1}=0.091$

$f_{B1,1}=0.909$

**Separation of phases**




**Addition of fresh phases to Both phase 1 and 2**

Total A =0.909

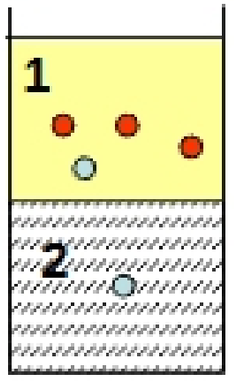
Total B =0.091

$f_{A2,2}=0.826$

$f_{B2,2}=0.008$

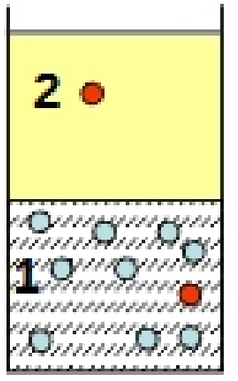
$f_{A1N,2}=0.083$

$f_{B1N,2}=0.083$




Total A = 0.091

Total B = 0.909




$f_{A2N,2}=0.083$

$f_{B2N,2}=0.083$

$f_{A1,2}=0.008$

$f_{B1,2}=0.826$

**Extraction 2**