CONSTANTA DE DISTRIBUTIE

Analitul “i”

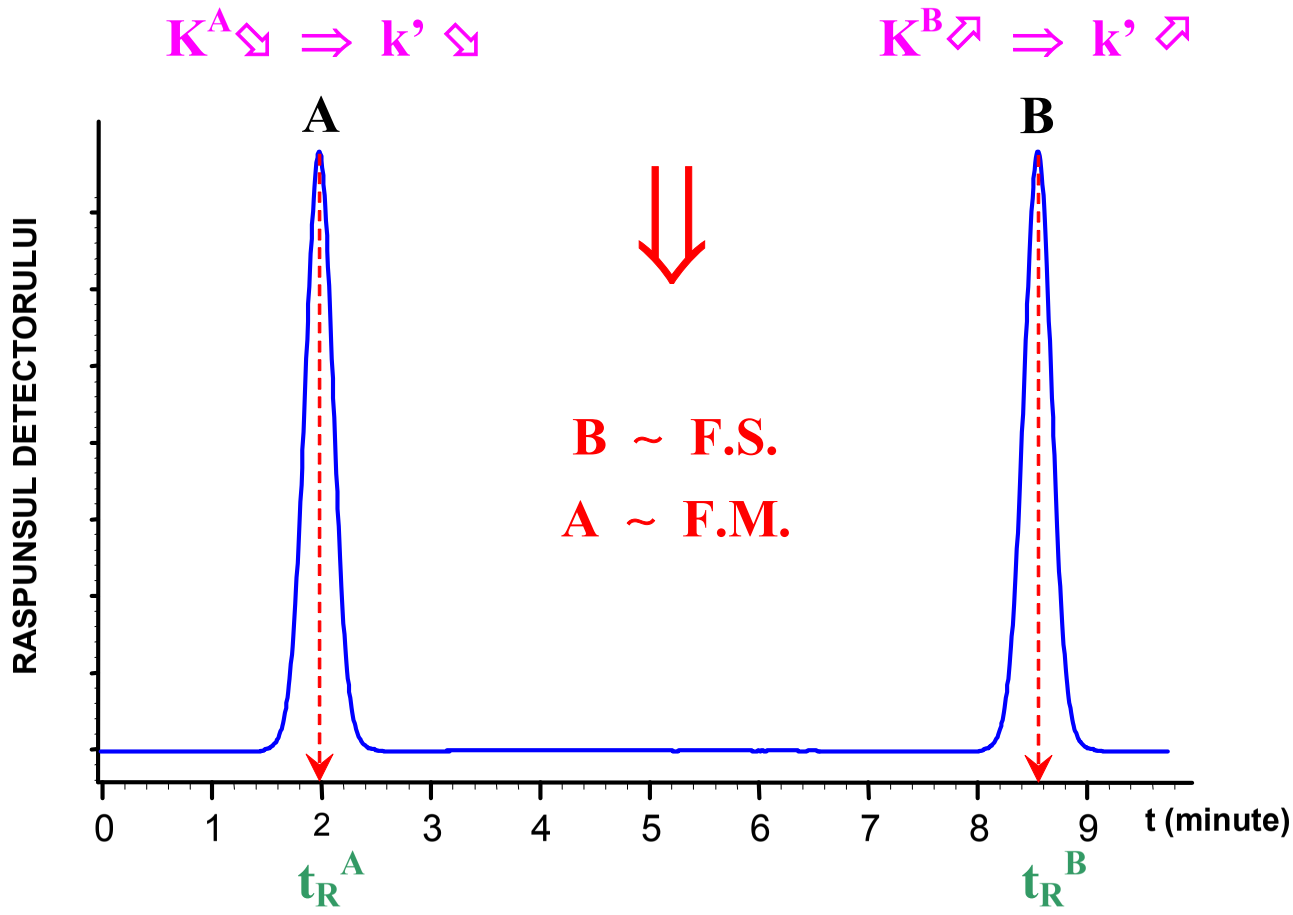
$$K^i = \frac{[i]_{F.S.}}{[i]_{F.M.}} = \frac{q^i_{F.S.}}{q^i_{F.S.}} \times \frac{V_{F.M.}}{V_{F.S.}} =$$

$$= \frac{n^i_{F.S.} \times \cancel{M_w}}{n^i_{F.M.} \times \cancel{M_w}} \times \frac{V_{F.M.}}{V_{F.S.}} = \frac{n^i_{F.S.}}{n^i_{F.M.}} \times \frac{V_{F.M.}}{V_{F.S.}}$$

$$= k' \times \beta$$

F.S., F.M. – univoc definite

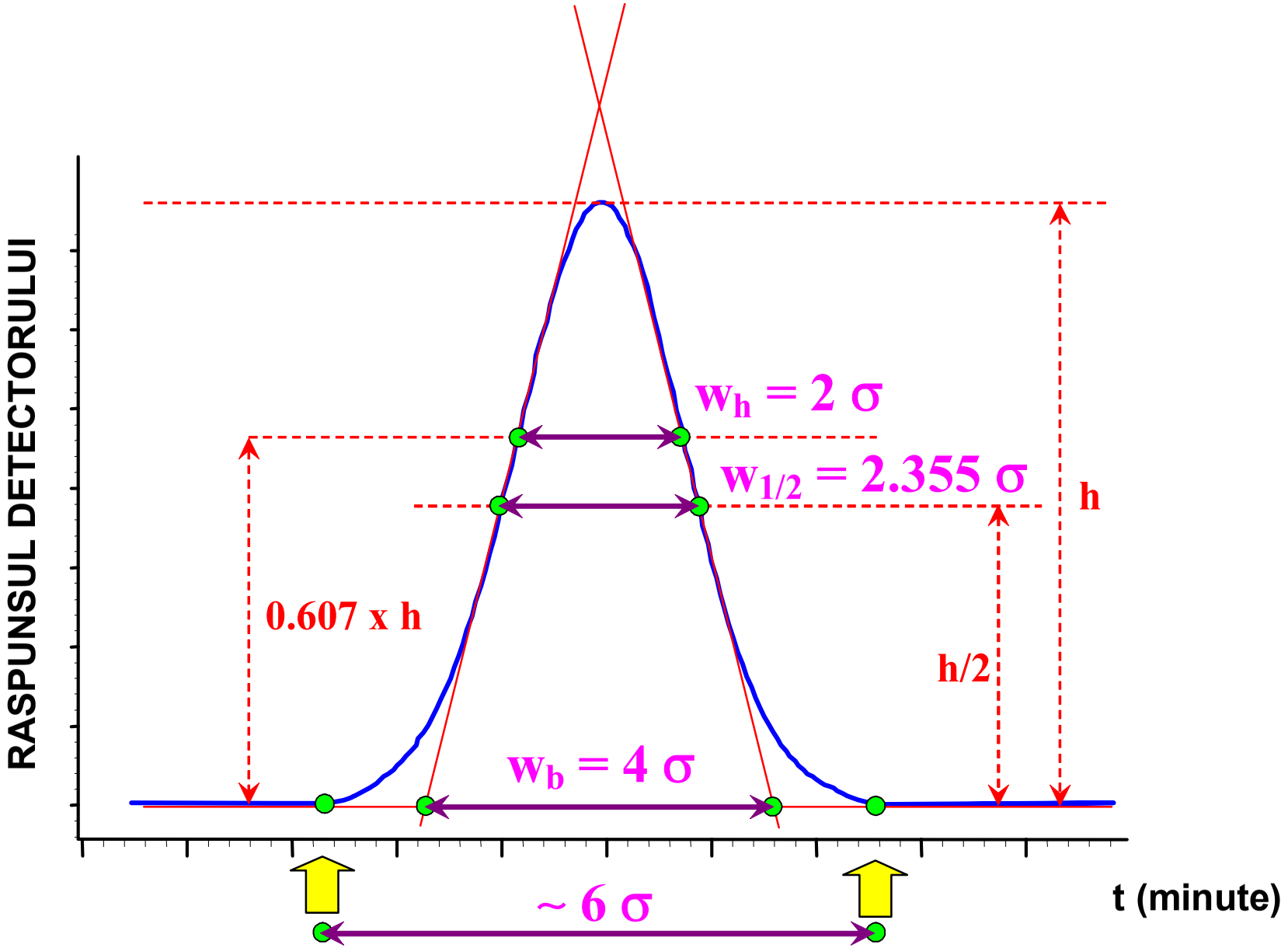
ATENTIE – $K^i = f(T)$

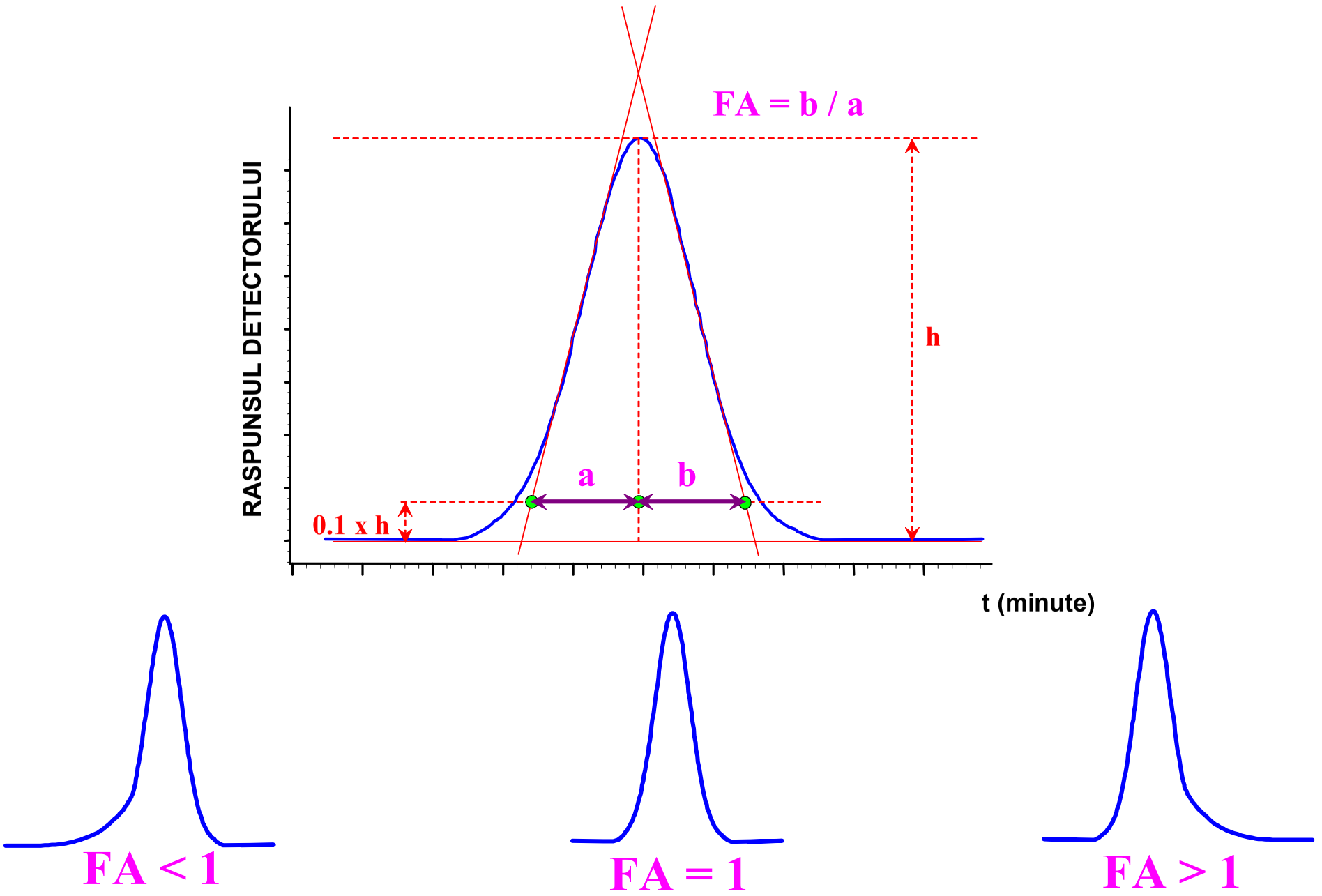

$K^A \searrow \Rightarrow k' \searrow$
$K^B \nearrow \Rightarrow k' \nearrow$
A
B
B ~ F.S.
A ~ F.M.
RASPUNSUL DETECTORULUI
0
1
2
3
4
5
6
7
8
9
t (minute)
t_R^A
t_R^B

t_R	=	timp de retentie absolut
t_R'	=	timp de retentie ajustat
k'	=	factor de capacitate
$t_o \equiv t_M$	=	timp mort
Rt_R	=	timp de retentie relativ a picului A in raport cu picul B

$$t_R' = t_R - t_o; \quad k' = (t_R - t_o)/t_o; \quad Rt_R = t_R^A/t_R^B \text{ sau } t_R'^A/t_R'^B$$

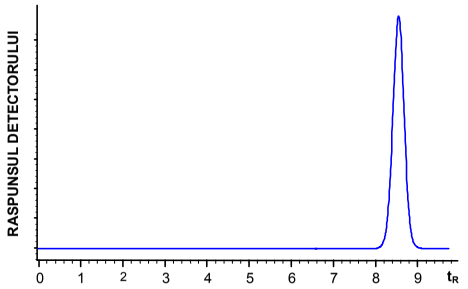
$$V_R = t_R \times F; \; F = \text{Debit}$$


RASPUNSUL DETECTORULUI
$w_h = 2\ \sigma$
$w_{1/2} = 2.355\ \sigma$
h
0.607 x h
h/2
$w_b = 4\ \sigma$
~ 6 σ
t (minute)


FA = b / a
RASPUNSUL DETECTORULUI
h
a
b
0.1 x h
t (minute)
FA < 1
FA = 1
FA > 1

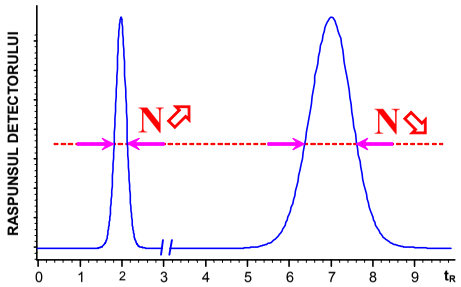
RETENTIE

$$k_i' \uparrow \quad \Rightarrow \quad K^i \uparrow \quad \Rightarrow \quad i \approx F.S.$$



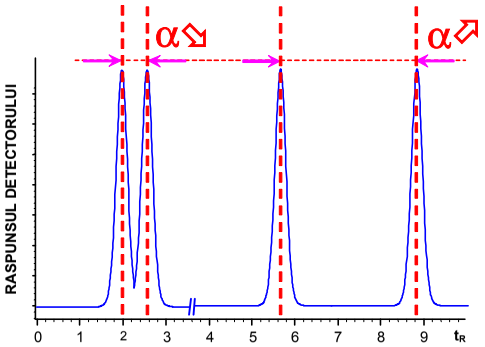
EFICIENTA

$$N^i = \frac{(t_R^i)^2}{\sigma^2}$$



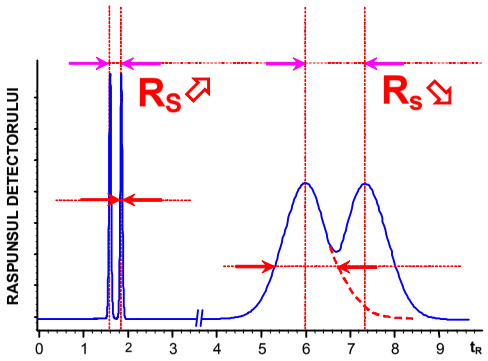
SELECTIVITATE

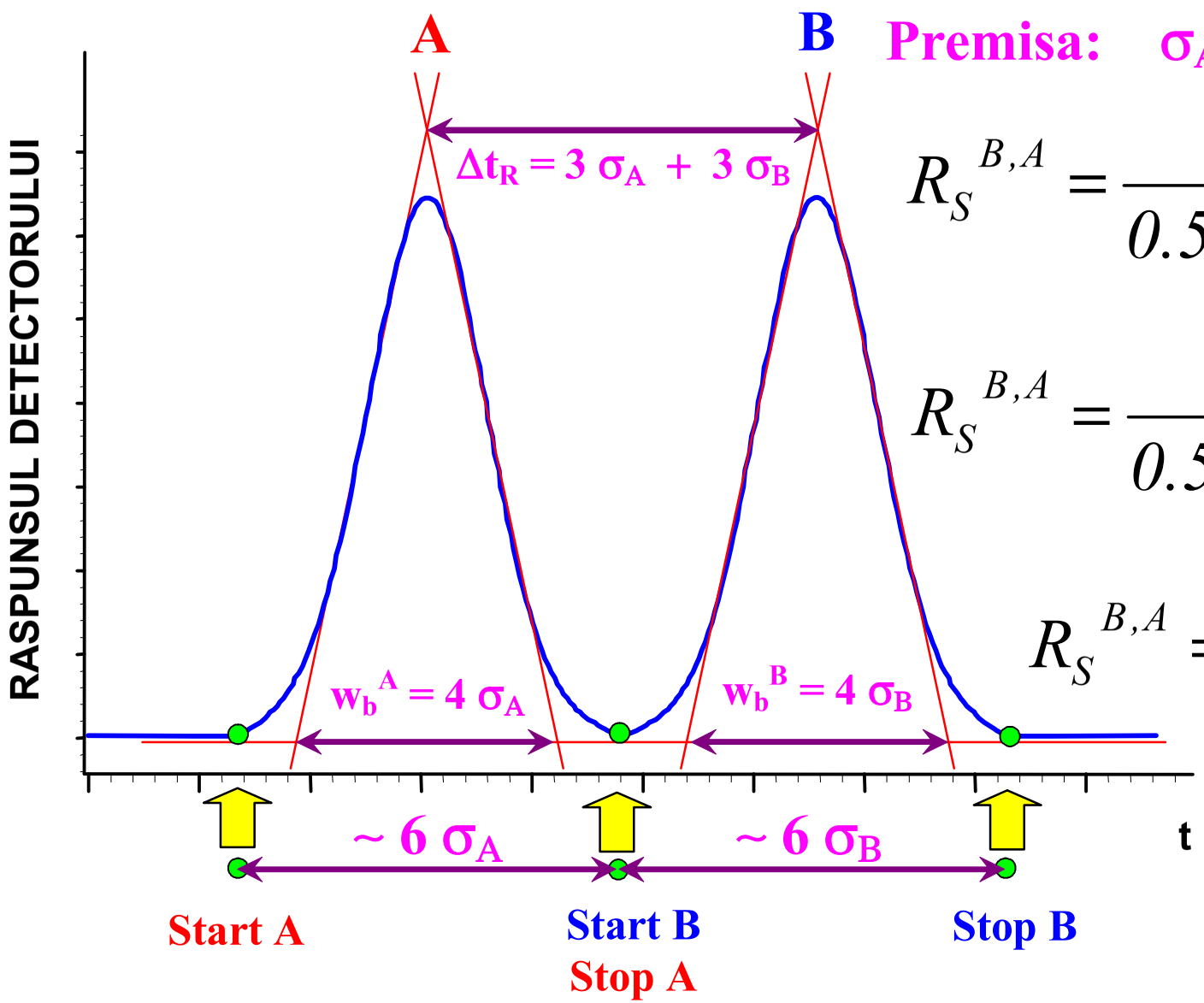
$$\alpha^{i,j} = \frac{k'^j}{k'^i}$$



REZOLUTIE

$$R_S^{\,j,i} = \frac{t_R^j - t_R^i}{0.5 \times (w_b^j + w_b^i)}$$



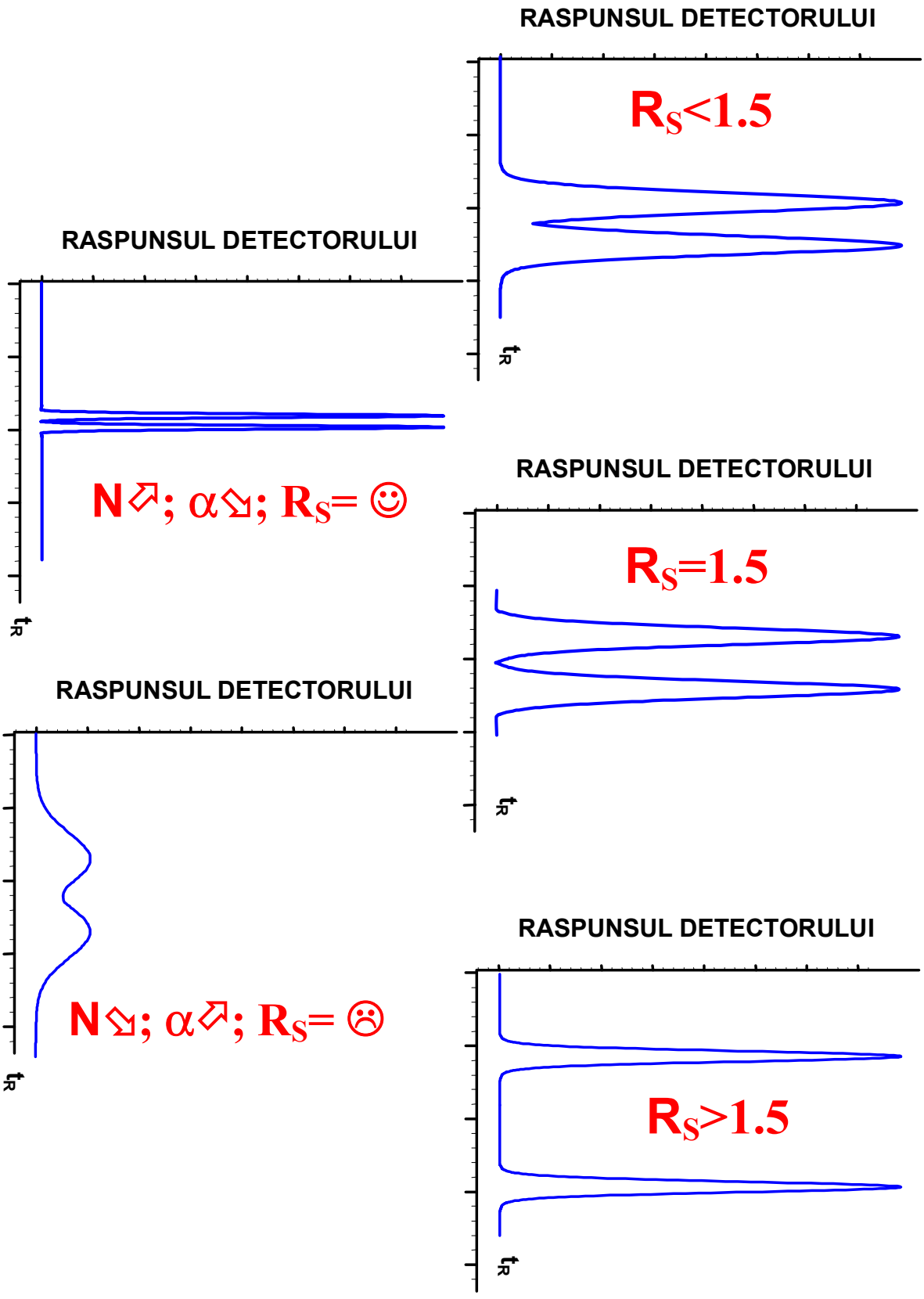


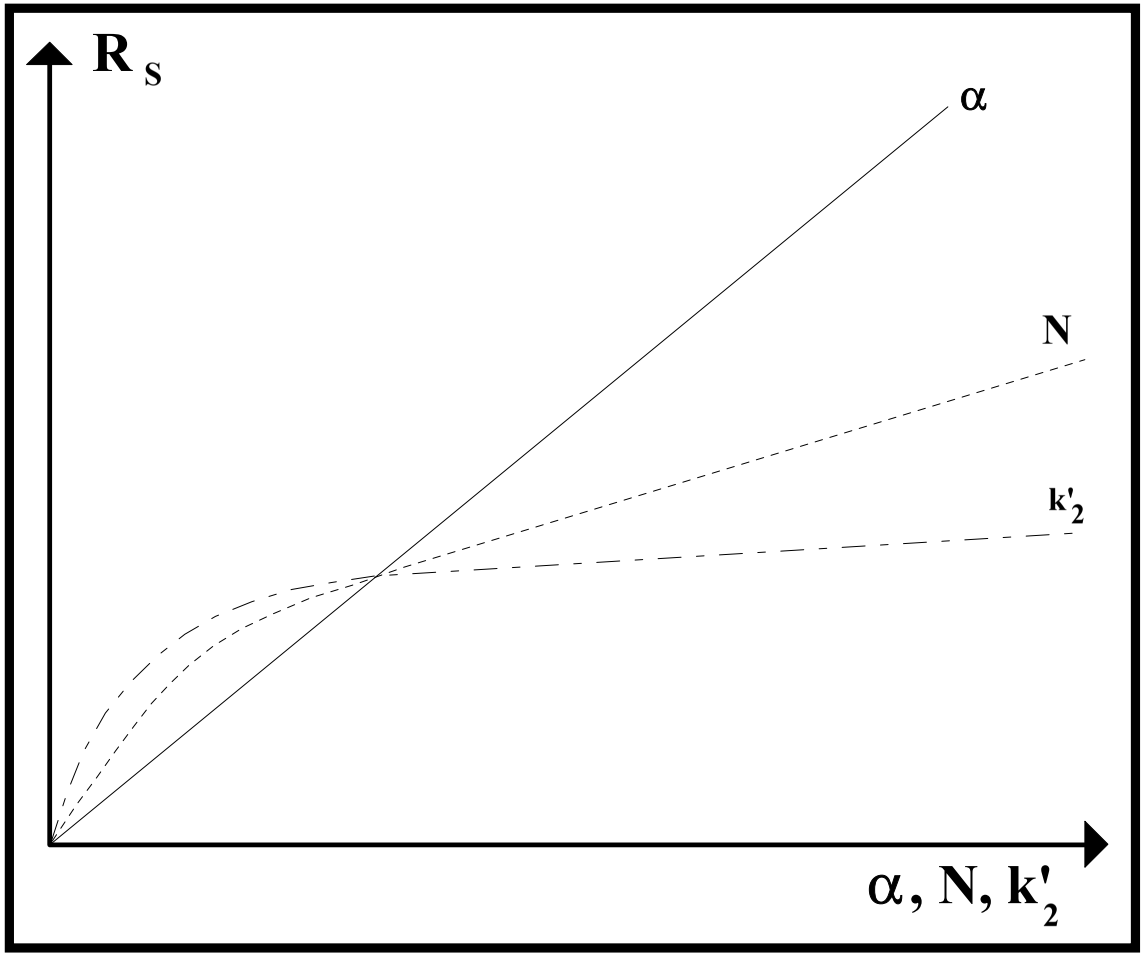
Premisa: $\sigma_A \cong \sigma_A \equiv \sigma$

$$R_S^{B,A} = \frac{t_R^B - t_R^A}{0.5 \times (w_b^B + w_b^A)}$$

$$R_S^{B,A} = \frac{6\sigma}{0.5 \times (4\sigma + 4\sigma)}$$

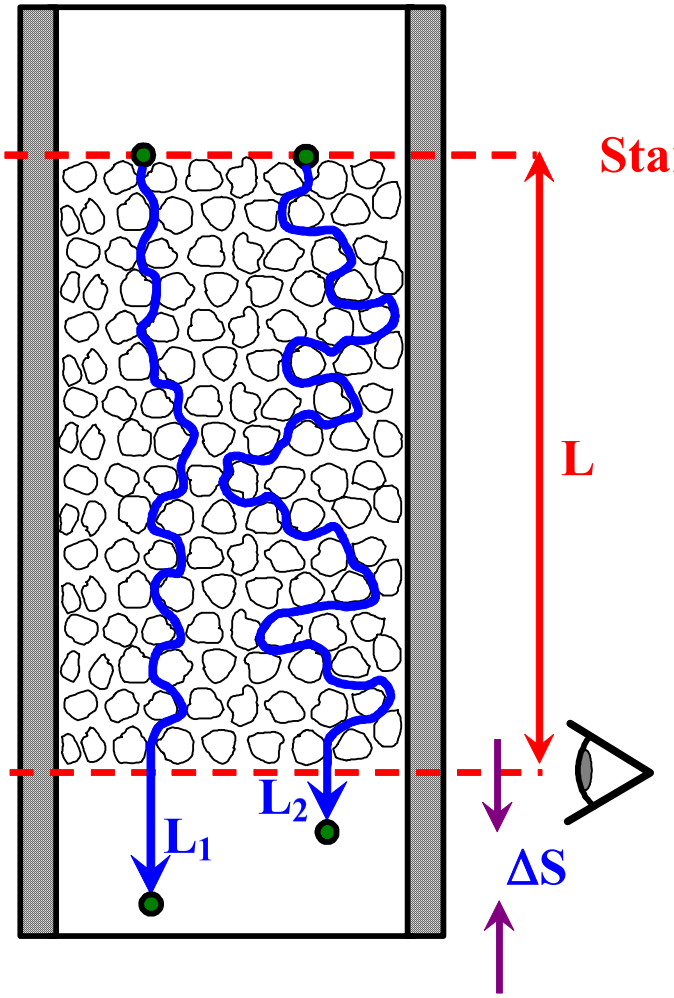
$$R_S^{B,A} = \frac{6\sigma}{4\sigma} = 1.5$$


RASPUNSUL DETECTORULUI
R_S<1.5
t_R
RASPUNSUL DETECTORULUI
N⇗; α⇘; R_S= ☺
t_R
RASPUNSUL DETECTORULUI
R_S=1.5
t_R
RASPUNSUL DETECTORULUI
N⇘; α⇗; R_S= ☹
t_R
RASPUNSUL DETECTORULUI
R_S>1.5
t_R



$$R_S = \frac{\sqrt{N}}{2} \times \frac{\alpha - 1}{\alpha + 1} \times \frac{k'}{k + 1'}$$

ANIZOTROPIA CURGERII



K – constanta de distributie ptr.

L – lungimea coloanei

u – viteza medie a F.M.

H = f(u) ?

$H = 1 / N;\ N \sim L / \Delta S \Rightarrow H \sim \Delta S$

$\Delta S = u \times \Delta t;\ \Delta t = (L_2 - L_1) / u$

$\Delta S = u \times (L_2 - L_1) / u \Rightarrow$

$H \sim (L_2 - L_1) \Rightarrow H \neq f(u)$

daca $d_p \searrow (L_2 - L_1) \searrow \Rightarrow H \searrow \Rightarrow N \nearrow$

daca $d_p \nearrow (L_2 - L_1) \nearrow \Rightarrow H \nearrow \Rightarrow N \searrow$

daca unif. umplerii $\nearrow (L_2 - L_1) \searrow \Rightarrow H \searrow \Rightarrow N \nearrow$

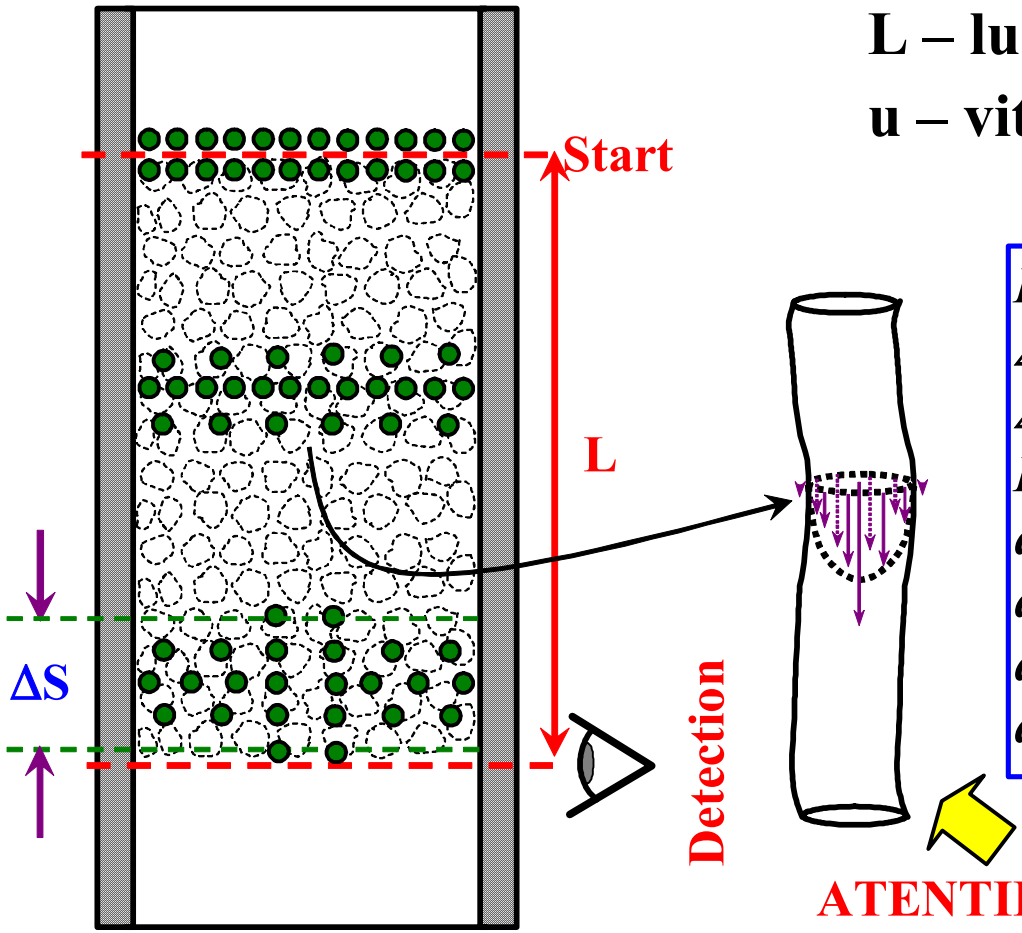
daca unif. umplerii $\searrow (L_2 - L_1) \nearrow \Rightarrow H \nearrow \Rightarrow N \searrow$

DIFUZIA LONGITUDINALA

K – constanta de distributie ptr. ●

L – lungimea coloanei

u – viteza medie a F.M.



H = f(u) ?

$H = 1 / N;\ N \sim L / \Delta S \Rightarrow H \sim \Delta S$

$\Delta S = v_D^{F.M.} \times t; \quad t = L / u$

$\Delta S = v_D^{F.M.} \times L / u \Rightarrow$

$H \sim v_D^{F.M.} \times L / u \Rightarrow H \sim f(1 / u)$

daca $u \nearrow \Delta S \searrow \Rightarrow H \searrow \Rightarrow N \nearrow$

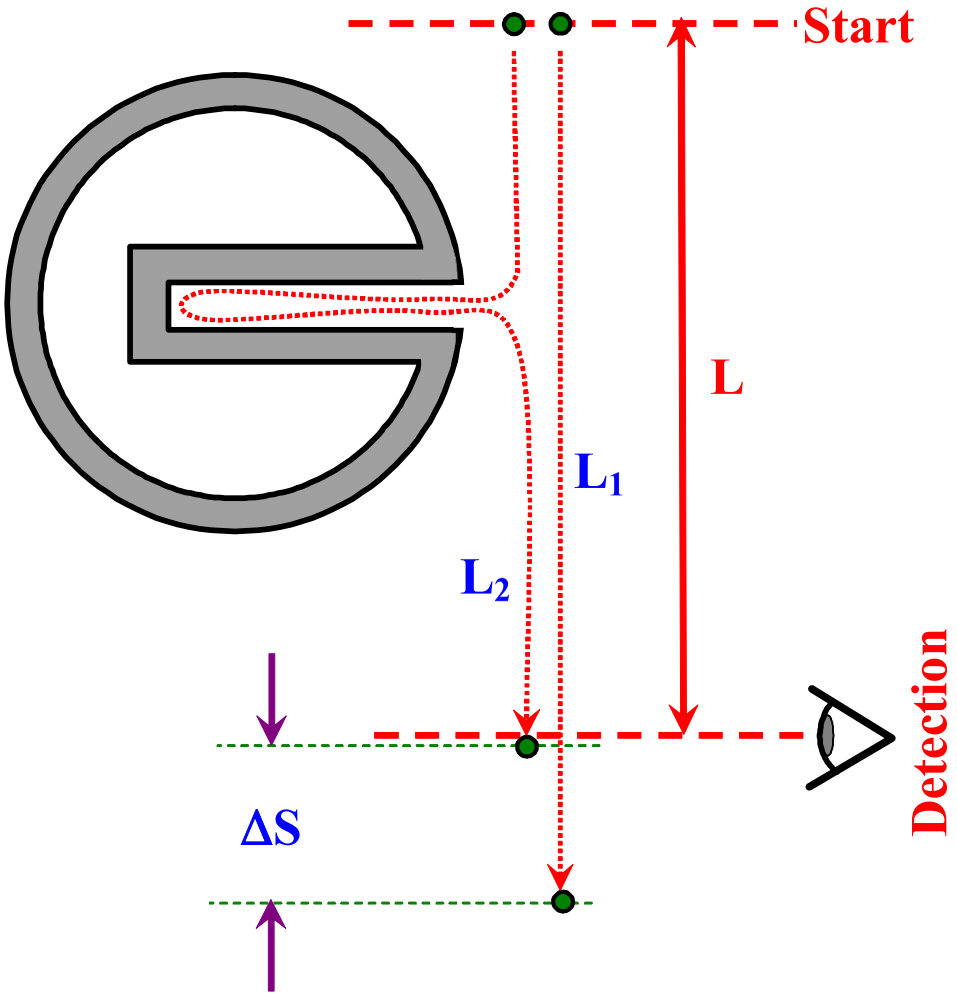
daca $u \searrow \Delta S \nearrow \Rightarrow H \nearrow \Rightarrow N \searrow$

daca $v_D^{F.M.} \nearrow \Delta S \nearrow \Rightarrow H \nearrow \Rightarrow N \searrow$

daca $v_D^{F.M.} \searrow \Delta S \searrow \Rightarrow H \searrow \Rightarrow N \nearrow$

ATENTIE – Nu uita contributia profilului de curgere hiperbolic in regim laminar !

REZISTENTA LA TRANSFERUL DE MASA IN FAZA MOBILA



K – constanta de distributie ptr.

L – lungimea coloanei

u – viteza medie a F.M.

H = f(u) ?

$H = 1 / N;\ N \sim L / \Delta S \Rightarrow H \sim \Delta S$

$\Delta S = u \times \Delta t;\quad \Delta t = t_2 - t_1$

$t_2 = L / u + (L_2 - L_1) / v_D^{F.M.};$

$t_1 = L / u;\ \Delta t = (L_2 - L_1) / v_D^{F.M.}$

$\Delta S = u \times (L_2 - L_1) / v_D^{F.M.} \Rightarrow$

$H \sim u \times (L_2 - L_1) / v_D^{F.M.} \Rightarrow$

$H \sim f(u, 1/ v_D^{F.M.})$

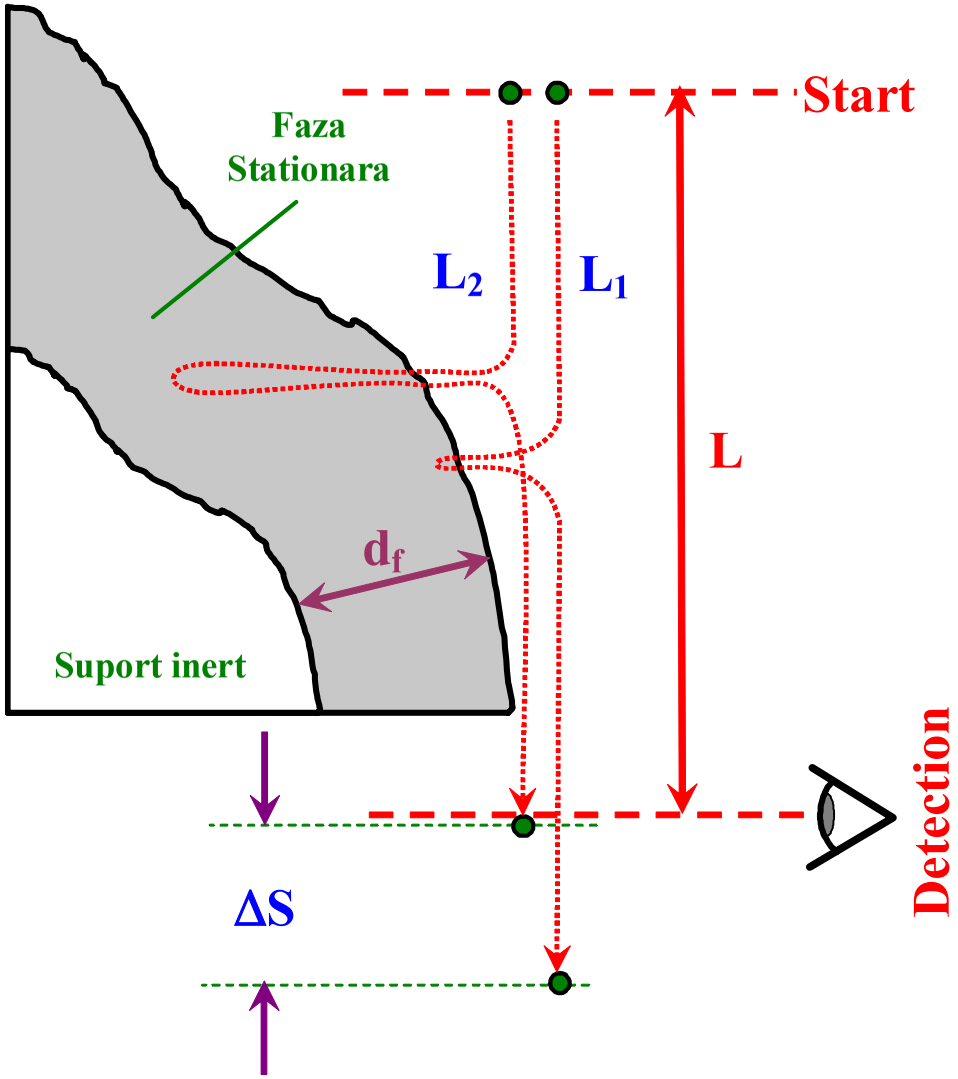
daca $u \nearrow \Delta S \nearrow \Rightarrow H \nearrow \Rightarrow N \searrow$

daca $u \searrow \Delta S \searrow \Rightarrow H \searrow \Rightarrow N \nearrow$

daca $v_D^{F.M.} \nearrow \Delta S \searrow \Rightarrow H \searrow \Rightarrow N \nearrow$

daca $v_D^{F.M.} \searrow \Delta S \nearrow \Rightarrow H \nearrow \Rightarrow N \searrow$

REZISTENTA LA TRANSFERUL DE MASA IN FAZA STATIONARA



K – constanta de distributie ptr.

L – lungimea coloanei

u – viteza medie a F.M.

H = f(u) ?

$H = 1/N;\ N \sim L/\Delta S \Rightarrow H \sim \Delta S$

$\Delta S = u \times \Delta t;\quad \Delta t = t_2 - t_1$

$t_2 = L_1/u + (L_2-L_1)/v_D^{F.S.};$

$t_1 = L_1/u;\ \Delta t = (L_2-L_1)/v_D^{F.S.}$

$\Delta S = u \times (L_2-L_1)/v_D^{F.S.} \Rightarrow L_2 = f'(d_f)$

$H \sim u \times (f'(d_f) - L_1)/v_D^{F.S.} \Rightarrow$

$H \sim f(u, d_f, 1/v_D^{F.S.})$

daca $u \nearrow \Delta S \nearrow \Rightarrow H \nearrow \Rightarrow N \searrow$

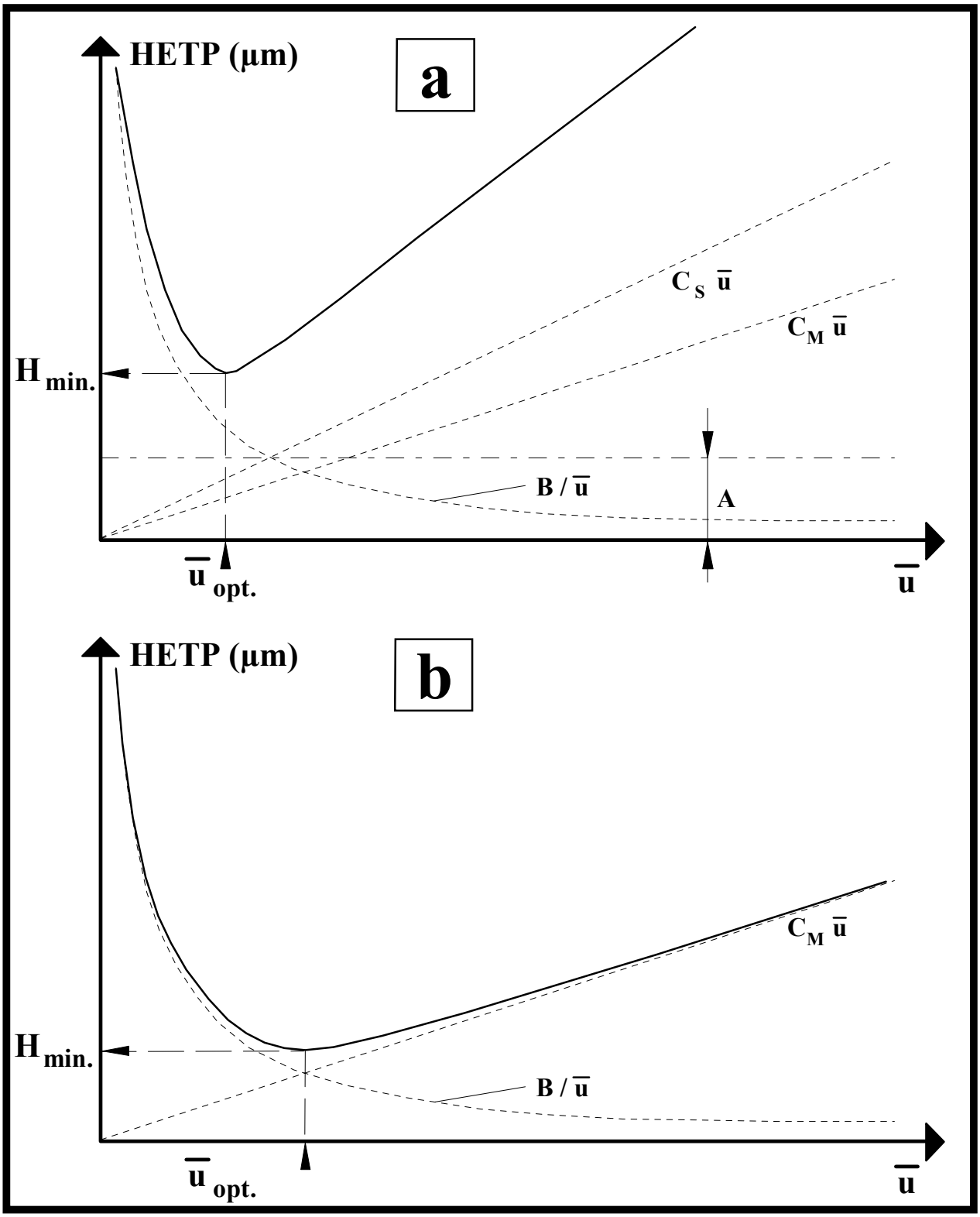
daca $u \searrow \Delta S \searrow \Rightarrow H \searrow \Rightarrow N \nearrow$

daca $v_D^{F.S.} \nearrow \Delta S \searrow \Rightarrow H \searrow \Rightarrow N \nearrow$

daca $v_D^{F.S.} \searrow \Delta S \nearrow \Rightarrow H \nearrow \Rightarrow N \searrow$

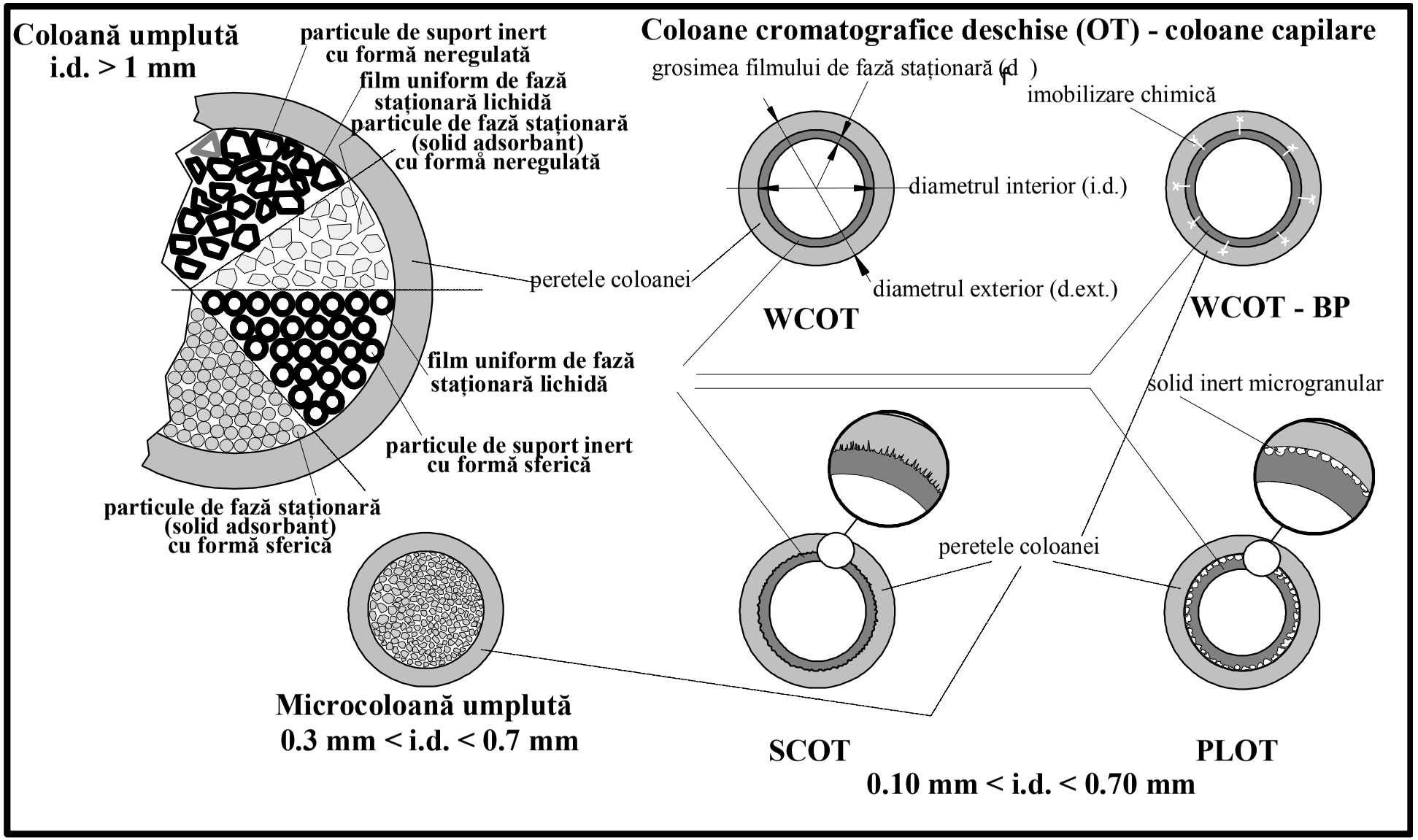
daca $d_f \nearrow \Delta S \nearrow \Rightarrow H \nearrow \Rightarrow N \searrow$

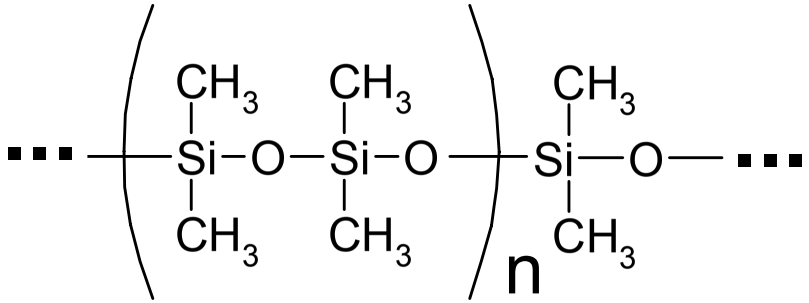
daca $d_f \searrow \Delta S \searrow \Rightarrow H \searrow \Rightarrow N \nearrow$



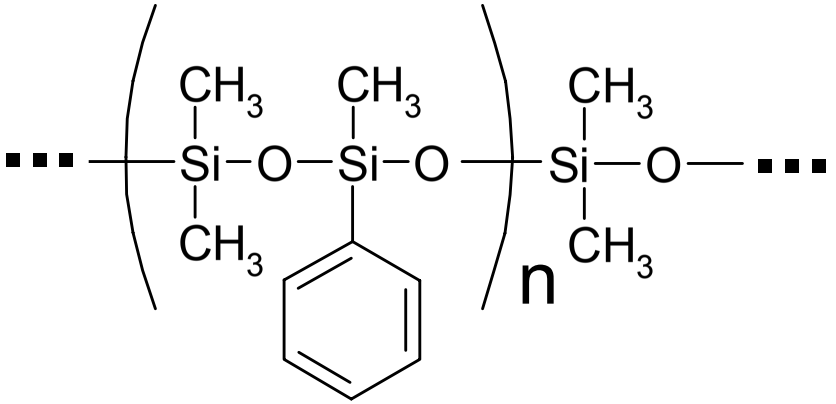
Ecuatia Golay – Van Deemter

a – coloana umpluta;
b – coloana deschisa (d_f mic)


Coloană umplută
i.d. > 1 mm
particule de suport inert cu formă neregulată
film uniform de fază staționară lichidă
particule de fază staționară (solid adsorbant) cu formă neregulată
peretele coloanei
film uniform de fază staționară lichidă
particule de suport inert cu formă sferică
particule de fază staționară (solid adsorbant) cu formă sferică
Microcoloană umplută
0.3 mm < i.d. < 0.7 mm
Coloane cromatografice deschise (OT) - coloane capilare
grosimea filmului de fază staționară (d f)
diametrul interior (i.d.)
diametrul exterior (d.ext.)
WCOT
imobilizare chimică
WCOT - BP
solid inert microgranular
peretele coloanei
SCOT
PLOT
0.10 mm < i.d. < 0.70 mm



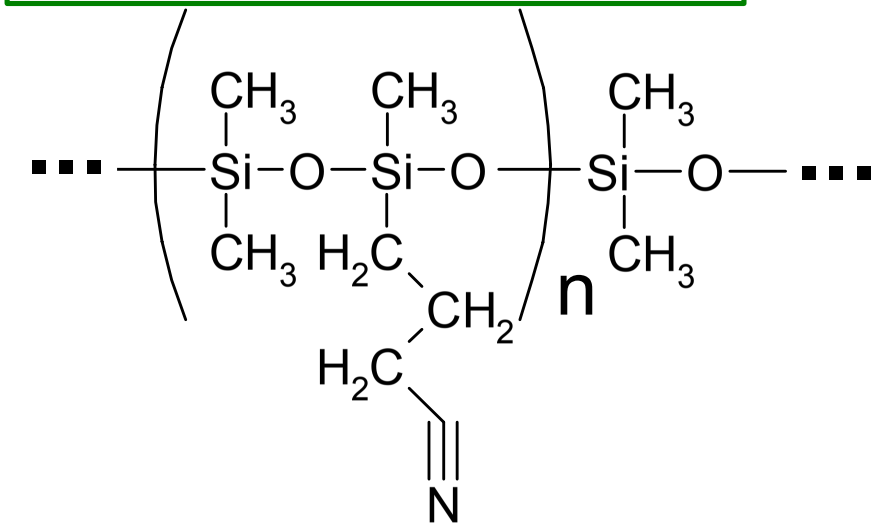
OV-1; HP-1;DB-1; BP-1; Ultra1; RSL150; JXR; SE-30



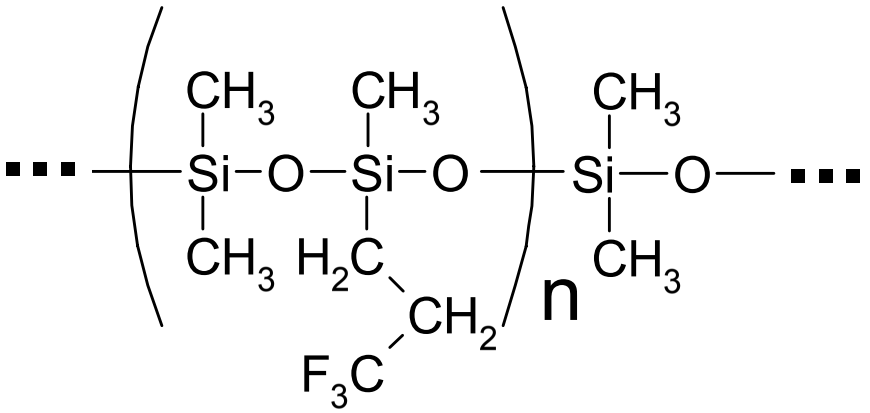
OV-73; HP-5;DB-5; SE-54; Ultra2; CPSil8 (5% Ph)

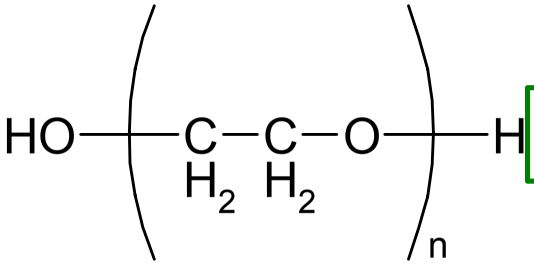
OV-17; HP-7;DB-17 (50% Ph)

Silar 10 C; SP 2340



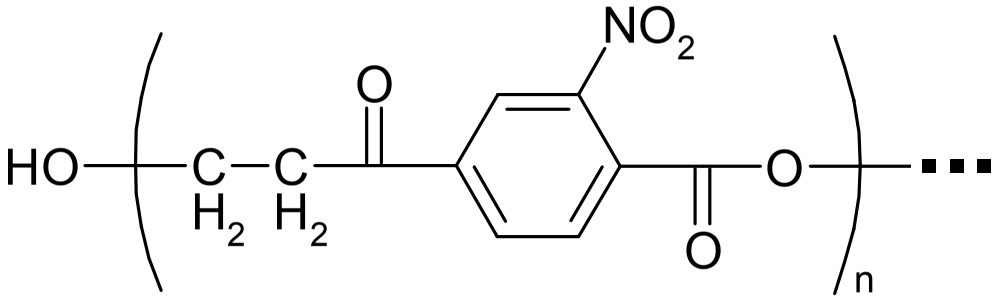
OV-210

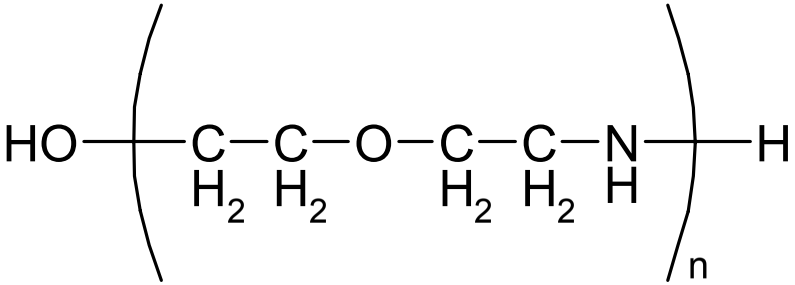




PEG; CARBOWAX

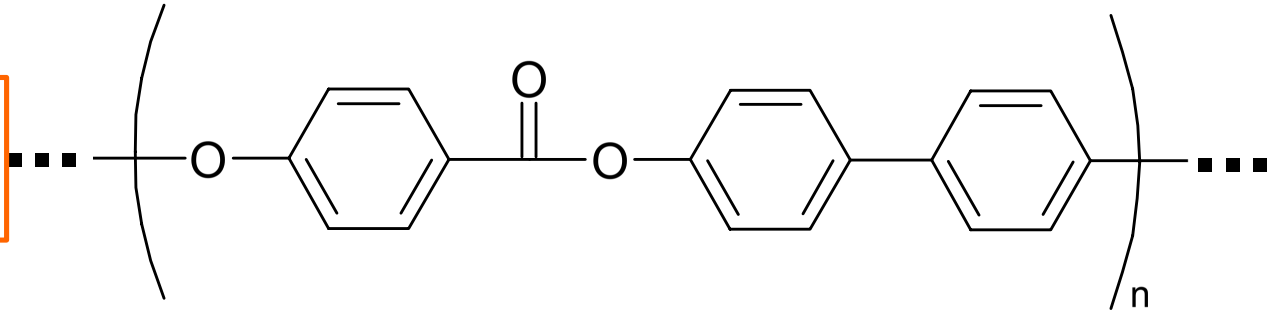
FFAP – free fatty acid phase



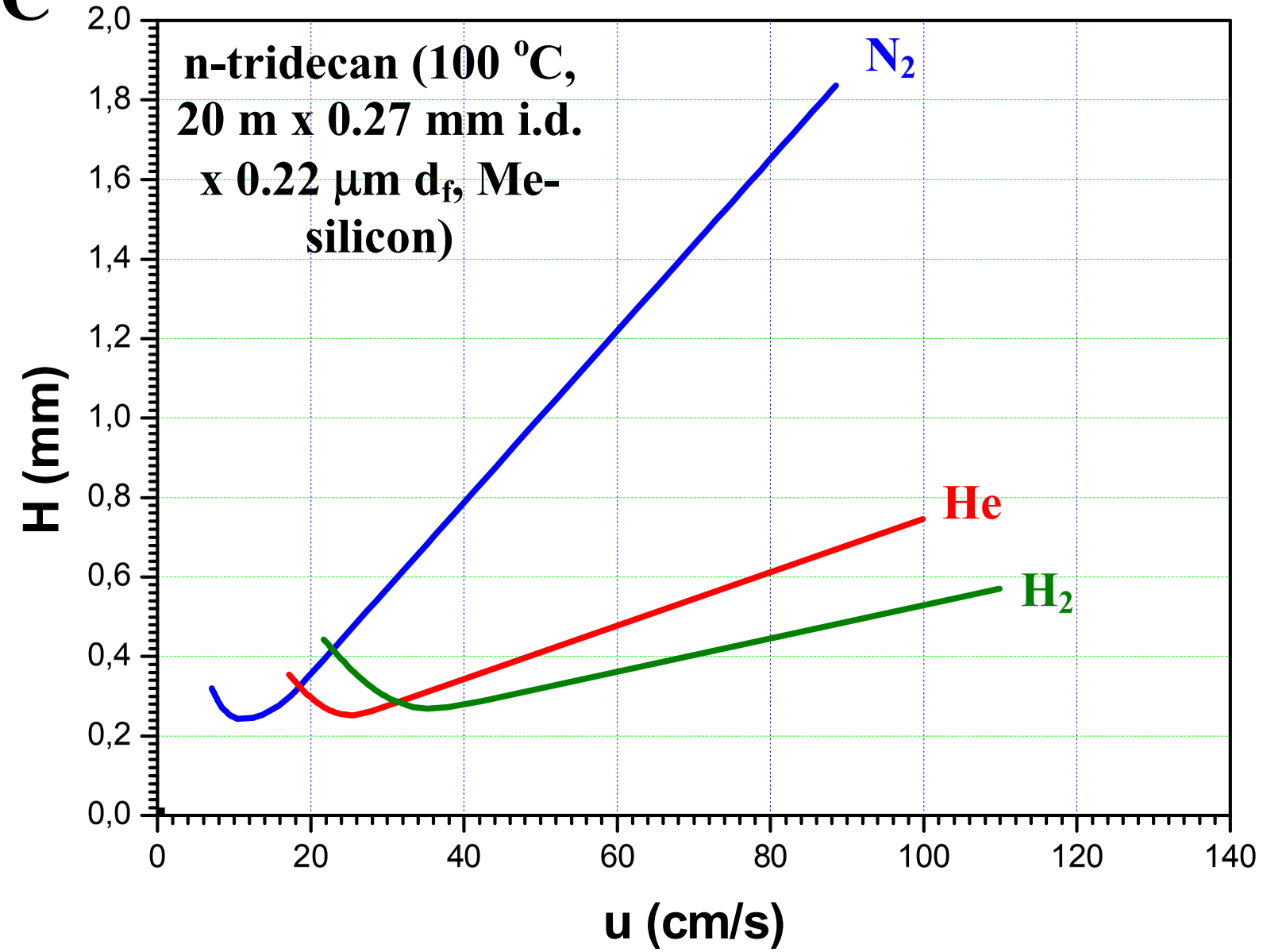


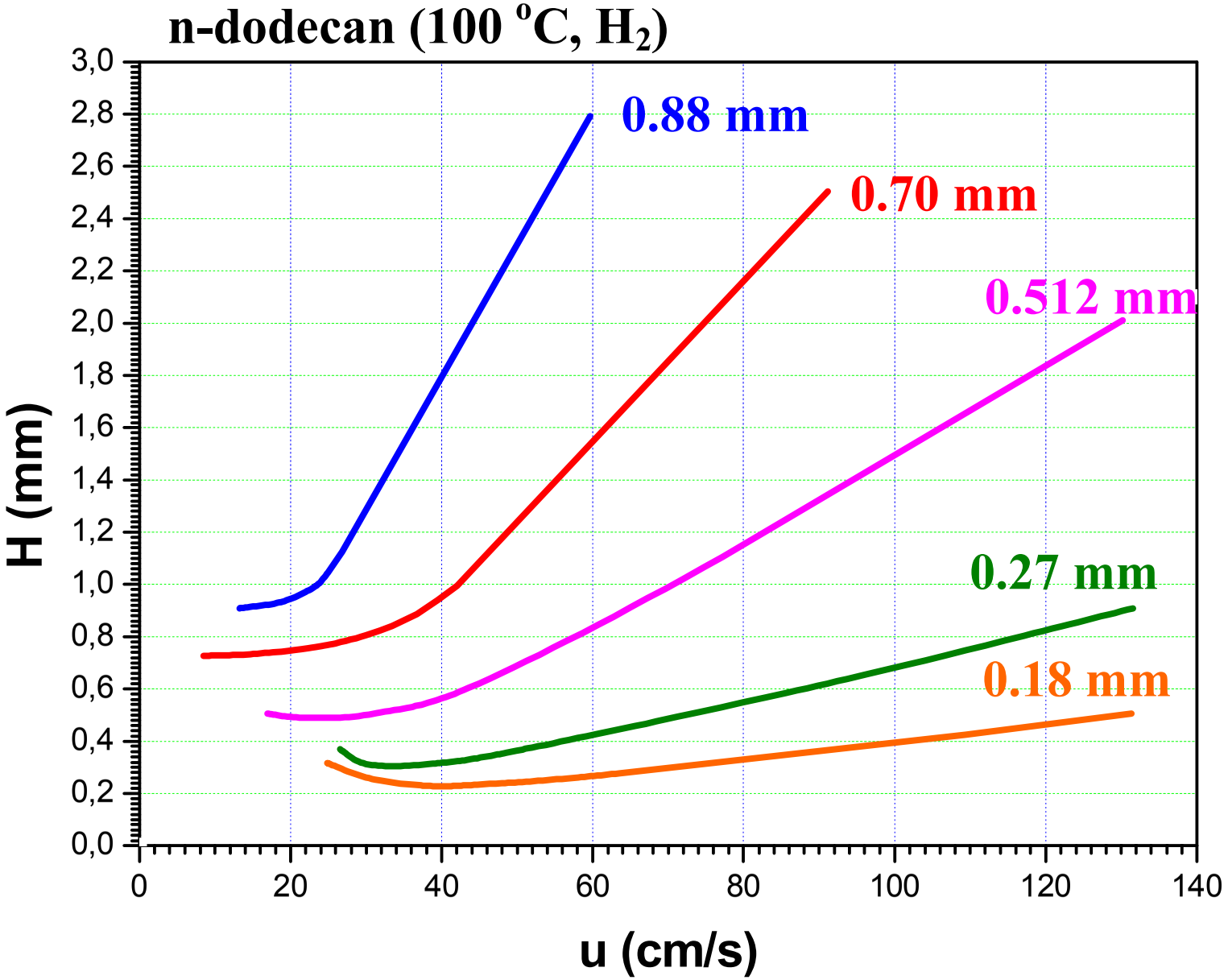
Dedicata alcaloizilor si derivatilor piridinici

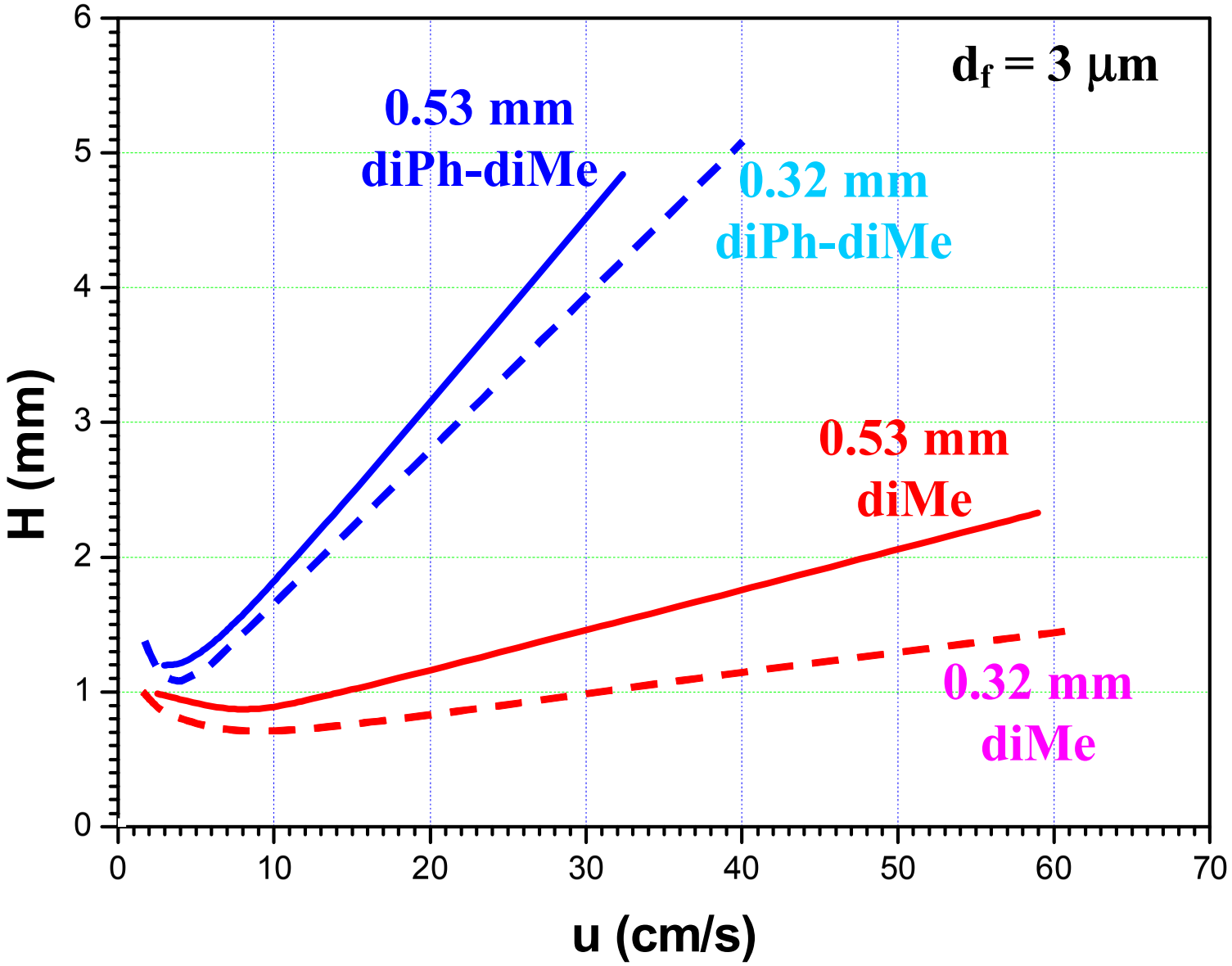
Dedicata comp. aromatici



GC


n-tridecan (100 °C,
20 m x 0.27 mm i.d.
x 0.22 µm df, Me-
silicon)
N2
He
H2
H (mm)
u (cm/s)
0,0
0,2
0,4
0,6
0,8
1,0
1,2
1,4
1,6
1,8
2,0
0
20
40
60
80
100
120
140


n-dodecan (100 °C, H2)
H (mm)
u (cm/s)
0.88 mm
0.70 mm
0.512 mm
0.27 mm
0.18 mm
3,0
2,8
2,6
2,4
2,2
2,0
1,8
1,6
1,4
1,2
1,0
0,8
0,6
0,4
0,2
0,0
0
20
40
60
80
100
120
140


$d_f = 3$ μm
0.53 mm
diPh-diMe
0.32 mm
diPh-diMe
0.53 mm
diMe
0.32 mm
diMe
H (mm)
u (cm/s)
0
1
2
3
4
5
6
0
10
20
30
40
50
60
70