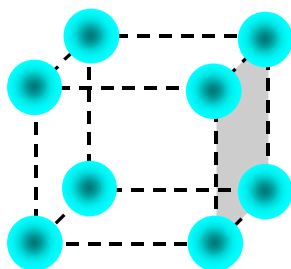


**III.Fizika BSC**  
**2014/2015 I.félév**  
**Kondenzált anyag fizika**  
**5. GYAKORLAT**  
(2014. Október 7.)

**Szimmetriák, egyszerű rácsok és kitöltésük (K), W.-S. cella.**

**I. Egyszerű rácsok:**

a) Egyszerű köbös rács  
(SC)



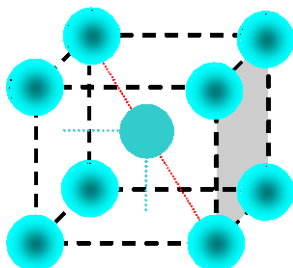
$$N = 1 = ( \text{●} )$$

$$K = \frac{[4\pi/3]r^3}{a^3} = \frac{\pi}{6} = 52\%$$

$$2r = a$$

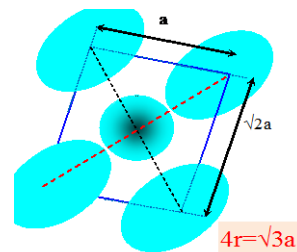
b)

Tércentrált köbös rács  
(BCC)



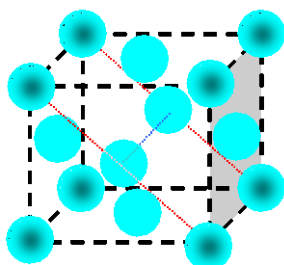
$$N = 2 = ( \text{●} + \text{●} )$$

$$K = \frac{2([4\pi/3]r^3)}{a^3} = \frac{\sqrt{3}\pi}{8} = 68\%$$



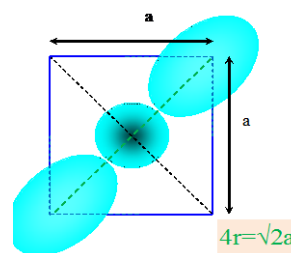
c)

Lapcentrált köbös rács  
(FCC)



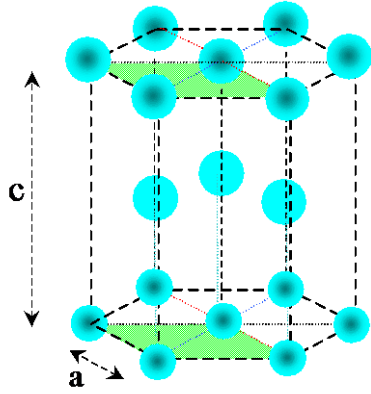
$$N = 4 = ( \text{●} + 3 \text{●} )$$

$$K = \frac{4([4\pi/3]r^3)}{a^3} = \frac{\sqrt{2}\pi}{6} = 74\%$$



d)

Szoros ill. hexagonális rács  
(HCP)

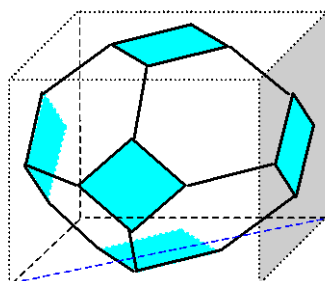
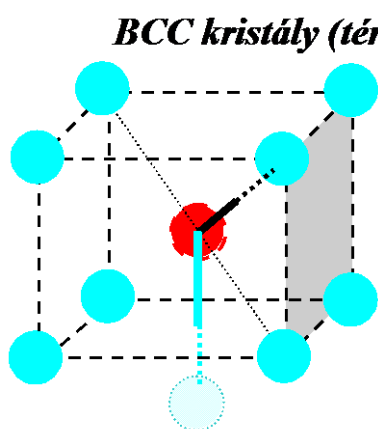


$$N = 2 = ( \text{●} + \text{●} )$$

$$K^{HCP} = K^{FCC} = \frac{\sqrt{2} \pi}{6} = 74\%$$

## II. Wigner-Seitz cellák

### 1. BCC Wigner-Seitz cella



**Wigner-Seitz cella**

8-kötés  $\Rightarrow$  8-

6-oldal + 6-

a)  $V^{BCC} = a^3 (1/2)$

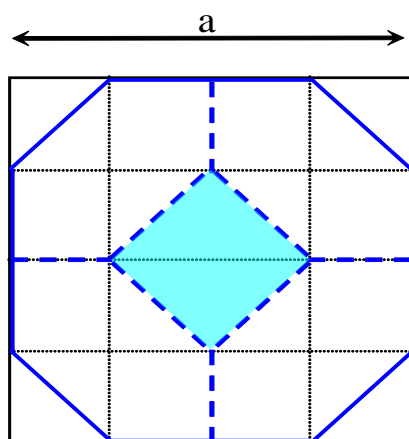
b) **Felület**

-Negyedelő pontok  
-Lapátlóval párhuzamos élek

c) **Beírt gömb sugara**

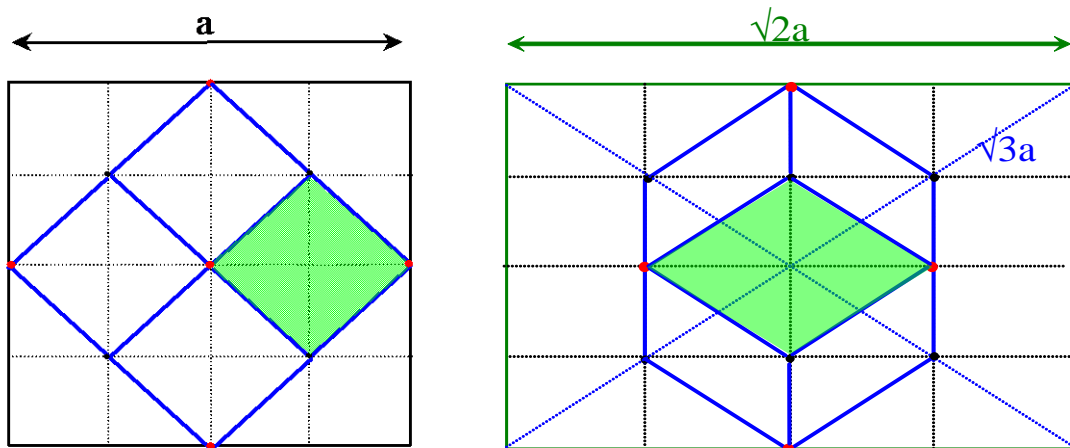
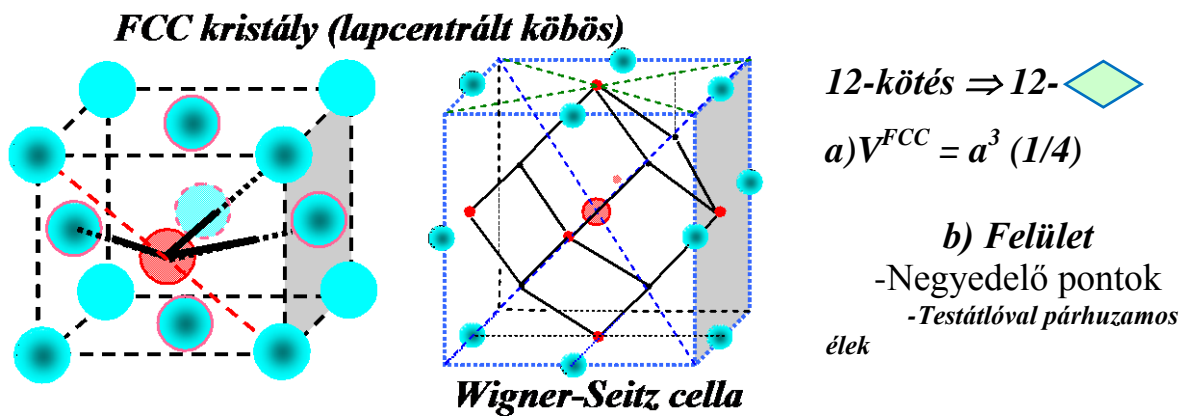
Testátló negyede:  $r_{be}^{BCC} = \sqrt{3}/4 a$

d) **Beírt gömb térfogathányada:**



$$V_g / V^{w.s.} = \left( \frac{[4\pi/3] r_{be}^3}{(1/2 a^3)} \right) = \frac{\sqrt{3} \pi}{8} = 68\%$$

## 2.FCC Wigner-Seitz cella



### c) Beírt gömb sugara

Lapátló negyede:  $r_{be}^{FCC} = \sqrt{2}/4 a$

### d) Beírt gömb térfogathányada:

$$V_g / V^{w.s.} = \left( \left[ \frac{4\pi}{3} r_{be}^3 \right] \right) / \left( \frac{1}{4} a^3 \right) = \frac{\sqrt{2} \pi}{6} = 74\%$$