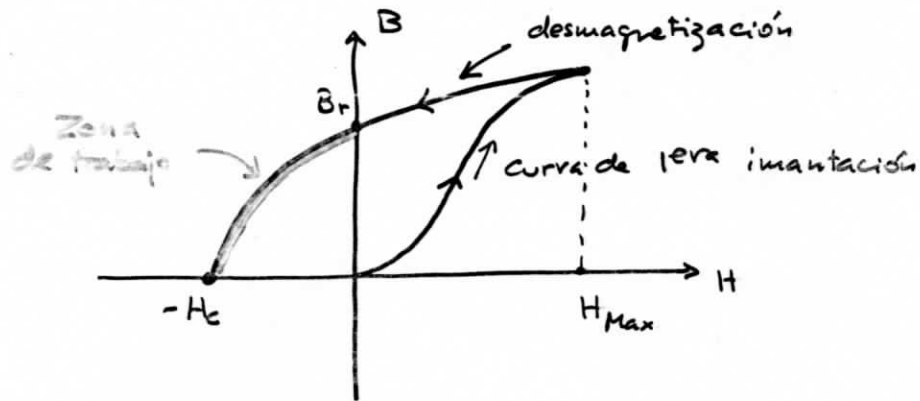
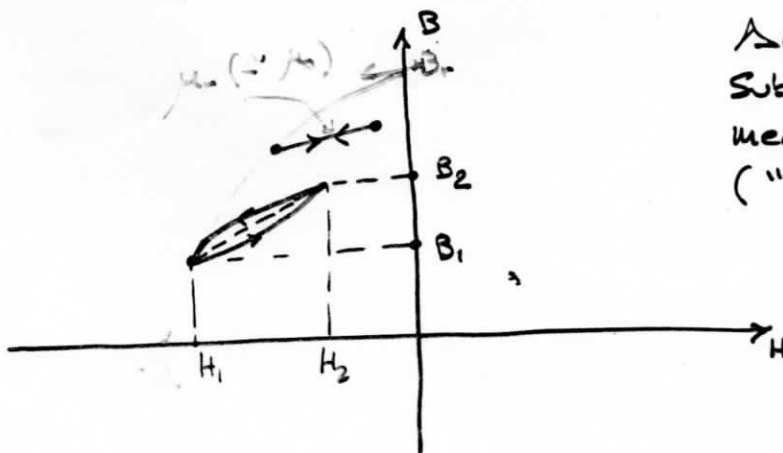
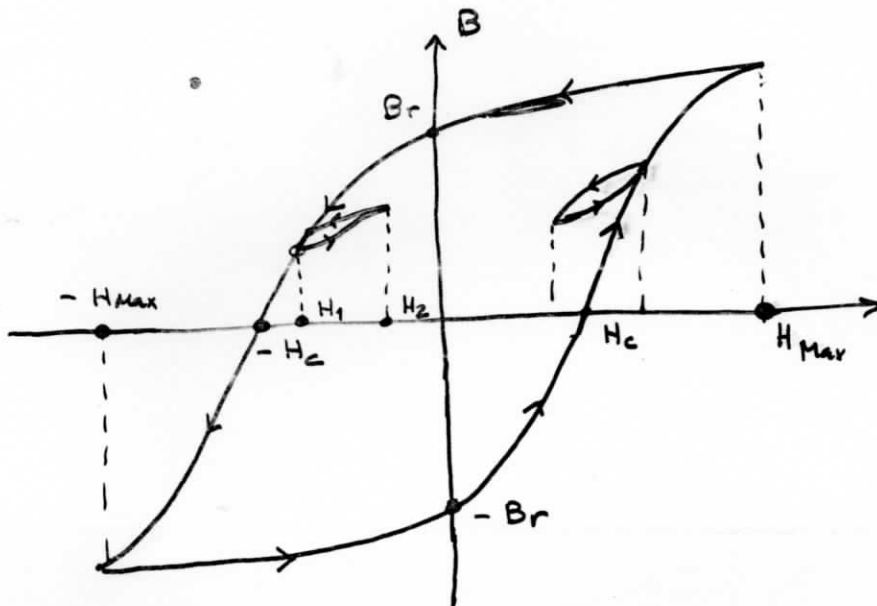


• Características de un imán permanente

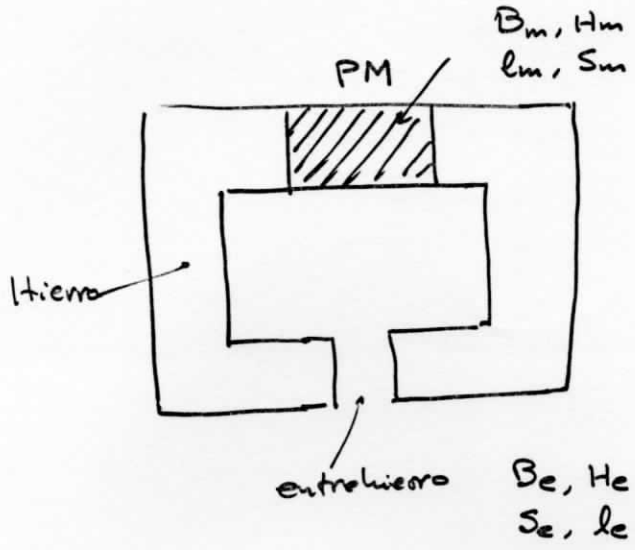


• "Rectas de retorno" (Subciclos de histéresis)



Punto de funcionamiento de un circuito magnético excitado por imán permanente.

- Característica $B(H)$ conocida
- Geometría conocida.



1) Hipótesis simplificadoras

$$\mu_{rFe} = \infty$$

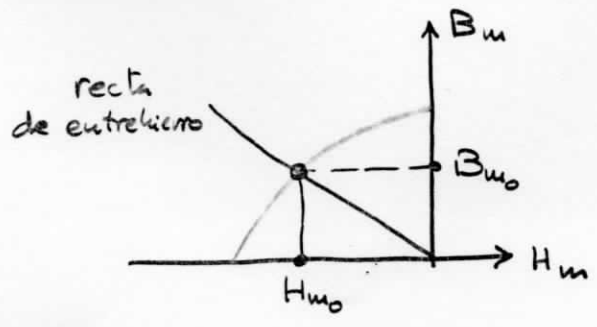
$\Rightarrow H_{Fe} = 0$
y no hay fugas

- (1) $B_m S_m = B_e S_e = \phi$
- (2) $H_m l_m + H_e l_e = 0$
- (3) $B_e = \mu_0 H_e$
- (4) $B_m = B_m(H_m)$
no lineal.

$$B_m = \frac{S_e}{S_m} B_e = \frac{S_e}{S_m} \mu_0 H_e$$

$$\Rightarrow B_m = -\mu_0 \frac{S_e}{S_m} \cdot \frac{l_m}{l_e} \cdot H_m$$

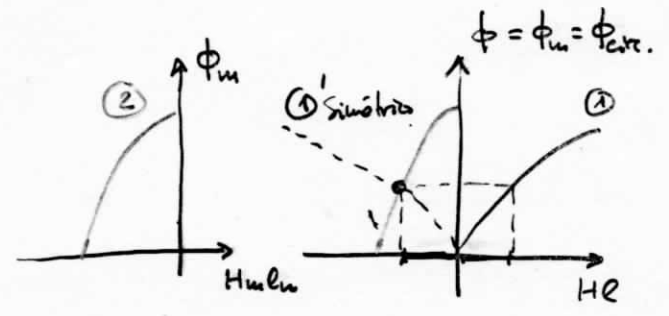
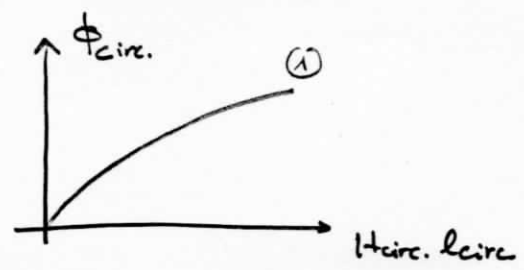
"Recta de entrehierro"



B_{m0}, H_{m0} : punto de funcionamiento de PM

2) Si el hierro presenta saturación (pero sin fugas)

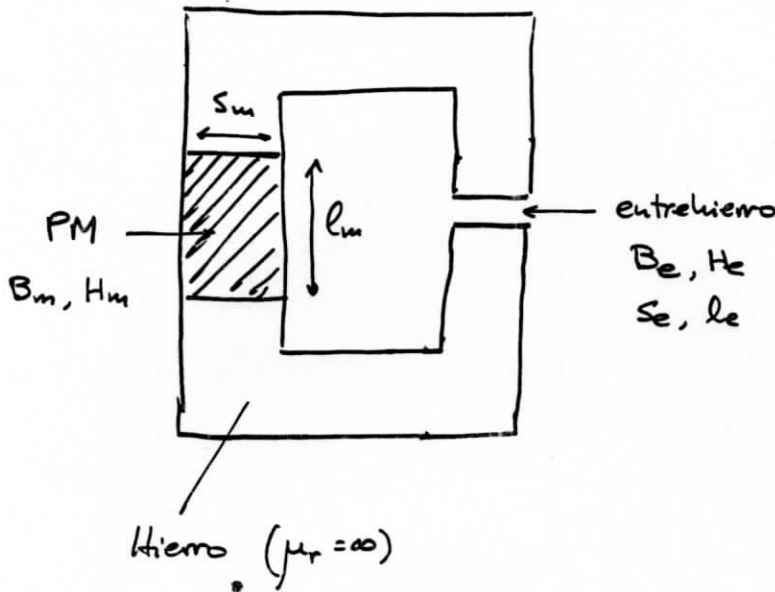
- (2)' $H_m l_m + H_{circuito} \cdot l_{circuito} = 0$
- (1)' $\phi_m = \phi_{circuito}$



• Dimensionamiento de un imán permanente de material conocido

Objetivo: Tener una inducción B_e en el entrehierro

Hip: $\mu_{rFe} = \infty$



$$\left. \begin{array}{l} B_e, H_e \\ S_e, l_e \end{array} \right\} \begin{array}{l} (1) B_m S_m = B_e S_e \\ (2) H_m l_m = - l_e \frac{B_e}{\mu_0} \\ (3) B_m = B_m(H_m) \end{array}$$

Sist. de 3 eqs. c/4 incógnitas:

B_m, H_m, S_m, l_m

→ Criterio de Evershed (criterio de optimización económica)

⇒ Volumen mínimo de PM

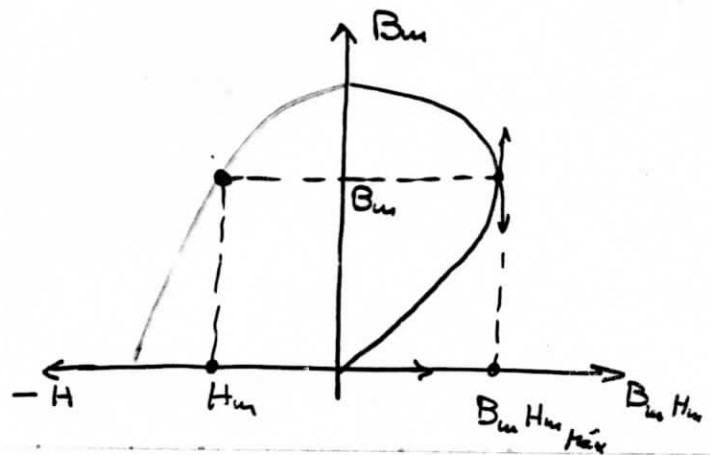
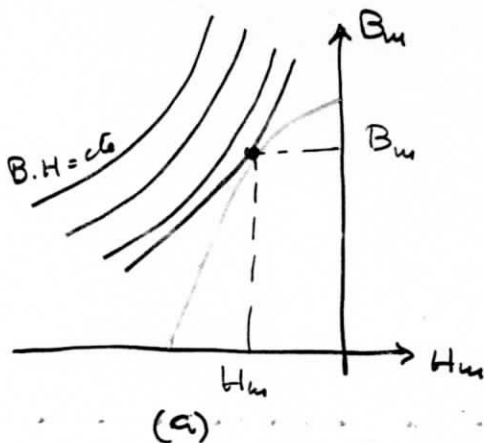
(4) $V_m = S_m \cdot l_m$ mínimo

(1) x (2) ⇒ $V_m \cdot (H_m \cdot B_m) = - \frac{S_e l_e}{\mu_0} B_e^2 = \text{cte.} \Rightarrow \underline{\underline{(H_m \cdot B_m)_{\text{máx}}}}$

→ Solución por métodos numéricos o gráficos

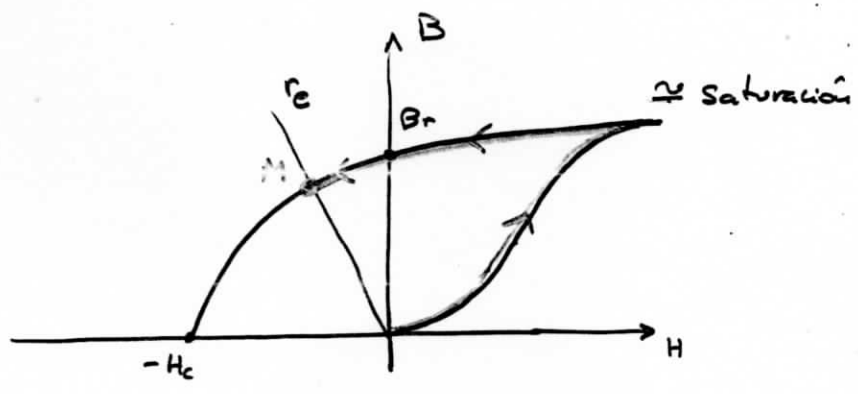
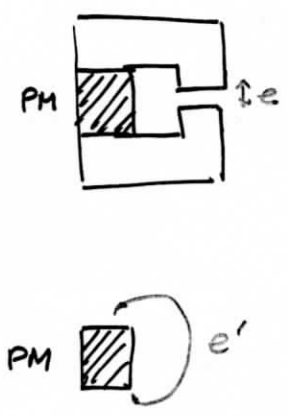
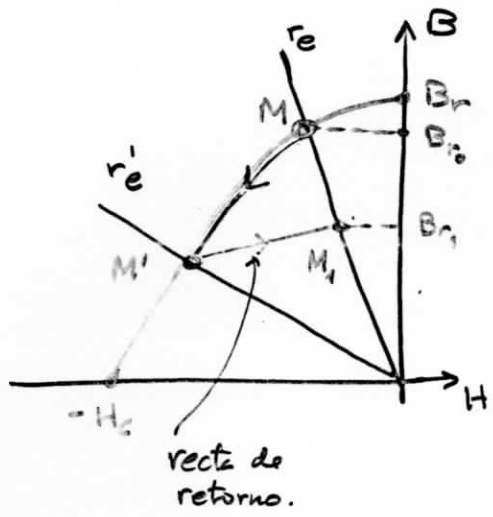
a) Hipérbolas $B \cdot H = \text{cte}$ → hipérbola tangente a $B_m(H_m)$

b) Trazado por puntos de $B_m \cdot H_m = f(B_m)$.



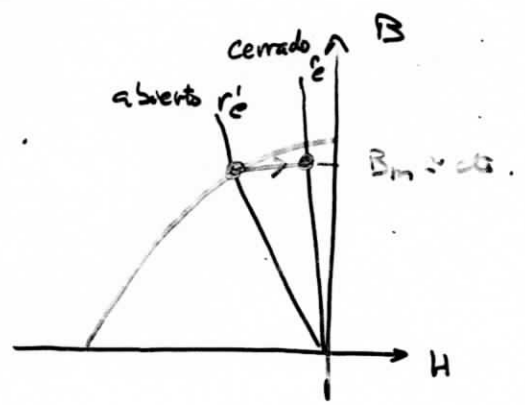
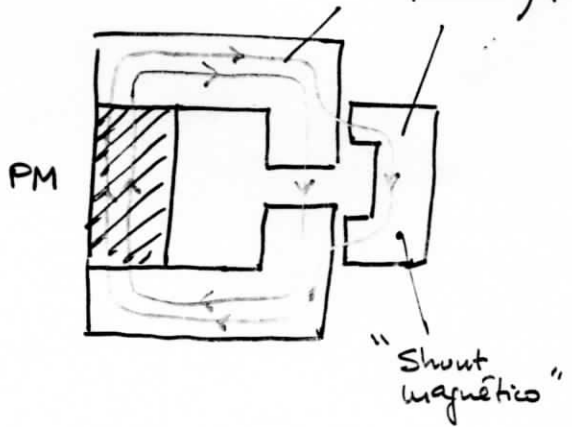
• Desmagnetización por desmontaje.

Desmontaje: aumento del entrehierro



→ Ejemplo: cerradura magnética.

hierro $\mu_r \approx \infty$



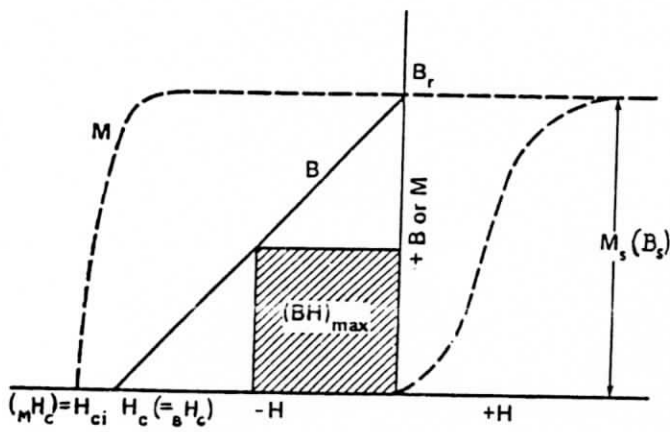


Fig. 2. The "normal" and "intrinsic" demagnetization curves of a modern PM material, with definitions of some common quantities.

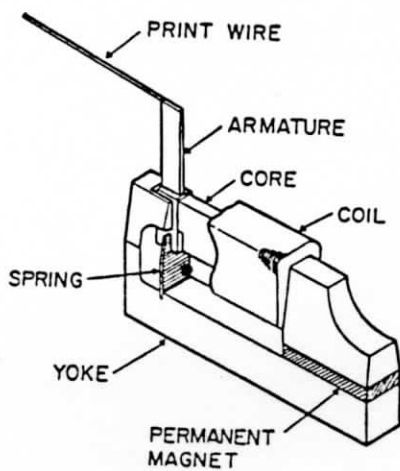


Fig. 17. Hammer mechanism for a dot-matrix printer [46].

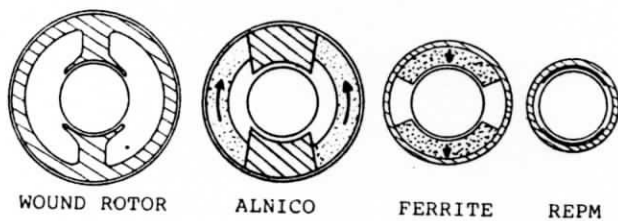


Fig. 14. Evolution of stator magnet geometry in small DC motors. (Based on 2-pole motors of comparable power using identical wound rotors.)

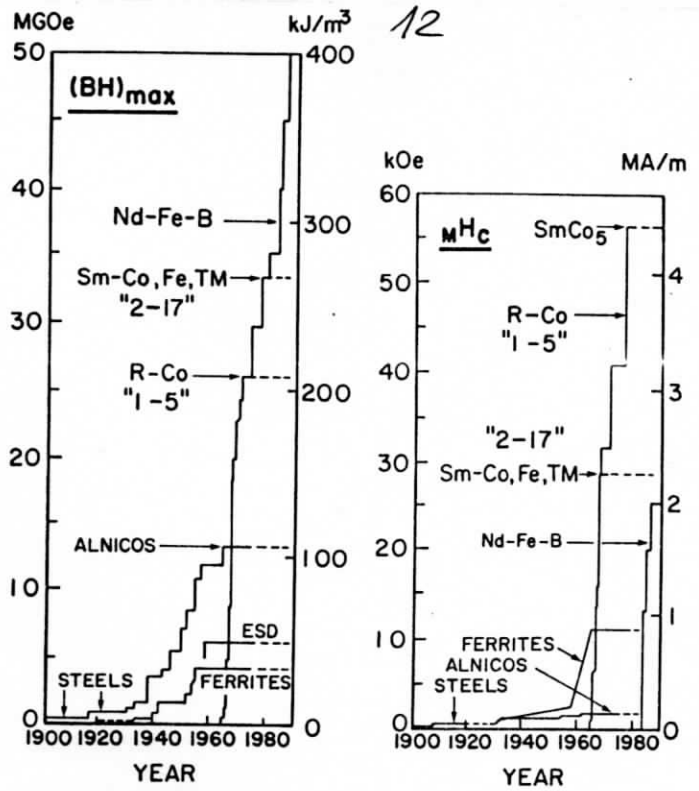


Fig. 3. The evolution of the magnetic circuit of moving-coil meters reflects the progress in magnet materials development.

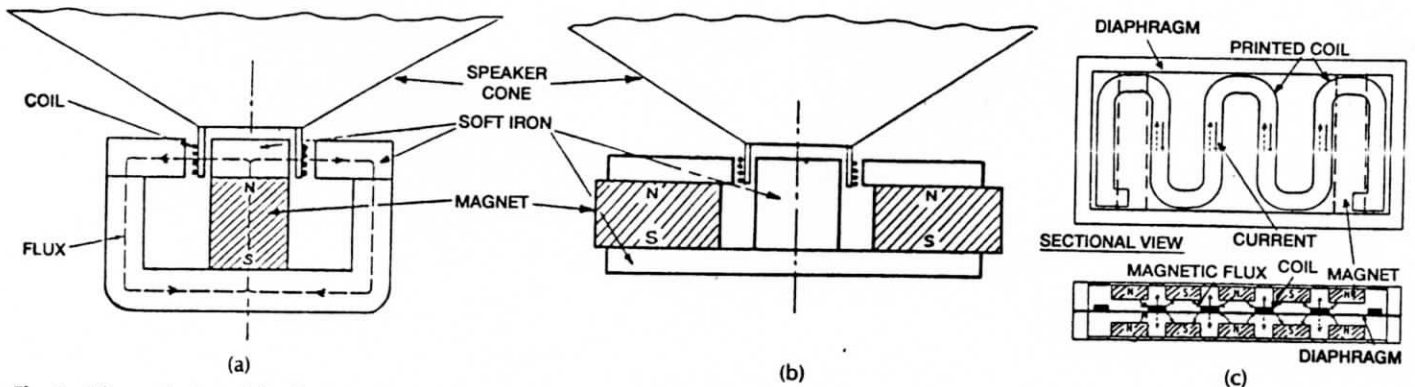
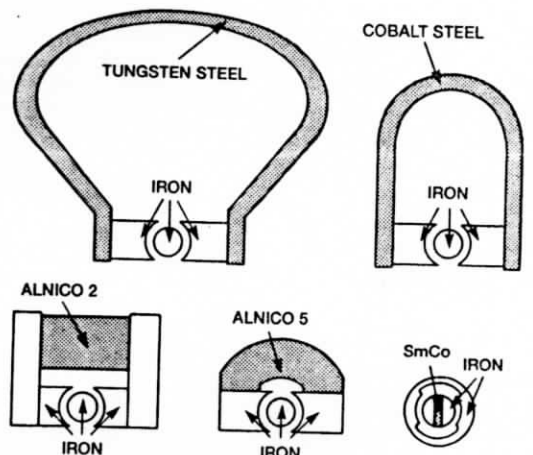


Fig. 4. The evolution of the design of loudspeaker PM systems with improving permanent magnet materials properties. (Clegg in [B-6]). (a) Typical Alnico speaker design. (b) Typical ferrite speaker system. (c) Flat speaker with REPM.

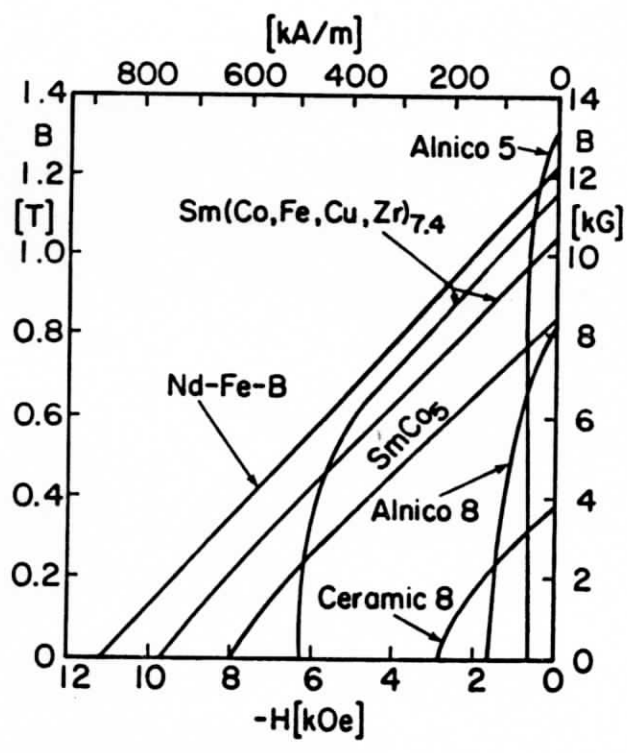


Fig. 6. Comparison of rare-earth magnets with some older magnet types. B, H -demagnetization curves of average commercial magnets.

