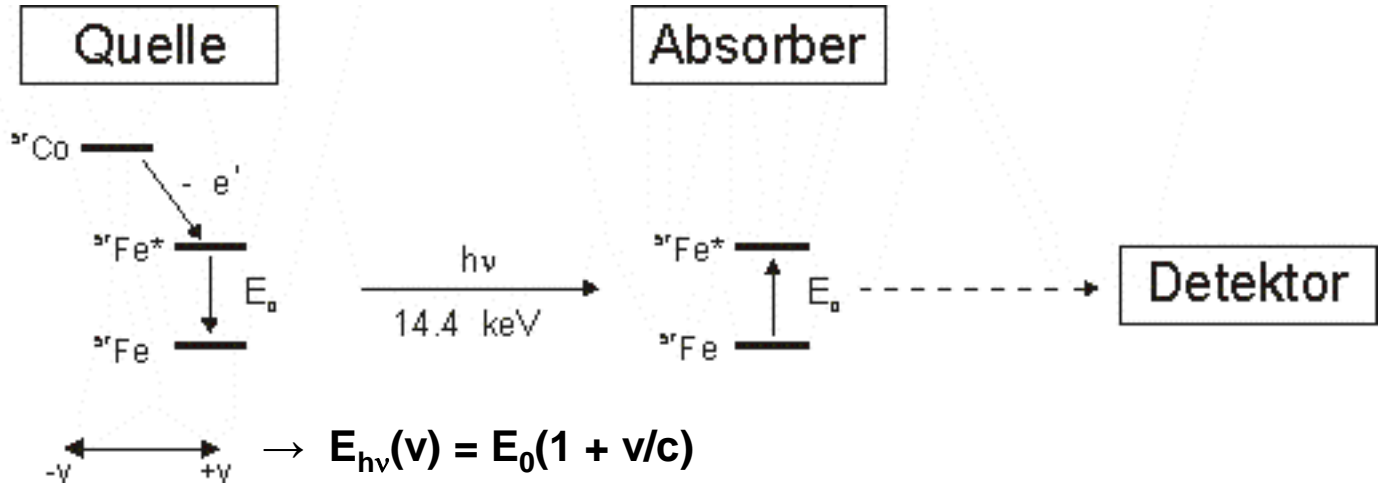


^{57}Fe -Mößbauer-Spektroskopie - Messprinzip

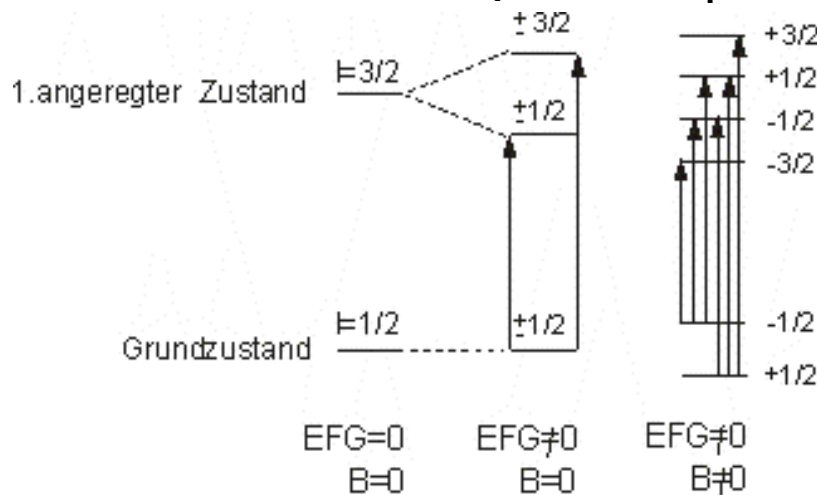


Quelle:

Radioaktiver Zerfall von $^{57}\text{Co} \rightarrow ^{57}\text{Fe}^* (I = 3/2) \rightarrow ^{57}\text{Fe} (I = 1/2)$

Absorber:

Probe mit $^{57}\text{Fe} (I = 1/2, m_I = \pm 1/2) \rightarrow ^{57}\text{Fe}^* (I = 3/2, m_I = \pm 1/2, \pm 3/2)$



Begriffe in der Mößbauer-Spektroskopie

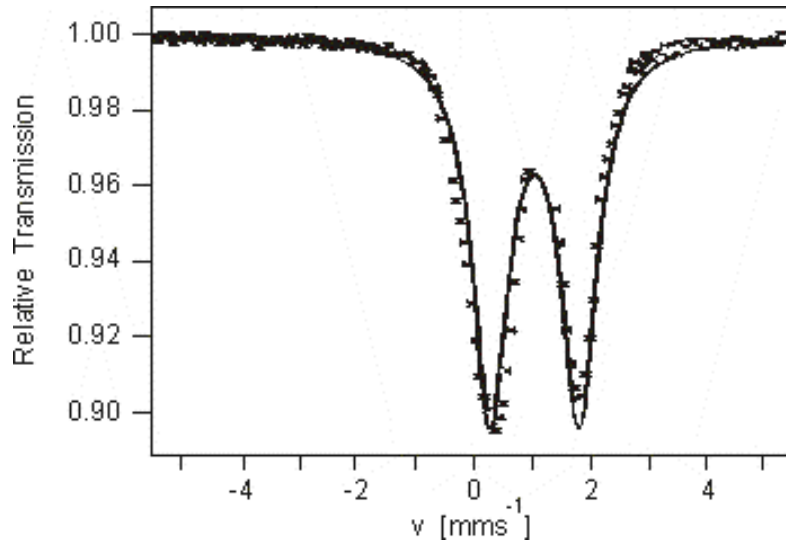
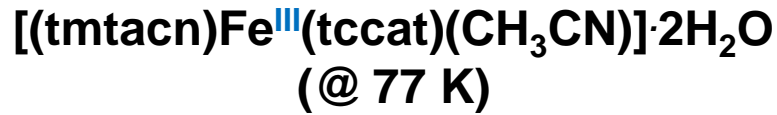
EFG = Elektrischer Feldgradient

B [T] = Externes Magnetfeld

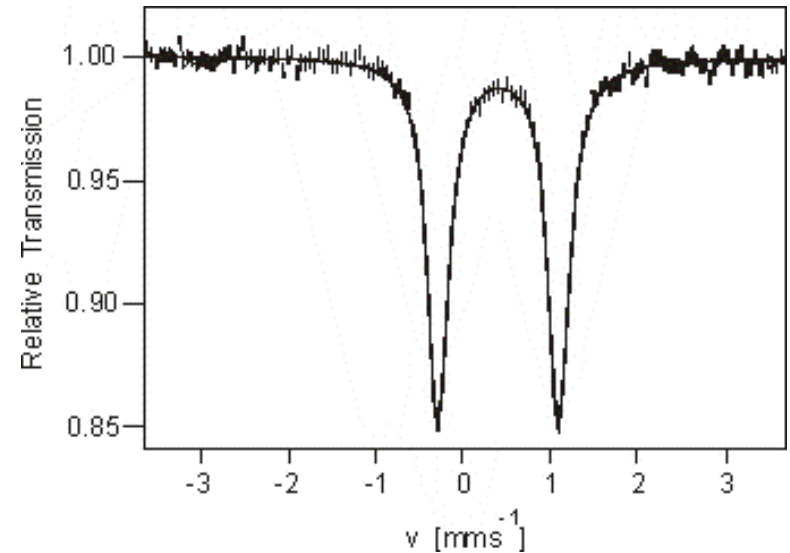
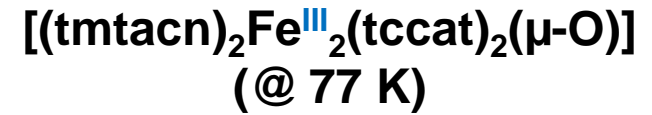
δ [mms^{-1}] = Isomerieverschiebung
(Resonanzfrequenz)

$|\Delta E_Q|$ [mms^{-1}] = Quadrupolaufspaltung
(Größe hängt vom EFG am Atomkern ab)

^{57}Fe -Mößbauer-Spektroskopie: Fe-Komplexe (Diss TJ)



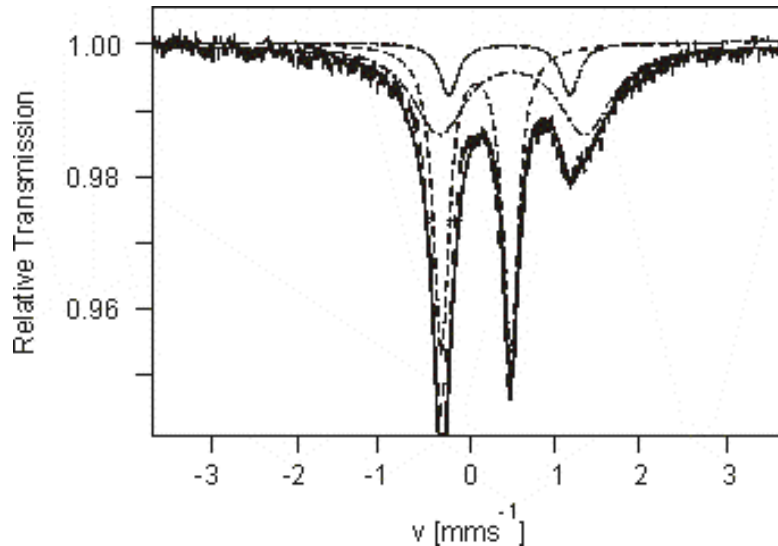
$$\delta = 1.06 \text{ mms}^{-1}$$
$$|\Delta E_Q| = 1.54 \text{ mms}^{-1}$$



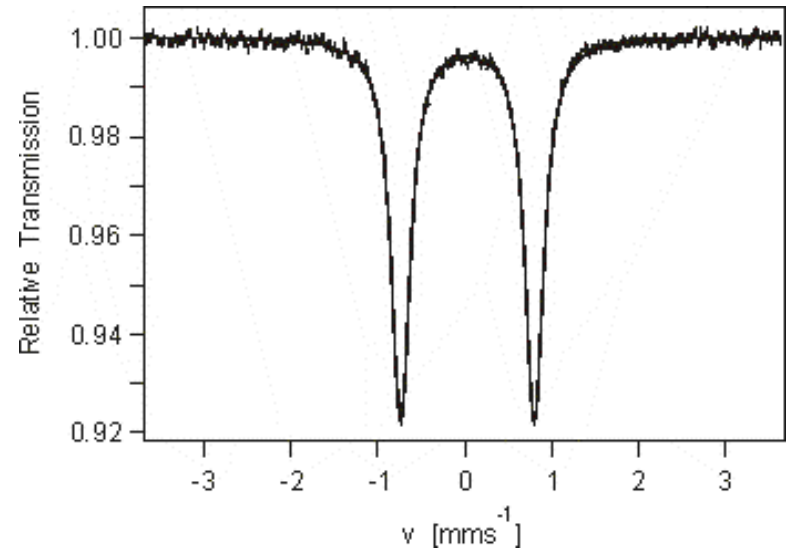
$$\delta = 0.40 \text{ mms}^{-1}$$
$$|\Delta E_Q| = 1.38 \text{ mms}^{-1}$$

tmtacn = 1,4,7-Trimethyl-1,4,7-triazacyclononan
tccat = Tetrachlorocatechol

^{57}Fe -Mössbauer-Spektroskopie: Fe-Komplexe (Diss TJ)



$$\delta = 0.52 \text{ mms}^{-1} (\text{Fe}^{\text{III}}), 0.09 \text{ mms}^{-1} (\text{Fe}^{\text{IV}})$$
$$|\Delta E_Q| = 1.67 \text{ mms}^{-1} (\text{Fe}^{\text{III}}), 0.81 \text{ mms}^{-1} (\text{Fe}^{\text{IV}})$$



$$\delta = 0.04 \text{ mms}^{-1}$$
$$|\Delta E_Q| = 1.55 \text{ mms}^{-1}$$

tmtacn = 1,4,7-Trimethyl-1,4,7-triazacyclononan
tccat = Tetrachlorocatechol

⁵⁷Fe-Mößbauer-Spektroskopie - Hämoglobin

Table 13.2 Mössbauer spectra for haemoglobin derivatives [10]

Compound*	<i>S</i>	<i>T</i> /K	Δ /(mm s ⁻¹)	δ (Fe) /(mm s ⁻¹)
HbCO	0	195	0.36	0.18
		4	0.36	0.26
Hb reduced	2	195	2.40	0.90
		4	2.40	0.91
HbNO	?	195-1.2	magnetically broadened	
HbO ₂	0	195	1.89	0.20
		77	2.19	0.26
		1.2	2.24	0.24
HiF	$\frac{5}{2}$	195-1.2	magnetically broadened	
HiH ₂ O	$\frac{5}{2}$	195	2.00	0.20
HiOH	$\frac{1}{2}$?	195	1.57	0.18
		77	1.9	0.2
HiN ₃	$\frac{1}{2}$	195	2.30	0.15
HiCN	$\frac{1}{2}$	195	1.39	0.17

* The abbreviation Hb is used for a Fe(II) haemoglobin compound and Hi for a Fe(III) haemoglobin compound.