

9. Jaká je hodnota pE ve vzorku kyselé důlní vody, který má $[\text{Fe}^{3+}] = 7,03 \times 10^{-3} \text{ M}$ a $[\text{Fe}^{2+}] = 3,71 \times 10^{-4} \text{ M}$?



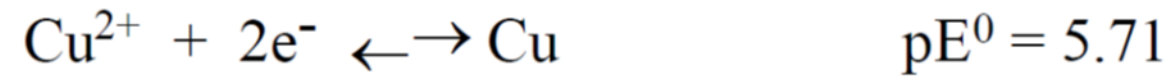
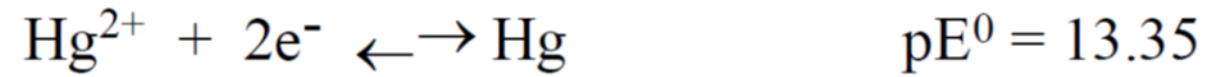


$$E = E^0 + \frac{2.303RT}{nF} \log \frac{[\text{Fe}^{3+}]}{[\text{Fe}^{2+}]} = E^0 + \frac{0.0591}{n} \log \frac{[\text{Fe}^{3+}]}{[\text{Fe}^{2+}]}$$

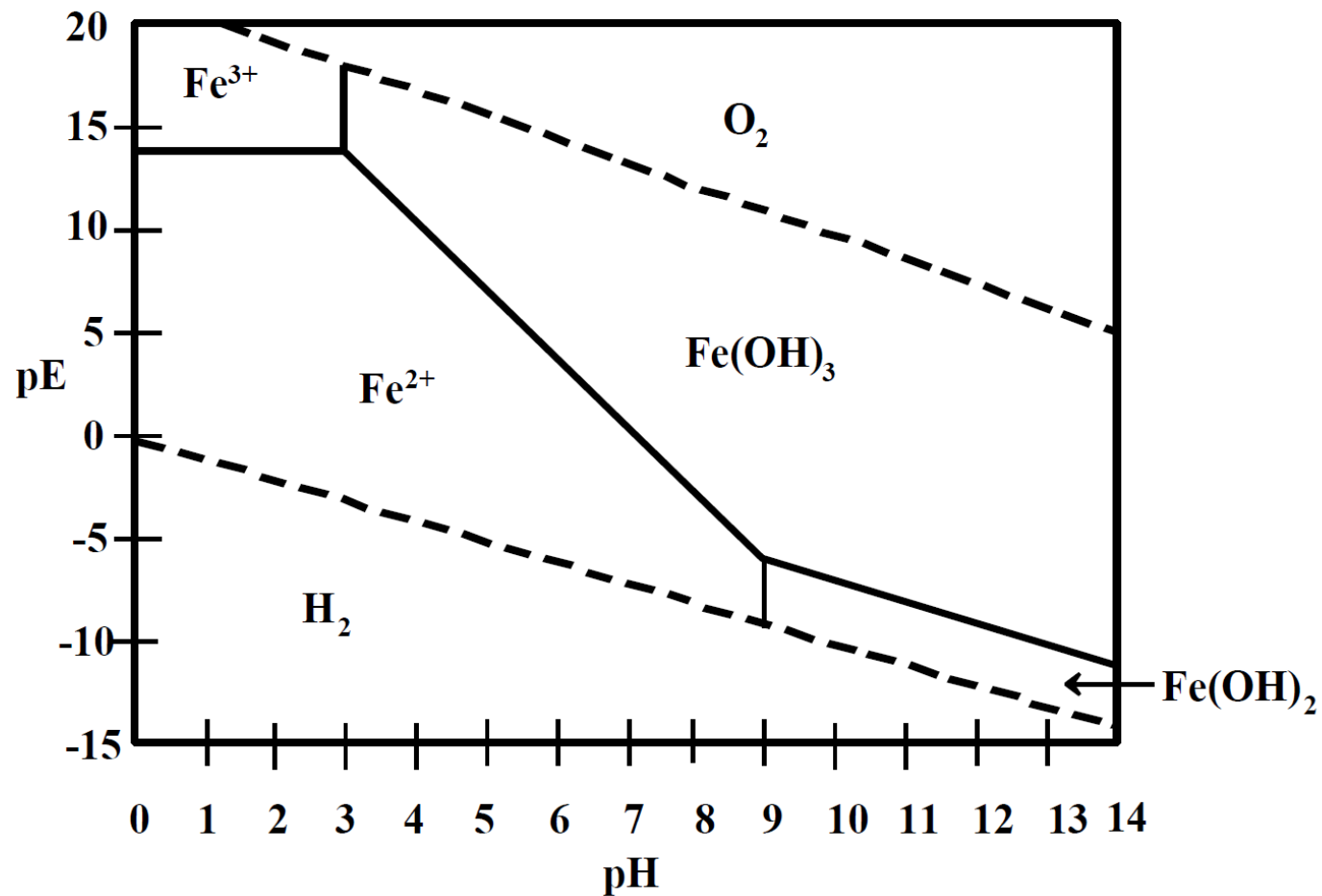
$$\text{pE} = \frac{E}{\frac{2.303RT}{F}} \quad \text{and} \quad \text{pE}^0 = \frac{E^0}{\frac{2.303RT}{F}}$$

$$\text{pE} = \text{pE}^0 + \frac{1}{n} \log \frac{[\text{Fe}^{3+}]}{[\text{Fe}^{2+}]}$$

$$pE = 13.2 + \log \frac{[Fe^{3+}]}{[Fe^{2+}]} = 13.2 + \log \frac{7.0 \cdot 10^{-3}}{3.7 \cdot 10^{-4}} = 13.2 + 1.277 = \text{yellow circle}$$

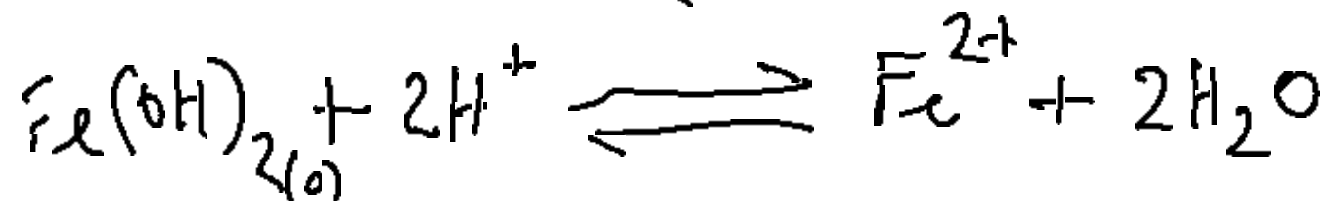


Za předpokladu koncentrace hydrogenuhličitanových iontů $[\text{HCO}_3^-]$ $1,00 \times 10^{-3}$ M,
 součin rozpustnosti FeCO_3 $3,5 \times 10^{-11}$,
 součin rozpustnosti $\text{Fe}(\text{OH})_2$ $8,0 \times 10^{-12}$
 co byste očekávali jako stabilní sloučeniny železa při pH 9,5 a pE -8,0?



$\text{pH} = 9.5 \Rightarrow$ DOMINANTNÍ FORMA VÝSKYTV ŽELEZA: $\text{Fe}(\text{OH})_2(\text{s})$
 $\text{pE} = -8.0$

ROZPOUŠTĚNÍ $\text{Fe}(\text{OH})_2$



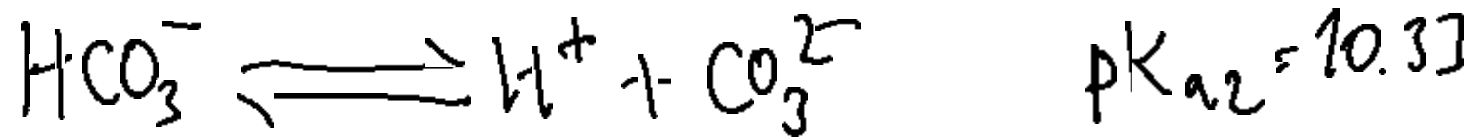
$$K_{\text{sp}} = \frac{[\text{Fe}^{2+}]}{[\text{H}^+]^2} = 8 \cdot 10^{-12}$$

$$[\text{H}^+] = 10^{-9.5} \text{ mol/L}$$

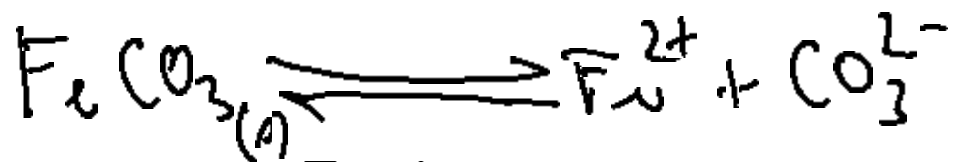
$$[\text{Fe}^{2+}] = 8 \cdot 10^{-12} [10^{-9.5}]^2 =$$



$$[\text{HCO}_3^-] = 10^{-3} \text{ mol/L} \quad \text{pH} = 9.5$$



$$\frac{[\text{CO}_3^{2-}][\text{H}^+]}{[\text{HCO}_3^-]} = K_{a2} \Rightarrow [\text{CO}_3^{2-}] = \frac{K_{a2}[\text{HCO}_3^-]}{[\text{H}^+]} = \frac{4.69 \cdot 10^{-11} \cdot 10^{-3}}{3.16 \cdot 10^{-10}} = 1.48 \cdot 10^{-4} \text{ mol/L}$$



$$K_{sp} = [\text{Fe}^{2+}][\text{CO}_3^{2-}] = 3.5 \cdot 10^{-11}$$

$$[\text{Fe}^{2+}] = \frac{K_{sp}}{[\text{CO}_3^{2-}]} = \frac{3.5 \cdot 10^{-11}}{1.48 \cdot 10^{-4}} = \text{[blacked out]}$$

DOMINANTNI FORMA: $\text{FeCO}_3(s)$