

12)

a. $Q < 1$ and $Q < K$

b. stay the same

c. decrease

d. $\frac{Q_{\text{new}}}{Q_{\text{old}}} = \frac{9}{1}$

$$Q_{\text{new}} = \frac{[3C]^2}{[A][B]} = 9 \left(\frac{[C]^2}{[A][B]} \right) = 9 Q_{\text{old}} \rightarrow \frac{Q_{\text{new}}}{Q_{\text{old}}} = 9$$

$$Q_{\text{old}} = \frac{[C]^2}{[A][B]}$$

e. $E_{\text{new}} = E^{\circ} - \frac{0.05912}{n_e} \log(9Q_{\text{old}})$

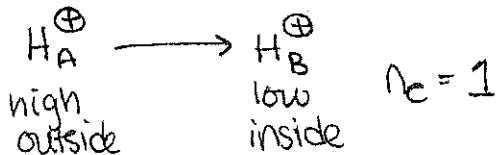
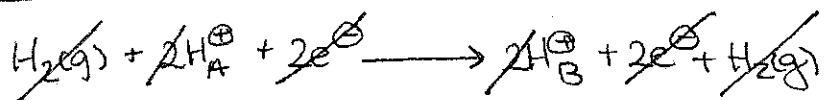
$$E_{\text{new}} = E_{\text{old}} - \frac{0.05912}{n_e} \log 9$$

$$\underbrace{E^{\circ} - 0.05912 \log(9Q_{\text{old}})}_{E_{\text{new}}} = \underbrace{E^{\circ} - \frac{0.05912}{n_e} \log Q_{\text{old}}}_{E_{\text{old}}} - \frac{0.05912}{n_e} \log 9$$

$$E_{\text{new}} = E_{\text{old}} - \frac{0.05912}{n_e} \log 9$$

$$E_{\text{new}} = 5.00 \text{ V} - \frac{0.05912 \text{ V}}{3} \log 9$$

$$\boxed{E_{\text{new}} = 4.98 \text{ V}}$$



$$E = \frac{-0.06}{n_e} \log\left(\frac{Q}{K}\right)$$

Recall $E = E^{\circ} - \frac{0.06}{n_e} \log Q$

$E^{\circ} = 0$ so $E \cdot n_e = -0.06 \log Q$

$$-\frac{E n_e}{0.06} = \log Q \leftarrow \text{KEY!}$$

$$Q_{\text{old}} = \frac{[\text{H}^+]_{\text{low}}}{[\text{H}^+]_{\text{high}}} = 10^{-\frac{(0.150)(1)}{0.06}} = 10^{-2.5}$$

$$Q_{\text{new}} = \frac{[\text{H}^+]_{\text{high}}}{[\text{H}^+]_{\text{low}}} = \frac{1}{10^{-2.5}} = \boxed{3 \times 10^2}$$