At 25°C

\[ E = E^\circ - \left( \frac{0.06}{n} \right) V \log(Q) \]

What is the value of \( E \) when everything is in standard states?

25% 1. \( E = \infty \)
25% 2. \( E = 0 \)
25% 3. \( E = E^\circ \)
25% 4. None of the above
**Quiz** At 25 °C

\[ E = E^\circ - \left( \frac{0.06}{n_e} \right) V \log(Q) \]

What is the value of \( E \) when everything is at equilibrium?

- 25% 1. \( E = \infty \)
- 25% 2. \( E = 0 \)
- 25% 3. \( E = E^\circ \)
- 25% 4. None of the above

**TP** At 25 °C

\[ E = E^\circ - \left( \frac{0.06}{n_e} \right) V \log(Q) \]

What is the value of \( E \) when there are **no products** present?

- 25% 1. \( E = \infty \)
- 25% 2. \( E = 0 \)
- 25% 3. \( E = E^\circ \)
- 25% 4. None of the above

**TP** At 25 °C

\[ E^\circ = \left( \frac{0.06}{n_e} \right) V \log(K) \]

What is the value of the **equilibrium constant** for

\[ 2A + 2B \rightleftharpoons 4C + 2D? \]

- 17% 1. \( K \)
- 17% 2. \( 2K \)
- 17% 3. \( K^2 \)
- 17% 4. \( K/2 \)
- 17% 5. \( K^\circ \)
- 17% 6. None of the above
[TP] For $A + B \rightleftharpoons 2C + D$ at 25 °C

$$E^* = (0.06/n_e) \cdot V \cdot \log(K)$$

What is the value of $n_e$ for $2A + 2B \rightleftharpoons 4C + 2D$?

1. $n_e$
2. $2n_e$
3. $n_e^2$
4. $n_e / 2$
5. $n_e^{1/2}$
6. None of the above

17% 1. $n_e$
17% 2. $2n_e$
17% 3. $n_e^2$
17% 4. $n_e / 2$
17% 5. $n_e^{1/2}$
17% 6. None of the above

[TP] For $A + B \rightleftharpoons 2C + D$ at 25 °C

$$E^* = (0.06/n_e) \cdot V \cdot \log(K)$$

What is the value of $E^*$ for $2A + 2B \rightleftharpoons 4C + 2D$?

17% 1. $E^*$
17% 2. $2E^*$
17% 3. $(E^*)^2$
17% 4. $E^*/2$
17% 5. $(E^*)^{1/2}$
17% 6. None of the above

[TP] For $A + B \rightleftharpoons 2C + D$ at 25 °C

$$E^* = (0.06/n_e) \cdot V \cdot \log(K)$$

What is the value of $E^*$ when all concentrations are doubled?

17% 1. $E^*$
17% 2. $2E^*$
17% 3. $(E^*)^2$
17% 4. $E^*/2$
17% 5. $(E^*)^{1/2}$
17% 6. None of the above

[Quiz] For $A + B \rightleftharpoons 2C + D$ at 25 °C, if $E = 5.0 \text{ V}$, $E^* = 2.0 \text{ V}$, and $n_e = 1$, what is the value of $E$ when all concentrations are doubled?

17% 1. $E < 5.0 \text{ V}$
17% 2. $E = 5.0 \text{ V}$
17% 3. $E > 5.0 \text{ V}$
17% 4. $(E)^2$
17% 5. $E / 2$
17% 6. $(E)^{1/2}$
Concentration cells: Mixing → electric current

What happens when ink is dropped into water?
It disperses spontaneously

What happens when salt water is dropped into fresh water?
It disperses spontaneously

Let’s see how to harness such spontaneity of mixing...
to generate electricity!

[TP] What do you expect to be true about the process
Cl^−(0.0001 M) → Cl^−(1 M)?

25% 1. $E > 0$
25% 2. $E = 0$
25% 3. $E < 0$
25% 4. More information needed

[TP] What do you expect to be true about the process
Cl^−(1 M) → Cl^−(0.0001 M)?

25% 1. $E > 0$
25% 2. $E = 0$
25% 3. $E < 0$
25% 4. More information needed
What is true about the process \( \text{Cl}^- (1 \text{ M}) \rightarrow \text{Cl}^- (0.0001 \text{ M}) \)?

1. \( K > 1 \)
2. \( K = 1 \)
3. \( K < 1 \)
4. More information needed

25% 1. \( K > 1 \)
25% 2. \( K = 1 \)
25% 3. \( K < 1 \)
25% 4. More information needed