

If the solution is hypotonic how can you adjust the isotonicity with NaCl or Boric acid  $E=0.52$ . And if the solution is hypertonic how much water you need to add to adjust its isotonicity

### Solution 1

Zinc chloride 0.6 gram  $E=0.62$

Dis water qsad 30 mL.

Determine the number of equivalent grams of NaCl we have.

$$\frac{0.6g \text{ ZnCl}_2}{1g \text{ ZnCl}_2} \times \left( \frac{0.62g \text{ NaCl}}{1g \text{ ZnCl}_2} \right) = 0.372g \text{ NaCl}$$

For the solution to be isotonic (0.9% NaCl) we need:

$$\frac{30mL}{100mL} \times \left( \frac{0.9g \text{ NaCl}}{100mL} \right) = 0.27g \text{ NaCl}$$

We have 0.372g of equivalent NaCl, which is greater than 0.27g NaCl, so the solution is HYPERTONIC.

For the solution to become isotonic, we'll use the 0.372g NaCl we have and determine how much water we need:

$$\frac{0.372g \text{ NaCl}}{0.9g \text{ NaCl}} \times \left( \frac{100mL}{100mL} \right) = 41.33mL$$

We need 41.33mL of water to make our solution isotonic. We have 30mL, so we need to add:

$$41.33mL - 30mL = \underline{\underline{11.33mL}}$$

### Solution 2

Zinc sulfate 0.5 gram  $E=0.15$

Dis water qsad 30 mL.

Determine the number of equivalent grams of NaCl we have.

$$\frac{0.5g \text{ ZnSO}_4}{1g \text{ ZnSO}_4} \times \left( \frac{0.15g \text{ NaCl}}{1g \text{ ZnSO}_4} \right) = 0.075g \text{ NaCl}$$

For the solution to be isotonic (0.9% NaCl) we need:

$$\frac{30mL}{100mL} \times \left( \frac{0.9g \text{ NaCl}}{100mL} \right) = 0.27g \text{ NaCl}$$

We have 0.075g of equivalent NaCl, which is less than 0.27g NaCl, so the solution is HYPOTONIC.

If we add more NaCl, then we need to add:

$$0.27g \text{ NaCl} - 0.075g \text{ NaCl} = \underline{\underline{0.195g \text{ NaCl}}}$$

If we qs with boric acid (E=0.52), then we should add:

$$\frac{0.195 \text{ NaCl}}{1} \times \left( \frac{1g \text{ BA}}{0.52g \text{ NaCl}} \right) = \underline{\underline{0.375g \text{ BA}}}$$

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### Solution 3

Sodium iodide 0.69 gram E=0.39

Dis water qsad 30 mL.

Determine the equivalent grams of NaCl we have:

$$\frac{0.69g \text{ NaI}}{1} \times \left( \frac{0.39g \text{ NaCl}}{1g \text{ NaI}} \right) = 0.2691g \text{ NaCl} = 0.27g \text{ NaCl}$$

For the solution to be isotonic (0.9% NaCl) we need:

$$\frac{30mL}{100mL} \times \left( \frac{0.9g \text{ NaCl}}{100mL} \right) = 0.27g \text{ NaCl}$$

So we have 0.27g NaCl and need 0.27g NaCl, so we're ISOTONIC!! And no more calcs are needed.