

## Objectives

To explore compensation mechanisms for pH homeostasis.

- Respiratory compensation.
- Renal compensation.

Review of ventilation regulation

Review for Mid-term

- Preparation Suggestions
- Discriminating study habits

## Compensation

A form of homeostasis that occurs when an acid-base imbalance occurs when the built in buffering system fails.

I. Respiratory Compensations

II. Renal Compensations

## Respiratory Compensations

The respiratory compensates for the metabolic disturbances to pH.

Respiratory centers are stimulated by H<sup>+</sup> levels and respond to restore balance.

## Metabolic Acidosis

Blood pH is low (below 7.35)

HCO<sub>3</sub><sup>-</sup> level is below 22 mEq/l

Response by respiratory system:

- Exhales more CO<sub>2</sub> to compensate.
- PCO<sub>2</sub> falls below 35 mm Hg.

## Metabolic Alkalosis

Blood pH is over 7.45

HCO<sub>3</sub><sup>-</sup> level is over 26 mEq/l

Response by respiratory system:

- Slow, shallow breathing pattern.
- This allows a build up of CO<sub>2</sub> in the blood.
- PCO<sub>2</sub> levels above 45 mm Hg.

## Renal Compensations

The kidneys compensate for respiratory disturbances to pH.

Respiratory acidosis:

Hypoventilating person –

will experience R.A. as CO<sub>2</sub> builds.

- PCO<sub>2</sub> high
- HCO<sub>3</sub><sup>-</sup> high -kidneys are retaining bicarbonate to offset acidosis.

## Renal Compensations

Respiratory alkalosis

If renal compensation is happening then:

- High blood pH
- Low pCO<sub>2</sub>
- Bicarbonate ion levels begin to fall  
(kidneys work to eliminate it)