If the PCO2 rises, an acute respiratory acidosis is present and bicarbonate must rise to restore the ratio. This is achieved by compensatory bicarbonate retention in the kidney.

If bicarbonate falls, an acute metabolic acidosis is present and PCO2 must be lowered to restore the ratio. This is achieved by a compensatory increase in ventilation.

The compensations for alkalosis are the reverse of the above.

If the **primary** process is **respiratory**, the compensation is **renal.**

If the **primary** process is **metabolic**, the compensation is **respiratory.**

The biggest source of acid in the body is CO_2.

Respiratory acidosis

- A respiratory acidosis is a primary acid-base disorder in which arterial PCO2 rises to a level higher than expected.
    - At onset, the acidosis is designated as an acute respiratory acidosis.
    - The body's compensatory response increases over the next few days, arterial bicarbonate increases even more
    - The pH returns towards the normal value and the condition is now a chronic respiratory acidosis.

A rise in arterial PCO2 is potent stimulus to ventilation so a respiratory acidosis will rapidly correct unless some abnormal factor is maintaining the hypoventilation.

This feedback mechanism is responsible for the normal tight control of arterial PCO2. *The factor causing the disorder is also the factor maintaining it.*

Other than by ventilator assistance, the PCO2 will return to normal only by correction of the cause of the decreased alveolar ventilation.

An extremely high arterial PCO2 has direct anaesthetic effects and this will lead to a worsening of the situation either by central depression of ventilation or as a result of less of airway patency or protection.

Acute respiratory acidosis – Buffering only

- The compensatory response to an acute respiratory acidosis is limited to buffering.
    - About 99% of this buffering occurs intracellularly, including the haemoglobin contained within the erythrocytes (RBCs).

Chronic respiratory acidosis – Renal bicarbonate retention

- With continuation of the acidosis, he kidneys respond by retaining bicarbonate and so arterial bicarbonate continues to rise.
    - This response is slower and takes 3 or 4 days to reach its maximum.