

BOX 52-7 Interpreting ABGs – Do You Have a Match?

1. Look at each number separately.
 - Label the pH:
 - If the pH is less than 7.35, the problem is acidosis.
 - If the pH is greater than 7.45, the problem is alkalosis.
 - Label the PaCO₂:
 - If the PaCO₂ is less than 35 mm Hg, more carbon dioxide is being exhaled than normal and indicates alkalosis.
 - If the PaCO₂ is greater than 45 mm Hg, less carbon dioxide is being exhaled than normal and indicates acidosis.
 - Label the bicarbonate:
 - If the HCO₃⁻ is less than 22 mEq/L, bicarbonate levels are lower than normal, indicating acidosis.
 - If the HCO₃⁻ is greater than 26 mEq/L, bicarbonate levels are higher than normal, indicating alkalosis.
2. Determine the cause of the acid–base imbalance.
 - Look at the pH—is it acidosis or alkalosis?
3. Determine if the origin of the imbalance is respiratory or metabolic.
 - Check the PaCO₂ and HCO₃⁻ which one MATCHES the same acid–base status as the pH?

EXAMPLE

pH = 7.33 (acidosis)

PaCO₂ = 55 (acidosis)

HCO₃ = 29 (alkalosis)

Cause of imbalance (hint: look at pH) = acidosis.

PaCO₂ (acidosis) MATCHES the pH (acidosis) = respiratory problem

Client has respiratory acidosis.

4. Look for evidence of compensation.
 - Look at the value that does NOT match the pH:
 - If it (e.g., PaCO₂ or HCO₃⁻) is within normal range, there is no compensation.
 - If it (e.g., PaCO₂ or HCO₃⁻) is above or below normal range, the body is compensating.

EXAMPLES

- a. In respiratory acidosis (pH < 7.35, PaCO₂ > 45 mm Hg), if the HCO₃⁻ is greater than 26 mEq/L, the kidneys are retaining bicarbonate to minimize the acidosis: renal compensation.
- b. In respiratory alkalosis (pH > 7.45, PaCO₂ < 35 mm Hg), if the HCO₃⁻ is less than 22 mEq/L, the kidneys are excreting bicarbonate to minimize the alkalosis: again, renal compensation.
- c. In metabolic acidosis (pH < 7.35, HCO₃⁻ < 22 mEq/L), if the PaCO₂ is less than 35 mm Hg, carbon dioxide is being “blown off” to minimize the acidosis: respiratory compensation.
- d. In metabolic alkalosis (pH > 7.45, HCO₃⁻ > 26 mEq/L), if the PaCO₂ is greater than 45 mm Hg, carbon dioxide is being retained to compensate for excess base: again, respiratory compensation.

Note: If the value that doesn't match (e.g., PaCO₂ or HCO₃⁻) is above or below normal and the pH is within normal range, the body has completely compensated. Complete compensation takes time to develop and is the result of a chronic condition (e.g., chronic respiratory acidosis with COPD).