

Arterial Blood Gas Analysis (ABGs)

Step 1 - Evaluate pH

7.35 - 7.45 midpoint = 7.40

If < 7.35 = acid

If > 7.45 = base

If normal (mark (n))

If normal, determine if acidic or basic using midpoint (7.40)

7.35 - 7.40 = acid 7.37 N (a)

7.41 - 7.45 = base 7.43 N (b)

Step 2 - Evaluate pCO₂ (carbon dioxide) acid (Respiratory Component)

35 - 45 mm Hg

High CO₂ (acid) = acid

If < 35 = base (alkaline)

If > 45 = acid

If normal (35-45) label (n)

pCO₂ 28 (b) ↓

pCO₂ 55 (a) ↑

Step 3 - Evaluate HCO₃ (bicarbonate) base (Metabolic Component)

22 - 26 mEq/L

If < 22 = acid

If > 26 = base

If normal (22-26) label (n)

HCO₃ 18 (a) ↓

HCO₃ 30 (b) ↑

Step 4 - Determine imbalance

Choose the labeled component that matches the pH label

pH 7.50 (b) ↑

CO₂ 25 (b) ↓

HCO₃ 24 (n)

CO₂ matches pH = Respiratory Alkalosis

Step 5 - Determine Compensation (**Partial**)

Look at the labeled component that did **not** match pH to determine compensation

Example:

pH 7.32 (a) ↓

CO₂ 50 (a) ↑

HCO₃ 30 (b) ↑

Ask - Is the pH normal? NO

Look at HCO₃ - is it normal? NO

Partial compensation - Respiratory Acidosis with partial compensation

Step 5 - Determine Compensation (**Full**)

If the pH is in the normal range = FULL COMPENSATION

Example:

pH 7.37 (N) a ↓

CO₂ 50 (a) ↑

HCO₃ 30 (b) ↑

Ask - Is the pH normal? YES

FULL compensation

Respiratory Acidosis with complete or full compensation

Step 5 – Determine Compensation (**None or Acute**)

Example:

pH	7.56 (b) ↑
CO ₂	38 (n)
HCO ₃	28 (b) ↑

Ask – Is the pH normal? **NO**

pH and HCO₃ match = Metabolic Alkalosis

look at the labeled component that did not match pH
which is CO₂

CO₂ is normal, so normal = **No** compensation or an
Acute Metabolic Alkalosis

Step 6 – Determine oxygenation status

Evaluate pO₂ = 80-100 mm Hg

In a healthy person younger than 60, 80-100 is the normal range. For every year over age 60, the value drops by 1 mm HG, so you would expect to see a 10 mm Hg drop over a decade. A pO₂ of 70 is normal for a 70 year old (on room air).

Ask – Is it normal?

What is the client's baseline?

Is it an acceptable range for this client?

Evaluate SaO₂ = 95 - 100%

Ask – Is it normal?

What is the client's baseline?

Is it in an acceptable range for this client?

Evaluate hemoglobin (Hgb)

Male 14-18 g/dl

Female 12-16 g/dl

Step 7 – Evaluate client to place ABG analysis in proper context

Ask – Does client's clinical picture match the acid-base and oxygenation interpretation?

Does the client have a chronic disorder that is associated with long-term alterations in ABGs?

Are there any acute processes occurring that need to be taken into consideration?

Does the client have fever?