

ABG cases

6-steps approach

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- **Step 1: Assess Validity** (using the Henderson-Hasselbalch equation or clinical judgment).

- **Step 2: Acidemia or Alkalemia**

Determine pH: $\text{pH} < 7.35$: Acidemia. $\text{pH} > 7.45$: Alkalemia.

- **Step 3: Metabolic or Respiratory**

Determine the primary disorder: Metabolic: HCO_3^- is abnormal (low for acidosis, high for alkalosis). Respiratory: PaCO_2 is abnormal (high for acidosis, low for alkalosis).

- **Step 4: Check Compensation**

- **Step 5: Calculate the Anion Gap**

Anion Gap (AG) = $\text{Na}^+ - (\text{Cl}^- + \text{HCO}_3^-)$: Normal AG: 8-12 mEq/L. Elevated AG suggests a primary metabolic acidosis

- **Step 6: Delta/Delta**

Evaluate Delta Gap (Delta/Delta): $\Delta\text{AG}/\Delta\text{HCO}_3^-$: Assess if there is an additional metabolic disorder (metabolic alkalosis with an AG metabolic acidosis).

Case 1

- 1- Check Validity.
- 2- Determine Acidemia/Alkalemia.
- 3- Determine Primary
- 4- Check for Compensation.
- 5- Calculate Anion Gap
- 6- Use Delta/Delta

- pH: 7.31
- PaCO₂: 55 mmHg
- HCO₃⁻: 28 mEq/L
- Na⁺: 138 mEq/L
- Cl⁻: 105 mEq/L

Case 2

- 1- Check Validity.
- 2- Determine Acidemia/Alkalemia.
- 3- Determine Primary
- 4- Check for Compensation.
- 5- Calculate Anion Gap
- 6- Use Delta/Delta

- pH: 7.50
- PaCO₂: 29 mmHg
- HCO₃⁻: 24 mEq/L
- Na⁺: 140 mEq/L
- Cl⁻: 100 mEq/L

Case 3

- 1- Check Validity.
- 2- Determine Acidemia/Alkalemia.
- 3- Determine Primary
- 4- Check for Compensation.
- 5- Calculate Anion Gap
- 6- Use Delta/Delta

- pH: 7.28
- PaCO₂: 27 mmHg
- HCO₃⁻: 15 mEq/L
- Na⁺: 135 mEq/L
- Cl⁻: 100 mEq/L

Case 4

- 1- Check Validity.
- 2- Determine Acidemia/Alkalemia.
- 3- Determine Primary
- 4- Check for Compensation.
- 5- Calculate Anion Gap
- 6- Use Delta/Delta

- pH: 7.46
- PaCO₂: 50 mmHg
- HCO₃⁻: 34 mEq/L
- Na⁺: 139 mEq/L
- Cl⁻: 96 mEq/L

Case 5

- 1- Check Validity.
- 2- Determine Acidemia/Alkalemia.
- 3- Determine Primary
- 4- Check for Compensation.
- 5- Calculate Anion Gap
- 6- Use Delta/Delta

- pH: 7.60
- PaCO₂: 22 mmHg
- HCO₃⁻: 24 mEq/L
- Na⁺: 141 mEq/L
- Cl⁻: 104 mEq/L

Case 6

- 1- Check Validity.
- 2- Determine Acidemia/Alkalemia.
- 3- Determine Primary
- 4- Check for Compensation.
- 5- Calculate Anion Gap
- 6- Use Delta/Delta

- pH: 7.30
- PaCO₂: 35 mmHg
- HCO₃⁻: 18 mEq/L
- Na⁺: 137 mEq/L
- Cl⁻: 99 mEq/L

Case 7

- 1- Check Validity.
- 2- Determine Acidemia/Alkalemia.
- 3- Determine Primary
- 4- Check for Compensation.
- 5- Calculate Anion Gap
- 6- Use Delta/Delta

- pH: 7.22
- PaCO₂: 60 mmHg
- HCO₃⁻: 25 mEq/L
- Na⁺: 136 mEq/L
- Cl⁻: 98 mEq/L

Case 8

- 1- Check Validity.
- 2- Determine Acidemia/Alkalemia.
- 3- Determine Primary
- 4- Check for Compensation.
- 5- Calculate Anion Gap
- 6- Use Delta/Delta

- pH: 7.55
- PaCO₂: 40 mmHg
- HCO₃⁻: 33 mEq/L
- Na⁺: 140 mEq/L
- Cl⁻: 98 mEq/L

Case 9

- 1- Check Validity.
- 2- Determine Acidemia/Alkalemia.
- 3- Determine Primary
- 4- Check for Compensation.
- 5- Calculate Anion Gap
- 6- Use Delta/Delta

- pH: 7.18
- PaCO₂: 32 mmHg
- HCO₃⁻: 14 mEq/L
- Na⁺: 135 mEq/L
- Cl⁻: 100 mEq/L

Case 10

- 1- Check Validity.
- 2- Determine Acidemia/Alkalemia.
- 3- Determine Primary
- 4- Check for Compensation.
- 5- Calculate Anion Gap
- 6- Use Delta/Delta

- pH: 7.35
- PaCO₂: 52 mmHg
- HCO₃⁻: 32 mEq/L
- Na⁺: 137 mEq/L
- Cl⁻: 103 mEq/L

Case 11

- 1- Check Validity.
- 2- Determine Acidemia/Alkalemia.
- 3- Determine Primary
- 4- Check for Compensation.
- 5- Calculate Anion Gap
- 6- Use Delta/Delta

- pH: 7.47
- PaCO₂: 48 mmHg
- HCO₃⁻: 30 mEq/L
- Na⁺: 138 mEq/L
- Cl⁻: 97 mEq/L

Case 12

- 1- Check Validity.
- 2- Determine Acidemia/Alkalemia.
- 3- Determine Primary
- 4- Check for Compensation.
- 5- Calculate Anion Gap
- 6- Use Delta/Delta

- pH: 7.41
- PaCO₂: 40 mmHg
- HCO₃⁻: 24 mEq/L
- Na⁺: 140 mEq/L
- Cl⁻: 103 mEq/L

Case 13

- 1- Check Validity.
- 2- Determine Acidemia/Alkalemia.
- 3- Determine Primary
- 4- Check for Compensation.
- 5- Calculate Anion Gap
- 6- Use Delta/Delta

- pH: 7.15
- PaCO₂: 35 mmHg
- HCO₃⁻: 12 mEq/L
- Na⁺: 136 mEq/L
- Cl⁻: 98 mEq/L

Case 14

- 1- Check Validity.
- 2- Determine Acidemia/Alkalemia.
- 3- Determine Primary
- 4- Check for Compensation.
- 5- Calculate Anion Gap
- 6- Use Delta/Delta

- pH: 7.29
- PaCO₂: 25 mmHg
- HCO₃⁻: 14 mEq/L
- Na⁺: 135 mEq/L
- Cl⁻: 100 mEq/L

Case 15

- 1- Check Validity.
- 2- Determine Acidemia/Alkalemia.
- 3- Determine Primary
- 4- Check for Compensation.
- 5- Calculate Anion Gap
- 6- Use Delta/Delta

- pH: 7.56
- PaCO₂: 30 mmHg
- HCO₃⁻: 24 mEq/L
- Na⁺: 138 mEq/L
- Cl⁻: 99 mEq/L

Case 16

- 1- Check Validity.
- 2- Determine Acidemia/Alkalemia.
- 3- Determine Primary
- 4- Check for Compensation.
- 5- Calculate Anion Gap
- 6- Use Delta/Delta

- pH: 7.32
- PaCO₂: 52 mmHg
- HCO₃⁻: 30 mEq/L
- Na⁺: 139 mEq/L
- Cl⁻: 95 mEq/L

Case 17

- 1- Check Validity.
- 2- Determine Acidemia/Alkalemia.
- 3- Determine Primary
- 4- Check for Compensation.
- 5- Calculate Anion Gap
- 6- Use Delta/Delta

- pH: 7.40
- PaCO₂: 40 mmHg
- HCO₃⁻: 24 mEq/L
- Na⁺: 142 mEq/L
- Cl⁻: 102 mEq/L

Case 18

- 1- Check Validity.
- 2- Determine Acidemia/Alkalemia.
- 3- Determine Primary
- 4- Check for Compensation.
- 5- Calculate Anion Gap
- 6- Use Delta/Delta

- pH: 7.24
- PaCO₂: 50 mmHg
- HCO₃⁻: 20 mEq/L
- Na⁺: 137 mEq/L
- Cl⁻: 100 mEq/L

Case 19

- 1- Check Validity.
- 2- Determine Acidemia/Alkalemia.
- 3- Determine Primary
- 4- Check for Compensation.
- 5- Calculate Anion Gap
- 6- Use Delta/Delta

- pH: 7.48
- PaCO₂: 29 mmHg
- HCO₃⁻: 22 mEq/L
- Na⁺: 139 mEq/L
- Cl⁻: 100 mEq/L

Case 20

- 1- Check Validity.
- 2- Determine Acidemia/Alkalemia.
- 3- Determine Primary
- 4- Check for Compensation.
- 5- Calculate Anion Gap
- 6- Use Delta/Delta

- pH: 7.19
- PaCO₂: 33 mmHg
- HCO₃⁻: 13 mEq/L
- Na⁺: 135 mEq/L
- Cl⁻: 98 mEq/L