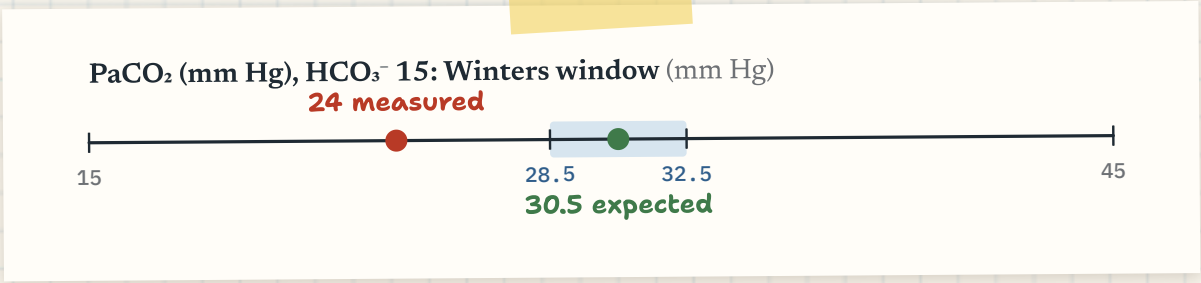
ABG in 6 steps

One algorithm, always in this order



Step by step

1. pH: below 7.35 acidemia, above 7.45 alkalemia
2. Primary disorder: the change that explains the pH
3. Compensation: measured vs expected
4. Anion gap: $Na^+ - (Cl^- + HCO_3^-)$
5. Steps 5–6: delta ratio if the gap is high, then clinical context (does the story explain every disorder?)

ANION GAP AND DELTA RATIO

$$AG = Na^+ - (Cl^- + HCO_3^-); \quad \text{delta ratio} = (AG - 12) / (24 - HCO_3^-)$$

normal AG about 12; calculate the ratio when the gap is high; cut-offs differ between sources

Primary disorder	Expected response
Metabolic acidosis	$PaCO_2 = 1.5 \times HCO_3^- + 8, \pm 2$
Metabolic alkalosis	$PaCO_2 = 40 + 0.7 \times (HCO_3^- - 24)$
Respiratory acidosis	HCO_3^- +1 per 10 acute; +4 chronic
Respiratory alkalosis	HCO_3^- −2 per 10 acute; −4 chronic
Delta ratio	1–2 pure; below 1 + normal-gap; above 2 + alkalosis

Expected compensation and the delta ratio

Rule of thumb

A missed compensation window suggests a second disorder

A high delta ratio points to a hidden metabolic alkalosis

Chronic means days: the kidney is slow

Exam traps

- ! A normal pH does not clear a gas: opposing disorders cancel out.
- ! Opening gas: HCO_3^- 15 predicts $PaCO_2$ about 30 (28.5–32.5); measured 24 is below it.
- ! Delta ratio cut-offs differ between sources: a strong clue, not proof.

ABG interpretation in 6 steps: the acid-base algorithm

Video, written lesson, practice question and sources: medservatory.com/usmle-step-1/renal-acid-base/stepwise-abg-interpretation-algorithm

For exam study only, not medical advice. Follow local guidelines and your lab's ranges.
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