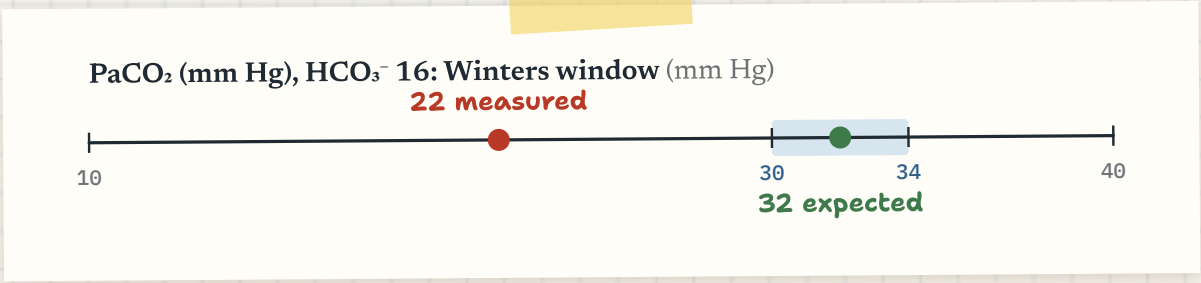
Salicylate: the mixed pattern

Respiratory alkalosis + high anion gap acidosis



Step by step

1. Anion gap = $Na^+ - (Cl^- + HCO_3^-)$
2. Winters: $1.5 \times HCO_3^- + 8 \pm 2$
3. Measured $PaCO_2$ below window: second disorder
4. Delta ratio about 1: pure high gap acidosis

WINTERS' FORMULA

$$PaCO_2 = 1.5 \times HCO_3^- + 8 \pm 2$$

Measured $PaCO_2$ below the window = respiratory alkalosis on top

Hit	Effect
Brain	Respiratory centre stimulated: hyperventilation, respiratory alkalosis (early, primary)
Mitochondria	Uncoupling: lactate and ketoacids, high anion gap acidosis (later)
Adults	Mixed; pH near normal or alkalaemic
Children, late or severe	Tips toward acidaemia

Two hits

Rule of thumb

Brain: alkalosis first. Mitochondria: acidosis later.

Acidotic by bicarbonate and gap, yet pH can be normal or high.

Exam traps

- The respiratory alkalosis is a second primary disorder, not compensation.
- Salicylate itself is only a small part of the gap.
- A normal or alkalaemic pH does not exclude the metabolic acidosis.

Salicylate poisoning acid-base: a classic mixed disorder

Video, written lesson, practice question and sources: medservatory.com/usmle-step-1/renal-acid-base/salicylate-poisoning-acid-base

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