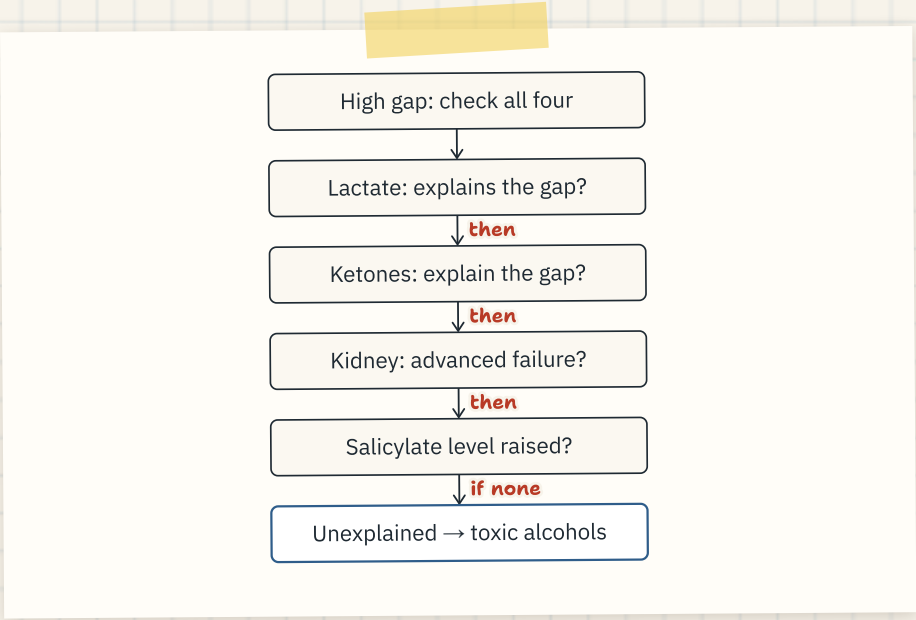
High anion gap acidosis: name the anion

Sort the causes by the unmeasured anion that is actually there



Step by step

1. A high anion gap means an unmeasured anion has arrived: name it.
2. Check lactate, ketones, creatinine and a salicylate level first.
3. If they do not explain the gap, think toxic alcohols.

ANION GAP

$$AG = Na^+ - (Cl^- + HCO_3^-)$$

about 8–12 by the common definition; a high gap means an unmeasured anion has arrived

Family	Anion(s)	Causes
Lactate	L-lactate, D-lactate	shock, sepsis, severe hypoxia; short bowel (D); propylene glycol
Ketoanions	β-hydroxybutyrate, acetoacetate	DKA, alcoholic ketoacidosis, starvation (milder)
Toxic alcohol acids	formate; glycolate, oxalate	methanol; ethylene glycol
Salicylate	own anion small; organic acids (lactate, ketoanions)	aspirin overdose (uncoupling)
Retained uraemic	sulfate, phosphate, urate, hippurate	advanced kidney failure only
5-oxoproline	5-oxoproline	chronic acetaminophen (glutathione depletion)

The anion families

GOLD MARK, re-sorted by anion

G glycols: ethylene → toxic acids; propylene → lactate

O 5-oxoproline · **L** L-lactate · **D** D-lactate

M methanol → formate · **A** aspirin → organic acids

R renal failure → uraemic anions · **K** ketoacidosis → ketoanions

Exam traps

- Alcoholic ketoacidosis: glucose can be normal or even low.
- The urine dipstick reads acetoacetate, not β-hydroxybutyrate, so it can look nearly negative.
- The routine lactate test misses D-lactate.
- Early kidney disease: the gap is often still normal.

High anion gap metabolic acidosis causes, sorted by the anion

Video, written lesson, practice question and sources: medservatory.com/usmle-step-1/renal-acid-base/high-anion-gap-metabolic-acidosis-causes

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