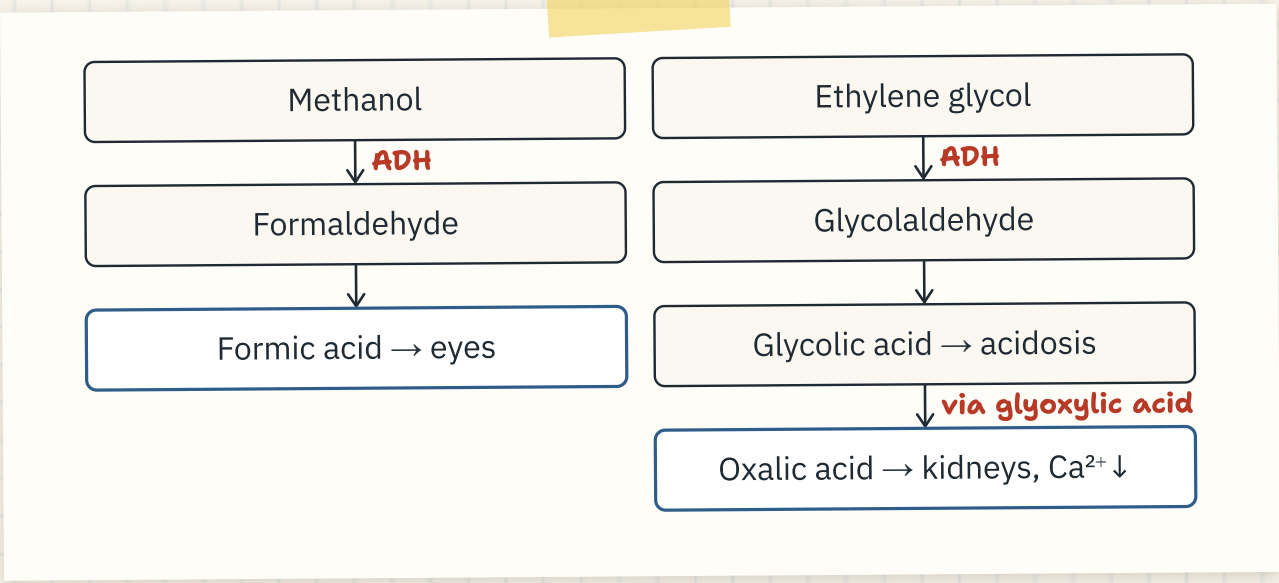
The osmolar gap

Toxic alcohols: early osmolar gap, late anion gap



Step by step

1. Calculate the anion gap and the osmolar gap
2. High anion gap + osmolar gap above 10 → methanol or ethylene glycol
3. Eyes → methanol; crystals, low calcium, kidney injury → ethylene glycol
4. Fomepizole blocks alcohol dehydrogenase; hemodialysis removes alcohol and acids

Alcohol	Becomes	Hallmark
Methanol	Formaldehyde → formic acid	Acidosis; retina and optic nerve: blurred, snowfield vision, blindness
Ethylene glycol	Glycolaldehyde → glycolic → glyoxylic → oxalic acid	Acidosis; calcium oxalate crystals, low calcium, kidney injury
Isopropyl alcohol	Acetone (a ketone)	Osmolar gap, ketosis, no anion gap acidosis

What each alcohol becomes

OSMOLAR GAP

$$\text{Measured osm} - (2 \times Na^{+} + \text{glucose}/18 + \text{BUN}/2.8)$$

normally below about 10 mOsm/kg; SI: $2 \times Na^{+}$ + glucose + urea (mmol/L)

Rule of thumb

Anion gap = unmeasured anions; osmolar gap = unmeasured particles

Early: osmolar gap high. Late: anion gap high

Methanol hits the eyes; ethylene glycol hits the kidneys

Exam traps

- A normal osmolar gap never rules out a toxic alcohol, especially in a late presenter.
- Isopropyl alcohol raises the osmolar gap but gives ketosis without an anion gap acidosis.
- Ethanol is never the sole cause of a significant metabolic acidosis.
- Fomepizole stops new acid; it cannot clear acid already made.

Osmolar gap: how toxic alcohols hide from the anion gap

Video, written lesson, practice question and sources: medservatory.com/usmle-step-1/renal-acid-base/osmolar-gap-toxic-alcohols

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