

Answer Key to [Nephrology Jumble Bumble: Spurious Chemistry Results](#)

1. HEMOLYSIS

Prolonged tourniquet time while collection of blood specimen results in venous stasis, with subsequent hemolysis of red blood cells and release of intracellular potassium into the blood stream. Limb exercise during phlebotomy can cause potassium release from skeletal muscle cells. Delay in transportation of a specimen to the laboratory results in leakage of intracellular potassium into the extracellular fluid.

2. PARAPROTEINEMIA

Paraproteins are known to interfere with multiple biochemical assays, including sodium, chloride, bicarbonate, calcium, phosphorus, urea nitrogen, and creatinine, leading to spurious chemistry results. Paraproteins also interact with some assay reagents, forming a precipitate and jeopardizing laboratory results. Removal of paraproteins from the specimen (“deproteinizing”) is recommended to avoid spurious results in this situation. Paraproteins can also alter the anion gap based on the charge of the protein molecules (IgG is cationic and lowers the AG; IgA is anionic and raises the AG). Details of mechanisms can be read in this [case report](#).

3. HYPOALBUMINEMIA

Albumin is anionic, and is the primary unmeasured anion in a normal anion gap. A fall in the albumin level will lower the anion gap. Every 1 g/dL decrease in the serum albumin level decreases the anion gap by about 2.5 mEq/L. This in-depth [review](#) from *CJASN* describes many other limitations of the serum anion gap as a diagnostic tool.

4. BILIRUBIN

The most commonly used assay for measuring serum creatinine is the Jaffe assay, in which creatinine reacts with picric acid under alkaline conditions to form a concentration-dependent colored product that is measured by a colorimeter. Bilirubin is a chromogen that is oxidized to biliverdin in the alkaline Jaffe system, and negatively interferes with the assay leading to underestimation of the serum creatinine. Although more accurate enzymatic creatinine assays are available, most centers use the Jaffe assay due to cost-related concerns. Information on other assays of creatinine and their comparisons are detailed in this [article](#).

Bonus Answer:

BROMISM

Bromide, like chloride, is a negatively charged halide. It causes false elevation of chloride levels by interfering with the assay. It also interferes

with the analysis of total bicarbonate, resulting in spurious hyperbicarbonatemia. On average, every 1 mEq/L rise in the bromide concentration causes the serum chloride concentration to rise by 3 mEq/L. The rise in serum chloride and bicarbonate explains the low anion gap. An anion gap as low as -60 mEq/L has been reported in the literature in cases of chronic bromide intoxication. Bromide is present in pyridostigmine (used in myasthenia gravis) and in some sedative drugs.