

13. **What are the typical lab findings in metabolic acidosis?**

Decreased pH and bicarbonate, and normal PCO₂. The lungs will attempt to compensate through hyperventilation to reduce carbonic acid, thereby reestablishing the 20:1 bicarbonate:carbonic acid ratio.

14. **What are the typical lab findings in metabolic alkalosis?**

Increased pH and bicarbonate and normal PCO₂. The lungs will attempt to compensate through hypoventilation to increase carbonic acid, thereby reestablishing the 20:1 bicarbonate:carbonic acid ratio. This compensatory mechanism is only partially effective because breathing can only be slowed to a certain extent.

15. **What is the relationship between pH and H⁺ concentration?**

Inverse. As [H⁺] increases, pH decreases and as [H⁺] decreases, pH increases.

16. **What is the relationship between pH and PCO₂?**

Inverse. As PCO₂ increases, pH decreases and as PCO₂ decreases, pH increases.

17. **What is the relationship between bicarbonate and pH?**

Direct. As bicarbonate increases, pH increases and as bicarbonate decreases, pH decreases.

18. **What is the compensatory mechanism to reestablish pH in a patient with a high HCO₃⁻ level?**

Hypoventilation. CO₂ is retained to reestablish the 20:1 ratio.

19. **Interpret the following arterial blood gas results:**

pH	7.07	(Reference range: 7.35-7.45)
PCO ₂	90 mm Hg	(Reference range: 35-45)
Total CO ₂	27 mEq/L	(Reference range: 23-27)

Respiratory acidosis. The low pH indicates acidosis and the high PCO₂ indicates a respiratory problem.

20. **Interpret the following arterial blood gas results:**

pH	7.55	(Reference range: 7.35-7.45)
PCO ₂	43 mm Hg	(Reference range: 35-45)
Total CO ₂	39 mEq/L	(Reference range: 23-27)

Metabolic alkalosis. The high pH indicates alkalosis and the high total CO₂ (bicarbonate) indicates a metabolic problem.

21. **What parameter is measured instead of bicarbonate?**

Total CO₂. This is an acceptable substitute because total CO₂ is primarily bicarbonate. Bicarbonate is approximately equal to total CO₂-1. Total CO₂ can be calculated from pH and PCO₂ or it can be measured by colorimetric methods.

22. **What is measured instead of carbonic acid?**

PCO₂. Carbonic acid = PCO₂ x 0.03.

23. **A patient has a slightly decreased pH, a low HCO₃⁻, and low PCO₂. What do these findings indicate?**

Compensated metabolic acidosis. Compensation for metabolic acidosis is hyperventilation to decrease PCO₂.

24. **What is base excess (BE) and how is it used clinically?**

BE is defined as the theoretical amount of acid or base needed to return the plasma pH to 7.40. It is used by some clinicians to assess the metabolic component of a patient's acid-base disorder. A positive value indicates an excess