

**Instructional Objectives / Learning Outcomes**  
**DMP 775, Veterinary Clinical Pathology**  
**Department of Diagnostic Medicine/Pathobiology**  
**College of Veterinary Medicine, Kansas State University**

Chapter 10: Blood gases, blood pH, and strong ion difference

203. If given an animal's values for serum  $[\text{Na}^+]$ , serum  $[\text{K}^+]$ , serum  $[\text{Cl}^-]$ , serum  $[\text{HCO}_3^-]$  (or  $\text{tCO}_2$  content), blood gas & pH, serum osmolality, and other supportive information or laboratory data,
- List and classify abnormalities using appropriate terms.
  - Propose appropriate ideas or conclusions (i.e., diseases, syndromes, or pathologic states) that might cause the defined abnormalities.
  - Based on your conclusions or ideas, explain the pathogenesis of each defined abnormality if the abnormality could be caused by the disorder.
204. Explain the abnormalities in  $\text{PCO}_2$ ,  $\text{PO}_2$ , and pH blood values that will occur if a sample is exposed to air or excess heparin or if there is delayed sample analysis.
205. Of the following analytes, recognize which are measured by blood gas and pH instruments; which are calculated from the measured results: pH,  $\text{PO}_2$ ,  $\text{PCO}_2$ ,  $[\text{tCO}_2]$ ,  $[\text{HCO}_3^-]$ , BE,  $\text{SO}_2$ .
206. Explain the pathogenesis of the:
- Acidemia that occurs in metabolic or respiratory acidoses
  - Alkalemia that occurs in metabolic or respiratory alkaloses
207. List the major processes of the non-respiratory system that produce:
- A decreased blood pH
  - An increased blood pH
- For each, list and recognize the major conditions or pathologic states that produce the changes. (Note: see electrolyte chapter)
208. List the major processes of the respiratory system that produce an increased blood  $\text{PCO}_2$  or decreased blood  $\text{PCO}_2$ . For each, list or recognize the major conditions or pathologic states that produce the changes.
209. List the major processes of the respiratory system that produce a decreased blood  $\text{PO}_2$ . For each, list or recognize the major conditions or pathologic states that produce the changes.
210. Recognize or explain why anemia may cause hypoxia but not hypoxemia.
211. Recognize or explain how the  $\text{SO}_2$  determination by a blood gas machine and a  $\text{SpO}_2$  from a pulse oximeter are different. Recognize when and explain why the  $\text{SpO}_2$  may remain near reference intervals but the true oxygen saturation is severely decreased.
212. If given an animal's values for serum  $[\text{Na}^+]$ , serum  $[\text{K}^+]$ , serum  $[\text{Cl}^-]$ , serum  $[\text{HCO}_3^-]$  (or  $\text{tCO}_2$  content), blood gas & pH, serum osmolality and other supportive information or laboratory data,
- Recognize data which are consistent with hypoadrenocorticism, salt-losing (Na-losing) nephropathy, dehydration (hypertonic, isotonic, or hypotonic), diarrheas, edematous states, diabetes mellitus with or without ketonuria, respiratory acidoses and alkaloses, metabolic acidoses and alkaloses, ketoacidosis, lactic acidosis, ethylene glycol toxicosis, upper GI obstruction in ruminants, renal insufficiency or failure.
  - For these pathologic states, explain the pathogenesis of the abnormal laboratory data.

213. Extra credit material
- a. Temperature correction of blood gas results (p. 388)
  - b. Pulse oximetry (p. 388-389)
  - c. SID (p. 393-398)