

Self Assessment – RSPT 2350 Module H

1. The negative log of the H ion concentration is the definition of **pH**.
2. Define a Buffer System: **A BUFFER IS DEFINED AS A SOLUTION OF TWO OR MORE CHEMICAL COMPOUNDS THAT PREVENT MARKED CHANGES IN H+ ION CONCENTRATION WHEN EITHER AN ACID OR BASE IS ADDED TO SOLUTION.**
3. Buffer systems prevent a pH change in the blood
 - A. **True**
 - B. False
4. The most important buffer system in the plasma is the
 - A. HHB/KHB
 - B. $\text{KH}_2\text{PO}_4/\text{KHPO}_4^-$
 - C. $\text{NaH}_2\text{PO}_4/\text{NaHPO}_4^-$
 - D. **$\text{H}_2\text{CO}_3/\text{HCO}_3^-$**
 - E. $\text{NH}_3/\text{NH}_4^+$
5. Buffer systems work within _____ to minimize pH change.
 - A. **Seconds**
 - B. Minutes
 - C. Hours
 - D. Days
6. A strong acid is one that dissociates readily in solution.
 - A. **True**
 - B. False
7. If the PaCO_2 is 88 torr, HCO_3^- 37 mEq/L, and pH is 7.20, how much should the PaCO_2 be lowered to restore a normal pH?
DESIRED RATIO IS 20 : 1
$$\frac{1.2 \text{ mEq/L}}{24 \text{ mEq/L}} \times 37 \text{ mEq/L} = 1.85 \text{ mEq/L}$$

$$\frac{1.85}{0.03} = 61.7 \text{ mm Hg}$$
8. A patient experiencing drowsiness, lethargy and coma would most likely have
 - A. Alkalotic pH
 - B. **Acidotic pH**
 - C. Normal pH

9. Name the two categories of acids in the body and give examples of each.
FIXED (NON-VOLATILE): AMINO ACIDS, URIC ACID, SULFURIC ACID, PHOSPHORIC ACID, PYRUVIC ACID, SUCCINIC ACID, LACTIC ACID (IF NO OXYGEN IS PRESENT), FATTY ACIDS, KETOACIDS (IF NO INSULIN IS PRESENT) SUCH AS ACETOACETIC ACID AND BETA-HYDROXYBUTYRIC ACID.
VOLATILE: CARBONIC ACID
10. What is the pH of the blood sample if the PaCO₂ is 22 torr and the HCO₃⁻ is 8 mEq/L?
 A. 7.23
 B. 7.40
 C. 7.48
 D. 7.50
- $$pH = 6.1 + \log \frac{[HCO_3^-]}{[H_2CO_3]} = 6.1 + \log \frac{8}{(22 \times .03)} = 6.1 + \log \frac{8}{.66} =$$
- $$pH = 6.1 + \log 12.12 = 6.1 + 1.08 =$$
- $$pH = 7.18 \dots \text{OOPS}$$
11. The buffer base is normally _____ per liter of blood, assuming a normal Hb level.
 A. 24 mEq/L
 B. 28 mEq/L
 C. 32 mEq/L
 D. 48 mEq/L
12. A base excess of +10 mEq/L means (more than one answer)
 A. Loss of base
 B. Gain of acid
 C. Loss of acid
 D. Gain of base
13. Given an actual BB of 56 mEq/L and a normal Hb, calculate the Base Excess
BE = BB_{OBSERVED} - BB_{NORMAL} = 56 mEq/L - 48 mEq/L = +8 mEq/L
14. Clinical signs of paresthesia, numbness, tingling in extremities, light headedness and dizziness are signs of which acid base disorder? **ALKALSOSIS**
15. You would not attempt to correct a high PaCO₂ in which of the following conditions (more than one answer)
 A. Normal pH
 B. Compensation for a metabolic alkalosis
 C. Permissive hypercapnia
 D. Acute respiratory acidosis from drug overdose

16. Which acids are produced from carbohydrate metabolism? (more than one answer)
- Succinic acid
 - Pyruvic acid
 - Phosphoric acid
 - Uric acid
17. The lungs excrete the volatile acid H_2CO_3 at a rate of **13,000** mEq day.
18. Fixed acids come from: (more than one answer)
- Break down of food substrates
 - Ingestion of some poisons
 - Lack of insulin
 - Lack of oxygen
19. Given the following ABG, pH 7.30, $PaCO_2$ 65 torr, HCO_3^- 33 mEq/L, how much of the rise in HCO_3^- is attributed to the hydration reaction?
- 2.5 mEq/L
 - 5 mEq/L
 - 6 mEq/L
 - 8 mEq/L

IGNORE THIS QUESTION. ALTHOUGH THERE IS A WAY TO SOLVE FOR IT, IT IS MORE THAN WE NEED TO GET INTO.

20. Write the Henderson Hasselbalch equation and show the relationship between pH, $PaCO_2$ and HCO_3^- .

$$pH = pK + \log \frac{HCO_3^-}{H_2CO_3}$$

21. The range of blood pH compatible with life is **6.8 – 7.8**.
22. What is the HCO_3^- level if the $PaCO_2$ is 80 mm Hg? **BAD QUESTION. IT DEPENDS ON THE pH.**
23. Which buffer system is referred to as a closed buffer system? **Hb⁺**
24. The plasma HCO_3^- concentration obtained from blood that has been equilibrated at 37° C with a $PaCO_2$ of 40 mm Hg is called **STANDARD BICARBONATE**.
25. If the actual BB is 30 mEq/L and the Hb is normal, the BE would be **30-48=-18 mEq/L** and should actually be called a base deficit.

26. If a patient developed lactic acidosis, which of the following buffers would react to accept the H^+ ions?
- A. NH_4^+
 - B. K_2HPO_4
 - C. NaH_2PO_4
 - D. **KHB**