

**Summarized by Korkot**

If u need some help with understanding this topic, I'd be more than happy to help ❤️

Acid-base physiology

	pH	Pco <sub>2</sub>	[HCO <sub>3</sub> <sup>-</sup> ]	COMPENSATORY RESPONSE
Metabolic acidosis	↓	↓	↓	Hyperventilation (immediate)
Metabolic alkalosis	↑	↑	↑	Hypoventilation (immediate)
Respiratory acidosis	↓	↑	↑	↑ renal [HCO <sub>3</sub> <sup>-</sup> ] reabsorption (delayed)
Respiratory alkalosis	↑	↓	↓	↓ renal [HCO <sub>3</sub> <sup>-</sup> ] reabsorption (delayed)

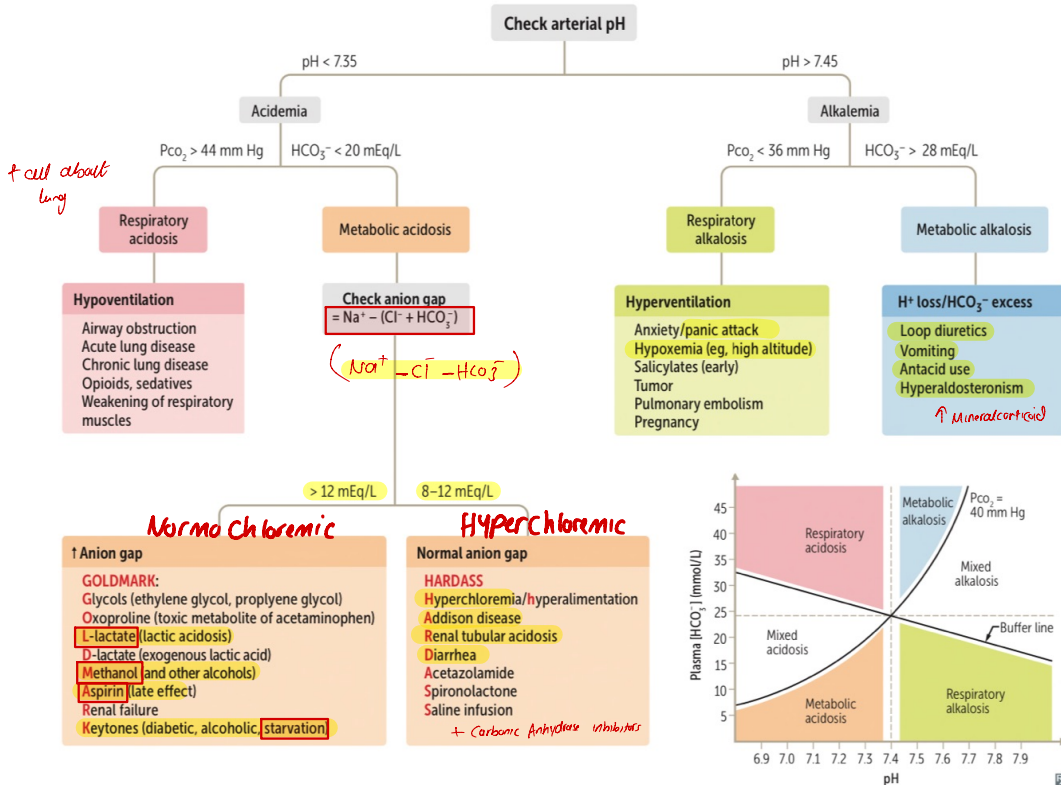
Key: ↓ ↑ = compensatory response.

Henderson-Hasselbalch equation:  $pH = 6.1 + \log \frac{[HCO_3^-]}{0.03 Pco_2}$

Predicted respiratory compensation for a simple metabolic acidosis can be calculated using the Winters formula. If measured Pco<sub>2</sub> > predicted Pco<sub>2</sub> → concomitant respiratory acidosis; if measured Pco<sub>2</sub> < predicted Pco<sub>2</sub> → concomitant respiratory alkalosis:

$Pco_2 = 1.5 [HCO_3^-] + 8 \pm 2$

Acidosis and alkalosis



## Indicate the Acid -Base Disorders in Each of the Following Patients

	pH	HCO <sub>3</sub> <sup>-</sup>	PCO <sub>2</sub>	Acid-Base Disorder ?
*	7.34	15	29	Metabolic acidosis
	7.49	35	48	Metabolic alkalosis
	7.34	31	60	Respiratory acidosis
	7.62	20	20	Respiratory alkalosis
*	7.09	15	50	Acidosis: respiratory + metabolic

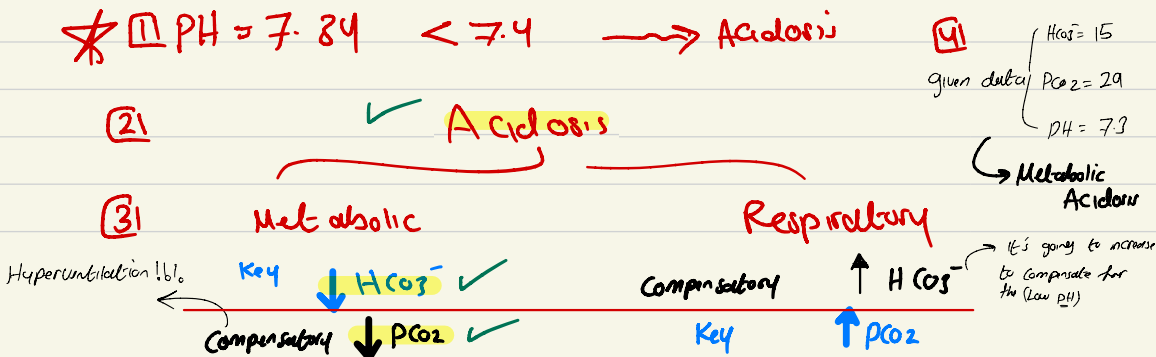
1. At first look at the Ph
2. put the 2 types under the major problem ( Acidosis ,Alkalosis)
3. use the **key** to know which is the compensatory on the other side

**Key for metabolic (HCO<sub>3</sub><sup>-</sup>)**

**Key for Respiratory is (PCO<sub>2</sub>)**

يعني يتحل حسب مفتاح المشكله بجهة  
والجهة الثانيه يكون compensation

4. then choose the suitable type according to the given data



$\text{pH} = 7.09 < 7.4$      $\text{HCO}_3^- = 15 < 24$      $\text{pCO}_2 = 50 > 40$   
 ↓

① less than 7.4

④ given data  
 $\downarrow \text{pH} \rightarrow \text{Acidosis}$

Acidosis ✓

Mixed ←  $\begin{cases} \downarrow \text{HCO}_3^- \\ \uparrow \text{pCO}_2 \end{cases}$

② Metabolic

Respiratory

③ Key  $\downarrow \text{HCO}_3^-$  ✓

Compensatory:  $\uparrow \text{HCO}_3^-$  → to compensate for

Compensatory:  $\downarrow \text{pCO}_2$

Key  $\uparrow \text{pCO}_2$  ✓

the High Acidity  
 It will  $\uparrow \text{HCO}_3^-$

→ Compensatory by the  
 Lungs through Hyper Ventilation

Note: If it was Metabolic Alkalosis  
 the Lungs will Hypoventilate → to  $\uparrow \text{pCO}_2$   
 so  $\uparrow [\text{H}^+]$  to compensate for  
 the High  $[\text{HCO}_3^-]$