

THE COLLEGE OF ST. SCHOLASTICA
Department of Nursing

NSG 3312 – Core Concepts in Nursing II
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ACID BASE PROBLEMS

To interpret arterial blood gases for a patient, one must memorize the normal values, which are as follows:

pH	7.35 to 7.45
pCO ₂	35 to 45 mmHg
HCO ₃	23 to 27 mEq/L

1. The first step: Always look at the pH to determine acidosis or alkalosis.

pH	<7.35 = acidosis
pH	>7.45 = alkalosis

2. The second step: Look at what is causing the imbalance. Is it the CO₂ or HCO₃⁻?

pCO ₂	<35 mmHg = alkalosis
pCO ₂	>45 mmHg = acidosis
HCO ₃	<23 mEq/L = acidosis
HCO ₃	>27 mEq/L = alkalosis

3. The third step: Determine if compensation is occurring.

pH	7.35 to 7.40 = compensated acidosis
pH	7.40 to 7.45 = compensated alkalosis

PRACTICE PROBLEMS FOR ACID/BASE IMBALANCES

Determine which of the following is occurring with each of the following:

Respiratory Acidosis (Uncompensated)

Respiratory Acidosis (Compensated)

Respiratory Alkalosis (Uncompensated)

Metabolic Acidosis (Uncompensated)

Metabolic Acidosis (Compensated)

Metabolic Alkalosis (Uncompensated)

Metabolic Alkalosis (Compensated)

Respiratory and Metabolic Acidosis (Mixed Disturbance)

Respiratory and Metabolic Alkalosis (Mixed Disturbance)

1. pH = 7.32
pCO₂ = 32 mmHg
HCO₃ = 14 mEq/L

2. pH = 7.37
pCO₂ = 28 mmHg
HCO₃ = 18 mEq/L
Ex: pCO₂ has decreased through hyperventilation to decrease the amount of H₂CO₃ in the body.

3. pH = 7.52
pCO₂ = 48 mmHg

$\text{HCO}_3^- = 39 \text{ mEq/L}$

4. pH = 7.44
pCO₂ = 48 mmHg
HCO₃ = 29 mEq/L

5. pH = 7.33
pCO₂ = 55 mmHg
HCO₃ = 23 mEq/L

Ex: Patient with chronic obstructive lung disease.

6. pH = 7.38
pCO₂ = 48 mmHg
HCO₃ = 29 mEq/L

Ex: HCO₃ has increased to compensate for elevated pCO₂.

7. pH = 7.50
pCO₂ = 30 mmHg
HCO₃ = 21 mEq/L

8. pH = 7.44
pCO₂ = 32 mmHg
HCO₃ = 22 mEq/L

Ex: HCO₃ has decreased in an attempt to decrease HCO₃ levels compared to metabolic acids.

9. pH = 7.30
pCO₂ = 50 mmHg
HCO₃ = 19 mEq/L

10. pH = 7.50
pCO₂ = 32 mmHg
HCO₃ = 30 mEq/L

Patient suffering from COPD – chronic bronchitis.

Patient with end stage renal disease (renal failure)

Patient suffering from COPD – emphysema

Patient with overdose of loop diuretics (Lasix)

Patient with excessive use of MOM

Slow choking victim i.e. child who has inhaled a balloon into her trachea

Patient hyperventilating from pain and connected to continuous nasogastric suction losing HCL acid along with gastric secretions.

Patient with a hyper-metabolic state, such as fever or sepsis

Patient in DKA

Patient in lactic acidemia

Patient losing acid through nasogastric suctioning.

Ex: $p\text{CO}_2$ has increased through hypoventilation to increase the amount of H_2CO_3 .

Patient with chronic renal failure and COPD

