Pathophysiology lab exam questions

Laboratory evaluation of acid-base balance

1. What is the direction of change in the parameters below during respiratory acidosis?

	during generation	during compensation
$aHCO_3^-$	?	?
st HCO_3^-	?	?
BE	?	?

2. Diabetic ketoacidosis. How and why do the indicated parameters deviate from normal?

   pH, pCO_2, BE, $aHCO_3^-$, st HCO_3^-, AG, se K^+

3. Traumatic shock (bleeding, crush). The acid-base parameters

	during first hours	one day later
pH	7.2	7.05
pCO_2	20 mmHg	55 mmHg
HCO_3	8 mmol/l	13 mmol/l
st HCO_3	11 mmol/l	11 mmol/l
BB	28 mEq/l	28 mEq/l
BE	–18 mEq/l	–18 mEq/l

   One day after the trauma symptoms of shock-lung develop.
   Identify the type and analyze the different stages of the acid-base imbalance!

4. A 35-year-old woman reports to the ED with shortness of breath. She has cyanosis of the lips. She has had a productive cough for 2 weeks. Her temperature is 39 °C, blood pressure 110/76 mmHg, heart rate 108 bpm, respirations 32/min, rapid and shallow. Breath sounds are diminished in both bases, with coarse bronchi in the upper lobes. Her ABG results are:

   pH = 7.44, pCO_2 = 28 mmHg, $aHCO_3^-$ = 18 mmol/l, $stHCO_3^-$ = 20 mmol/l,
   AG = 12 mmol/l, pO_2 = 54 mmHg

   How do you interpret her ABG result? What other test would you order to verify your diagnosis?

5. A 23 year-old woman with exacerbated rheumatoid arthritis enters to the ED. She has frequently vomited lately. Her medication: Aspirin 3–5 pills/day. Her ABG result:

   pH = 7.70, pCO_2 = 25 mmHg, $aHCO_3^-$ = 30 mmol/l, AG = 22 mmol/l

   (Calculated pCO_2 = 42–44 mmHg.)

   What kind of acid-base disorders does she have?

6. A 60-year-old male presents to the ED from a nursing home. He has been breathing rapidly and is less responsive than usual. There is nothing else remarkable in the anamnestic data. His serum electrolyte panel and ABG:

   Na^+ = 123 mmol/l, K^+ = 3.9 mmol/l, Cl^- = 99 mmol/l

   pH = 7.31, pCO_2 = 10 mmHg, $aHCO_3^-$ = 5 mmol/l

   (Calculated pCO_2 = 13.5–17.5 mmHg)

   What kind of acid-base disorders does he have?

7. A 42 year-old type 1 DM female has flu for four days with incessant vomiting. She presents to the ED two days after stopping insulin due to no food intake. Her serum electrolyte panel and ABG:

   Na^+ = 130 mmol/l, K^+ = 5.5 mmol/l, Cl^- = 80 mmol/l, glucose = 15 mmol/l,

   pH = 7.21, pCO_2 = 25 mmHg, $aHCO_3^-$ = 10 mmol/l.

   (Calculated pCO_2 = 21–25 mmHg)

   What kind of acid-base disorders does she have?

8. A 30-year-old female bone marrow transplanted patient with neutropenic fever has been receiving multiple antibiotics including amphotericin B. She developed rigors and dyspnea. Her serum electrolyte panel and ABG:

   Na^+ = 125 mmol/l, K^+ = 2.5 mmol/l, Cl^- = 100 mmol/l,

   pH = 7.07, pCO_2 = 28 mmHg, $aHCO_3^-$ = 8 mmol/l.

   (Calculated pCO_2 = 18–22 mmHg.)

   What kind of acid-base disorders does she have?