

SAT Chemistry Practice Test 12

Acids and Bases

1. Which is true about a solution that is acidic?

- A. $[H^{1+}]$ equals zero.
- B. $[OH^{1-}]$ equals $[H^{1+}]$.
- C. $[H^{1+}]$ is less than $[OH^{1-}]$.
- D. $[H^{1+}]$ is greater than $[OH^{1-}]$.
- E. $K_w = 1 \times 10^{-7}$.

2. According to the Bronsted-Lowry theory, a base can

- A. donate a proton
- B. yield H^{1+} ions
- C. donate an electron pair
- D. accept an electron pair
- E. accept a proton

3. What volume of 0.200 M NaOH(aq) is needed to neutralize 40.0 mL of a 0.100 M HCl(aq)?

- A. 100.0 mL
- B. 80.0 mL
- C. 40.0 mL
- D. 20.0 mL
- E. 10.0 mL

4. As an acidic solution is titrated with drops of the base, the pH value of the solution will

- A. increase
- B. decrease
- C. remain the same
- D. approach zero
- E. none of the above

5. Which pH value demonstrates a solution with the greatest concentration of OH^{1-} ions?

- A. 1

- B. 7
- C. 10
- D. 12
- E. 14

6. The reaction: $\text{HI}(\text{aq}) + \text{LiOH}(\text{aq}) \rightarrow \text{H}_2\text{O}(\text{l}) + \text{LiI}(\text{aq})$ is classified as

- A. a single replacement
- B. a neutralization reaction
- C. the process of hydrolysis
- D. a synthesis reaction
- E. an oxidation-reduction reaction

7. How many times stronger is an acid with a pH of 2 than acid with a pH of 5?

- A. A pH of 2 is three times as strong.
- B. A pH of 2 is one thousand times as strong.
- C. A pH of 2 is three times as weak.
- D. A pH of 2 is one thousand times as weak.
- E. A pH of 5 is three thousand times as strong.

8. Which substance below is expected to be the strongest electrolyte?

- A. Chlorous acid
- B. Water
- C. Acetic acid
- D. Hydrofluoric acid
- E. Hypochlorous acid

9. Which of the following statements is true?

- A. NaCl is a neutral salt.
- B. $\text{KC}_2\text{H}_3\text{O}_2$ is an acidic salt.
- C. KOH is an acid.
- D. HCl and KOH react to form hydrogen gas and water.
- E. NaBr is basic salt.

10. Which pairing is not a set of conjugates?

- A. OH^{1-} and H_2O
- B. $\text{HC}_2\text{H}_3\text{O}_2$ and $\text{C}_2\text{H}_3\text{O}_2^{1-}$
- C. HCl and Cl^{1-}
- D. NH_3 and NH_4^{1+}
- E. H_2SO_4 and SO_4^{2-}

11. Which reaction below is incorrect based upon the reactants given?

- A. $\text{HF} + \text{LiOH} \rightarrow \text{H}_2\text{O} + \text{LiF}$
- B. $2\text{HCl} + \text{Zn} \rightarrow \text{H}_2\text{O} + \text{ZnCl}_2$
- C. $\text{SO}_2 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_3$
- D. $\text{K}_2\text{O} + \text{H}_2\text{O} \rightarrow 2\text{KOH}$
- E. All of the above reactions is correct.

12. Which compound below is not correctly paired with its name?

- A. KOH is potassium hydroxide.
- B. H_2SO_3 is sulfurous acid.
- C. HI is hydroiodic acid.
- D. HClO_2 is chloric acid
- E. H_3PO_4 is phosphoric acid.

Redox and Electrochemistry

1. The oxidation number for hydrogen in NaH is

- A. 1+
- B. 2+
- C. 0
- D. 1-
- E. 2-

2. Of the compounds below, in which one does chlorine have the highest oxidation number?

- A. HCl

B. KClO_3

C. HClO_2

D. KClO_4

E. CaCl_2

3. In the reaction $\text{Al} + \text{Fe}^{3+} \rightarrow \text{Al}^{3+} + \text{Fe}$, the oxidizing agent is

A. Al

B. Fe

C. Al^{3+}

D. Fe^{3+}

E. none of the above

4. In the chemical cell reaction $2\text{Cr} + 3\text{Ni}^{2+} \rightarrow 2\text{Cr}^{3+} + 3\text{Ni}$, which species is reduced?

A. Cr

B. Ni^{2+}

C. Cr^{3+}

D. Ni

E. none of the above

5. When Fe^{2+} is oxidized to Fe^{3+} , the Fe^{2+} ion

A. loses 1 electron

B. loses 1 proton

C. gains 1 electron

D. gains 1 proton

E. gains 1 neutron

6. Which half-reaction demonstrates conservation of mass and conservation of charge?

A. $\text{Cl}_2 + e^- \rightarrow \text{Cl}^{1-}$

B. $\text{Cl}_2 + 2e^- \rightarrow \text{Cl}^{1-}$

C. $\text{Cl}_2 \rightarrow 2\text{Cl}^{1-} + e^-$

D. $\text{Cl}_2 + e^- \rightarrow 2\text{Cl}^{1-}$

E. $\text{Cl}_2 + 2e^- \rightarrow 2\text{Cl}^{1-}$

7. When the equation $\text{Co} + \text{Ni}^{2+} \rightarrow \text{Co}^{3+} + \text{Ni}$ is balanced, the sum of the coefficients is
- A. 2
 - B. 3
 - C. 5
 - D. 10
 - E. 15
8. What is the purpose of the salt bridge in an electrochemical cell?
- A. It allows ion migration.
 - B. It allows neutron migration.
 - C. It allows electron migration.
 - D. It prevents ion migration.
 - E. It prevents neutron migration.
9. Making reference to electronegativity values, which substance is most easily reduced?
- A. Br_2
 - B. Cl_2
 - C. F_2
 - D. I_2
 - E. At_2
10. When nonspontaneous redox reactions occur by use of an external current, the process is called
- A. neutralization
 - B. esterification
 - C. electrolysis
 - D. hydrolysis
 - E. voltaic ion

Organic Chemistry

1. Which hydrocarbon will undergo a substitution reaction with a halogen?
- A. Pentyne

- B. Ethene
- C. Propyne
- D. Butane
- E. Propene

2. Which type of organic reaction is represented by the equation $C_3H_6 + H_2 \rightarrow C_3H_8$?

- A. Addition
- B. Substitution
- C. Condensation
- D. Polymerization
- E. Dehydration synthesis

3. When the amine group of one amino acid reacts with the carboxylic acid group of another amino acid, the resulting functional group formed is called

- A. an amine
- B. an amide
- C. an ester
- D. a plastic
- E. a polymer

4. Which one of the following polymers is synthetic?

- A. Nucleic acids
- B. Plastic
- C. Proteins
- D. Cellulose
- E. Starch

5. Which two compounds are not isomers of each other?

- A. n-pentane and 2-methylbutane
- B. CH_3CH_2OH and CH_3OCH_3
- C. CH_3COOH and CH_3CH_2COOH
- D. CH_3COCH_3 and CH_3CH_2CHO
- E. $CH_3CH_2CH_2Cl$ and $CH_3CHClCH_3$

6. A carbonyl group is present in all of these functional groups except:

- A. ketones
- B. aldehydes
- C. esters
- D. amides
- E. ethers

7. An organic compound has a molecular formula of C_3H_4 . Which compound below belongs to the same class of hydrocarbons?

- A. C_2H_6
- B. C_3H_6
- C. C_4H_8
- D. C_2H_2
- E. CH_4

8. Which statement is false?

- A. $CH_3CH_2NH_2$ is ethanamine.
- B. $CH_3CHBrCHBrCH_3$ is 2,3-dibromobutane.
- C. CH_3CH_2OH is an ether.
- D. Cyclopentane and 2-pentene have a molecular formula of C_5H_{10} .
- E. Alkenes and alkynes are unsaturated.