

Chemistry SAT practice Paper 29

Q1. All of the following involve a chemical change EXCEPT

- A. the formation of HCl from H₂ and Cl₂
- B. the color change when NO is exposed to air
- C. the formation of steam from burning H₂ and O₂
- D. the solidification of vegetable oil at low temperatures
- E. the odor of NH₃ when NH₄Cl is rubbed together with Ca(OH)₂ powder

Q2. When most fuels burn, the products include carbon dioxide and

- A. hydrocarbons
- B. hydrogen
- C. water
- D. hydroxide
- E. hydrogen peroxide

Q3. In the metric system, the prefix kilo- means

- A. 10⁰
- B. 10⁻¹
- C. 10⁻²
- D. 10²
- E. 10³

Q4. How many atoms are in 1 mole of water?

- A. 3
- B. 54
- C. 6.02×10^{23}
- D. $2(6.02 \times 10^{23})$
- E. $3(6.02 \times 10^{23})$

Q5. Which of the following elements normally exist as monoatomic molecules?

- A. Cl**
- B. H**
- C. O**
- D. N**
- E. He**

Q6. The shape of a PCl_3 molecule is described as

- A. bent**
- B. trigonal planar**
- C. linear**
- D. trigonal pyramidal**
- E. tetrahedral**

Q7. The complete loss of an electron of one atom to another atom with the consequent formation of electrostatic charges is referred to as

- A. a covalent bond**
- B. a polar covalent bond**
- C. an ionic bond**
- D. a coordinate covalent bond**
- E. a pi bond between p orbitals**

Q8. In the electrolysis of water, the cathode reduction reaction is

- A. $2\text{H}_2\text{O}(\text{l}) + 2\text{e}^- \rightarrow \text{H}_2(\text{g}) + 2\text{OH}^- + \text{O}_2(\text{g})$**
- B. $2\text{H}_2\text{O}(\text{l}) \rightarrow \frac{1}{2} \text{O}_2(\text{g}) + 2\text{H}^+ + 2\text{e}^-$**
- C. $2\text{OH}^- + 2\text{e}^- \rightarrow \text{O}_2(\text{g}) + \text{H}_2(\text{g})$**
- D. $2\text{H}^+ + 2\text{e}^- \rightarrow \text{H}_2(\text{g})$**
- E. $2\text{H}_2\text{O}(\text{l}) + 4\text{e}^- \rightarrow \text{O}_2(\text{g}) + 2\text{H}_2(\text{g})$**

Q9. Which of the following radiation emissions has no mass?

- A. Alpha particle**

B. Beta particle

C. Proton

D. Neutron

E. Gamma ray

Q10. If a radioactive element with a half-life of 100 years is found to have transmuted so that only 25% of the original sample remains, what is the age, in years, of the sample?

A. 25

B. 50

C. 100

D. 200

E. 400

Q11. What is the pH of an acetic acid solution if the $[H_3O^+] = 1 \times 10^{-4}$ mole/liter?

A. 1

B. 2

C. 3

D. 4

E. 5

Q12. The polarity of water is useful in explaining which of the following?

I. The solution process

II. The ionization process

III. The high conductivity of distilled water

A. I only

B. II only

C. I and II only

D. II and III only

E. I, II, and III

Q13. When sulfur dioxide is bubbled through water, the solution will contain

- A. sulfurous acid
- B. sulfuric acid
- C. hydrosulfuric acid
- D. persulfuric acid
- E. anhydrous sulfuric acid

Q14. Four grams of hydrogen gas at STP contain

- A. 6.02×10^{23} atoms
- B. 12.04×10^{23} atoms
- C. 12.04×10^{46} atoms
- D. 1.2×10^{23} molecules
- E. 12.04×10^{23} molecules

Q15. Analysis of a gas gave: C = 85.7% and H = 14.3%. If the formula mass of this gas is 42 atomic mass units, what are the empirical formula and the true formula?

- A. CH; C₄H₄
- B. CH₂; C₃H₆
- C. CH₃; C₃H₉
- D. C₂H₂; C₃H₆
- E. C₂H₄; C₃H₆

Q16. Which fraction would be used to correct a given volume of gas at 300K to its new volume when it is heated to 333K and the pressure is kept constant?

A. $\frac{303 - 273}{60 + 273}$

B. $\frac{60}{30}$

C. $\frac{273}{333}$

D. $\frac{303}{333}$

Q17. What would be the predicted freezing point of a solution that has 684 grams of sucrose (1 mol = 342 g) dissolved in 2,000 grams of water?

- A. -1.86°C or 271.14 K
- B. -0.93°C or 272.07 K
- C. -1.39°C or 271.61 K
- D. -2.48°C or 270.52 K
- E. -3.72°C or 269.28 K

Q18. What is the approximate pH of a 0.005 M solution of H_2SO_4 ?

- A. 1
- B. 2
- C. 5
- D. 9
- E. 13

Q19. How many grams of NaOH are needed to make 100 grams of a 5% solution?

- A. 2
- B. 5
- C. 20
- D. 40
- E. 95

Q20. For the Haber process: $\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3 + \text{heat}$ (at equilibrium), which of the following statements concerning the reaction rate is/are true?

- I. The reaction to the right will increase when pressure is increased.
 - II. The reaction to the right will decrease when the temperature is increased.
 - III. The reaction to the right will decrease when NH_3 is removed from the chamber.
- A. I only

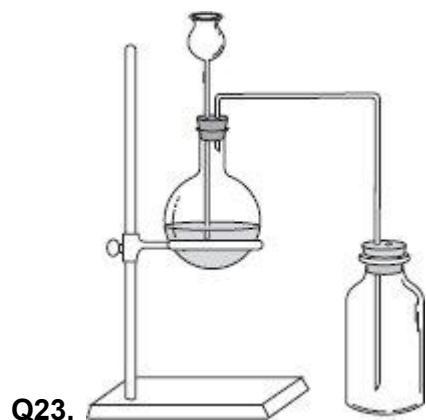
- B. II only
- C. I and II only
- D. II and III only
- E. I, II, and III

Q21. If you titrate 1.0M H_2SO_4 solution against 50. milliliters of 1.0M NaOH solution, what volume of H_2SO_4 , in milliliters, will be needed for neutralization?

- A. 10.
- B. 25.
- C. 40.
- D. 50.
- E. 100

Q22. How many grams of CO_2 can be prepared from 150 grams of calcium carbonate reacting with an excess of hydrochloric acid solution?

- A. 11
- B. 22
- C. 33
- D. 44
- E. 66



The diagram represents a setup that may be used to prepare and collect

- A. NH_3

B. NO

C. H₂

D. SO₃

E. CO₂