Chemistry Sample Questions

Answers are at the bottom of the last page.
For help with questions, please visit Khan Academy or ChemTutor

Chemistry Test Topics

The exam covers nine topic areas of general chemistry:

- Compounds and Elements (3 questions)
- States of Matter (2 questions)
- Reactions (4 questions)
- Stoichiometry (6 questions)
- Structure of Matter (8 questions)
- Periodic Properties (3 questions)
- Solutions (6 questions)
- Dynamics (2 questions)
- Mathematics (10 questions)

1. An atom with an electron configuration of $1s^2\,2s^2\,2p^3$ has how many valence electrons?
    a. 2
    b. 3
    c. 4
    d. 5
    e. 7

2. The _____ sublevel of an atom has a total of five orbitals.
    a. s
    b. p
    c. d
    d. f
    e. g

3. You give a child a balloon, and he goes outside with it to play in the snow. Soon, he returns crying. What happened?
    a. The balloon expanded and burst.
    b. The balloon froze solid.
    c. The balloon shrank.
    d. The balloon dissolved.
    e. The child forgot Charles' Law.

4. What kind of bonding occurs in the compound potassium oxide?
    a. ionic
    b. nonpolar covalent
    c. polar covalent (double bond)
    d. polar covalent (single bond)
    e. None of the above

5. A gas with a temperature of 21.0°C and a volume of 10.0 L is compressed to 5.00 L. What will be the new temperature?
    a. 10.5 °C
    b. 420. °C
    c. 42.0 °C
    d. –126 °C
    e. 315 °C

6. Which of the following sublevels does not exist as written?
   a. 3f
   b. 6f
   c. 2s
   d. 5d
   e. 8s

7. What is the molecular shape of PH3?
   a. tetrahedral
   b. trigonal planar
   c. bent
   d. linear
   e. trigonal pyramidal

8. What is the percent by mass concentration of sodium bromide in a solution which contains 50.0 g of sodium bromide in 200.0 g of water?
   a. 40.0 %
   b. 20.0 %
   c. 25.0 %
   d. 33.3 %
   e. 50.0 %

9. How many milliliters of 6.00 *M* HCl solution would be required to prepare 2.00 L of 0.140 *M* HCl by dilution?
   a. 420 mL
   b. 168 mL
   c. 85.6 mL
   d. 46.7 mL
   e. 30.0 mL

10. What is the molar concentration of 2000. mL of aqueous solution containing 135 g of glucose, $C_6H_{12}O_6$?
   a. 12.15 M
   b. 0.750 M
   c. 67.5 M
   d. 0.667 M
   e. 0.375 M

11. What is the formula of copper (II) sulfate pentahydrate?
   a. Cu2(SO4)2 . 5 H2O
   b. Cu2(SO4) . 5 H2O
   c. CuSO4 . 6 H2O
   d. CuSO4 . 5 H2O
   e. None of the above

12. What is the electron configuration for the nitride ion?
   a. $1s^2\ 2s^2\ 2p^1$
   b. $1s^2\ 2s^2\ 2p^3$
   c. $1s^2\ 2s^2\ 2p^5$
   d. $1s^2\ 2s^2\ 2p^6$
   e. None of the above

13. A tank has a pressure of 30.0 atm at a temperature of 22.0^{o}C. After heating, the temperature rises to 35.0^{o}C. What is the new pressure?
   a. 54.3 atm
   b. 31.3 atm
   c. 28.7 atm
   d. 47.7 atm
   e. 30.6 atm

14. Which pair is immiscible?
   a. ethanol and water
   b. water and octane, C_8H_{18}
   c. isopropyl alcohol and water
   d. acetic acid and water
   e. octane and oil

15. How many grams of sodium hydroxide are required to prepare 250.0 mL of a 6.00 M solution?
    a. 1.50 g
    b. 0.0375 g
    c. 0.600 g
    d. 3.75 g
    e. 60.0 g

16. 5.60 L of a gas at STP has a mass of 13.0 g. What is the molar mass of the gas?
    a. 33.2 g/mol
    b. 66.4 g/mol
    c. 26.0 g/mol
    d. 52.0 g/mol
    e. none of the above

17. What volume of 0.62 *M* sodium hydroxide is required to neutralize 20.00 mL of 0.391 nitric acid?
    Word reaction with reactants *only.* (Students should predict products):
    Sodium hydroxide + nitric acid
    a. 23.6 mL
    b. 16.9 mL
    c. 9.03 mL
    d. 11.8 mL
    e. none of the above

18. How many moles are in 20.0 g of sodium carbonate?
    a. 1.89 mol
    b. 212 mol
    c. 2.12×10^3 mol
    d. 0.189 mol
    e. 18.9 mol

19. The percent of nitrogen in magnesium nitride is
    a. 27.8%
    b. 36.6%
    c. 16.1%
    d. 72.2%
    e. 63.4

20. What is the molar concentration of 250. mL of aqueous solution containing 48.8 g of glucose, $C_6H_{12}O_6$?
    a. 5.12 M
    b. 0.923 M
    c. 0.271 M
    d. 1.08 M
    e. 0.195 M

21. How many grams of aluminum metal will react with 0.0500 mole of oxygen gas according to the unbalanced equation given below?
    Aluminum + Oxygen = Aluminum Oxide
    a. 1.35 g
    b. 1.01 g
    c. 4.32 g
    d. 2.06 g
    e. 1.80 g

22. For the equation given, how many grams of methane will react with 125 g of oxygen?
    Word reaction with reactants *only.* (Students should predict products):
    Methane (CH_4) burns in oxygen
    a. 39.1 g
    b. 19.5 g
    c. 15.6 g
    d. 31.3 g
    e. 62.5 g

For problems 23 - 24, Given the word reaction with reactants only (students should predict products):
phosphoric acid reacts with magnesium carbonate

23. From the balanced chemical equation, the simplest whole number coefficient for the product magnesium phosphate is:
    a. 1
    b. 2
    c. 3
    d. 4
    e. none of the above

24. If 50.0 g of magnesium carbonate reacts completely with phosphoric acid, the grams of gas produced is
    a. 52.2 g
    b. 26.1 g
    c. 13.1 g
    d. 50.0 g
    e. 55.0 g

25. How many molecules are in 5.8 g of acetone, C3H6O?
    a. 0.10 molecules
    b. 6.0 x 1022 molecules
    c. 3.5 x 1024 molecules
    d. 6.0 x 1023 molecules
    e. none of the above

26. This reaction is an example of which of the following types?
aluminum reacts with bromine to produce aluminum bromide
    a. combination
    b. single displacement
    c. decomposition
    d. gaseous
    e. precipitation

27. What is the simplest whole number coefficient for aluminum bromide in the above reaction (#26)?
    a. 1
    b. 2
    c. 3
    d. 4
    e. none of the above

28. How many moles of oxygen are required for the complete reaction of 45g of C_2H_4 when it is burned?
    a. 1.3 x 10_2 mol
    b. 0.64 mol
    c. 112.4 mol
    d. 4.8 mol
    e. none of the above

29. If 14.0 g of C_2H_4 is burned and the actual yield of water is 7.84 g, the percent yield in the reaction is:
    a. 0.56%
    b. 43.6%
    c. 87.1%
    d. 56.0%
    e. 82.0%

Answers:
1d, 2c, 3c, 4a, 5d, 6a, 7e, 8b, 9d, 10e, 11d, 12d, 13b, 14b, 15e, 16d, 17e, 18d, 19a, 20d, 21e, 22d, 23a, 24b, 25b, 26a, 27b, 28d, 29b