



# **SCIENCE PROFICIENCY (Chemistry)**

**Directions:** For each statement or question, choose the letter of the word or expression that, of those given, best completes or answers the question. Then on your answer sheet, blacken the circle that corresponds to your final answer.

## **Notes:**

- ▶ Calculators of any kind are not permitted. All numbers used are real numbers.

## **BEGIN HERE:**

1. A gas measures 100 mL at 26 C and 1atm. What will be its volume at 13 C and 0.5 atm?  
a. 50                    b. 100                    c. 150                    d. 200

2. Given the following electron configuration, determine the group number and period number of the element.  
 $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^5$

a. Period 4, Group 5                    c. Period 3, Group 7  
b. Period 5, Group 4                    d. Period 7, Group 3

3. Balance the following chemical equations:  
 $C_6H_{12}O_4 + O_2 \rightarrow CO_2 + H_2O$

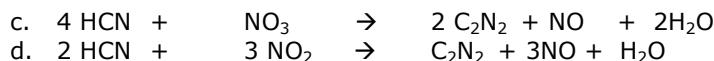
a.  $C_6H_{12}O_4 + 15/2O_2 \rightarrow 6CO_2 + 7H_2O$   
b.  $2C_6H_{12}O_4 + 15O_2 \rightarrow 12CO_2 + 14H_2O$   
c.  $4C_6H_{12}O_4 + 30O_2 \rightarrow 24CO_2 + 26H_2O$   
d.  $C_6H_{12}O_4 + 15O_2 \rightarrow 6CO_2 + 7H_2O$

4. Cyanogen ( $C_2N_2$ ) can be prepared by a catalyzed phase reaction between HCN and NO<sub>2</sub>. The products of the reaction are  $C_2N_2$ , NO, and H<sub>2</sub>O. What is the balanced chemical reaction?

a.  $4HCN + 2NO_2 \rightarrow 2C_2N_2 + 4NO + 2H_2O$   
b.  $2HCN + NO_2 \rightarrow C_2N_2 + NO + H_2O$



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5. A chemical bond is an attractive force that holds atoms together. What type of chemical bond which refers to the electrovalent or electrostatic attraction between positive and negative ions?
- a. Ionic Bond
  - b. Crystal Lattice
  - c. Covalent Bond
  - d. Polar Covalent Bond

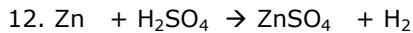
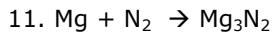
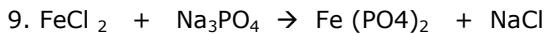
For nos 6- 8, Fill the table below.

Element	Mass #	Atomic #	Proton #	Electron #	Neutron #
Radon	(6)	53	(7)	(8)	74

- a. 53                    b. 74                    c. 106                    d. 127

For nos. 9 – 12 refer to the choices below

- a. Combination
- b. Decomposition
- c. Single Replacement
- d. Double Replacement



13. What volume of HCl is needed to prepare 3L of 3 molar hydrochloric acid from 6 molar solution?

- a. 1.0 L
- b. 1.5 L
- c. 2.0 L
- d. 2.5 L

Nitrogen gas reacts with hydrogen gas to produce ammonia as shown in the following equation:

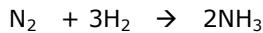
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14. How many moles of H<sub>2</sub> are needed to react with 2.5 mole N<sub>2</sub>?  
a. 2.5  
b. 5.0  
c. 7.5  
d. 10.0

15. From the answer in no. 14, how many grams of H<sub>2</sub> will be produced?  
a. 2.5  
b. 5.0  
c. 7.5  
d. 10.0

16. A gas measures 450 mL at a temp of 30C, what will be its volume at 50 C?  
a. 250 mL  
b. 500 mL  
c. 750mL  
d. 1000mL

17. A mixture shows the following properties: Its particles do not settle down, can not be filtered, and cannot be seen by the naked eye. The mixture does not show the Tyndall effect. Which of the following best describe this mixture?  
a. homogeneous  
b. solution  
c. colloid  
d. suspension

18. If the volume of one mole of gas molecules remains constant, lowering the temperature will make the pressure  
a. increase  
b. decrease  
c. increase then decrease  
d. decrease then increase

19. What happens to the volume of a confined gas if its pressure is doubled and its temperature remains constant?  
a. increase  
b. decrease  
c. will remain the same  
d. all of the above

20. The formula that indicates the local number of atoms of the elements in a compound is the  
a. empirical formula  
b. molecular formula  
c. structural formula  
d. simplest formula

21. What chemical equation will represent the reaction of MgCl<sub>2</sub> and KOH?  
a. MgK + HCl  
b. Mg + KCl<sub>2</sub> + H<sub>2</sub>O  
c. MgO + K + HCl  
d. Mg(OH)<sub>2</sub> + KCl



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22. Which of the following statement is true?
  - a. Orbitals make up a subshell; subshells make up a shell.
  - b. Subshells make up a shell; shells make up an orbital.
  - c. Shells make up an orbital; orbitals make up a subshell.
  - d. None of the above.
23. Which of the following does not belong to the group?
  - a. Molarity
  - b. Molality
  - c. Normality
  - d. Acidity
24. If 50 g of reactants are used up in a reaction, what will be the mass of the products?
  - a. 25
  - b. 30
  - c. 45
  - d. 50
25. Which of the following is not a chemical reaction?
  - a. burning paper
  - b. rusting of metal
  - c. ripening of fruit
  - d. freezing carbon dioxide
26. Which of the following is true about sub atomic particles, mass number and atomic number?
  - a. mass number is equal to the number of neutron
  - b. proton plus electron is equal to the mass number
  - c. atomic number is equal to the number of protons
  - d. neutron number can be calculated given only the mass number
27. In a compound, the sum of the total positive oxidation numbers and negative oxidation numbers must be equal to \_\_\_\_\_.
  - a. 0
  - b. 1
  - c. 2
  - d. 3
28. Atoms of the same elements having the same atomic number can have different mass number due to differences in their number of neutrons. These atoms are \_\_\_\_\_.
  - a. neutrons
  - b. protons
  - c. isotopes
  - d. isomers
29. Random movement of particles is least observable in what phase of matter?
  - a. gas
  - b. plasma
  - c. solid
  - d. liquid
30. What are electrons found in an incomplete outer shell of an atom called?

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- a. electronegativity
- b. electron configuration
- c. lone pair
- d. valence electrons

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