



Answer by circling the letter in front of the given answers. Each correct answer is worth 2 points. Writing with a pencil, circling two or more answers or crossing over the answer will be penalized by 0 points.

I. MULTIPLE CHOICE TEST WITH ONE CORRECT ANSWER  
(Answer by circling only one of the answers marked with A, B, C or D)

1. Jane should separate two liquid substances from a mixture. They have different boiling points. What glassware is needed to assemble the apparatus?

- A. A funnel
- B. A graduated cylinder
- C. Burets
- D. A Liebig condenser

2. A bottle containing a chemical is marked with the warning symbol below. What kind of substance is in the bottle?



- A. Flammable
- B. Oxidizing
- C. Toxic
- D. Corrosive

3. Which of the following statements about the law of conservation of mass **is false**?

- A. The total mass of the reactants and products in chemical reaction is unchanged.
- B. In an open system where gas is released during chemical reactions, a decrease in the mass of the system is observed.
- C. The simple chemical reactions create new types of atoms.
- D. Atoms are not lost, but are rearranged in the chemical reactions.

4. Jana wanted to check if aluminium is the hard material used in a rod and she carried out an experiment. She put the rod on a tripod. At one end of the rod she glued a piece of wax and the opposite end was heated with a burner. What should Jana do to check if the rod is made of aluminium?

- A. Measure the mass of the rod.
- B. Measure the volume of the rod.
- C. Check whether the rod conducts heat.
- D. Check the hardness of the material of the rod.

5. Which of the following is an example of a physical change only?

- A. Condensation of water vapor.
- B. Burning a candle.

C. Photosynthesis in green parts of the plant.  
D. Adding an effervescent tablet in a glass of water, followed by releasing bubbles.

6. Which of the following changes is chemical?

- A. Perfume evaporation.
- B. Firecracker explosion.
- C. Ice cream melting.
- D. Heating up a mixture of cooking salt and water to the boiling point.

7. A pure substance X is heated. A solid and a gas are obtained. What kind of substance is X?

- A. An element.
- B. A simple substance.
- C. A compound.
- D. A mixture.

8. The test tube contains two white substances in a solid aggregate state. After adding water in the tube a yellow color is obtained. The content of the test tube is filtered and a yellow precipitate and colorless filtrate are obtained. On that basis **alone** it can be concluded that:

- A. A chemical reaction takes place in the tube.
- B. The filtrate is a pure substance.
- C. The yellow precipitate is a mixture.
- D. The content of the test tube is a pure yellow substance.

9. Which of the following are pure substances, and which are mixtures?

- I. diamond      II. steel      III. baking soda
- IV. phosphorus      V. milk

- A. Pure substances are: I, II, III and IV, mixture is: V.
- B. Pure substances are: I and IV, mixtures are: II, III and V.
- C. Pure substances are: I, III and IV, mixtures are: II and V.
- D. Pure substances are: III and IV, mixtures are: I, II and V.



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10. Which of the following are simple substances, and which are compounds?

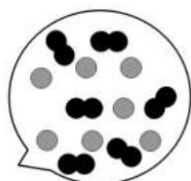
- I. sugar      II. bluestone      III. graphite  
IV. chlorine      V. ozone

- A. Simple substances are: III, IV and V, compounds are: I and II.  
B. Simple substances are: I, III and IV, compounds are: II and V.  
C. Simple substances are: IV and V, compounds are: I, II and III.  
D. Simple substances are: I, II, IV and V, compounds are: III, V.

11. What procedure **CANNOT** be used to separate  $\text{KNO}_3$  from aqueous solution?

- A. Evaporation of water.  
B. Crystallization and decantation.  
C. Filtering.  
D. Distillation.

12. A model of particles in a mixture under standard conditions is shown in the figure below. The mixture could be made up of:



- A. Iron and sulfur  
B. Helium and hydrogen  
C. Hydrogen and oxygen  
D. Phosphorus and hydrogen

13. Anna's task is to order the following oxides:  $\text{Al}_2\text{O}_3$ ,  $\text{CO}$ ,  $\text{NO}_2$ ,  $\text{Cu}_2\text{O}$  and  $\text{N}_2\text{O}_5$  in sequence by increasing the valence of the element in the oxide. Help Anna!

- A.  $\text{Al}_2\text{O}_3$ ,  $\text{N}_2\text{O}_5$ ,  $\text{Cu}_2\text{O}$ ,  $\text{CO}$  and  $\text{NO}_2$   
B.  $\text{Cu}_2\text{O}$ ,  $\text{CO}$ ,  $\text{NO}_2$ ,  $\text{Al}_2\text{O}_3$  and  $\text{N}_2\text{O}_5$   
C.  $\text{Cu}_2\text{O}$ ,  $\text{CO}$ ,  $\text{Al}_2\text{O}_3$ ,  $\text{NO}_2$  and  $\text{N}_2\text{O}_5$   
D.  $\text{Al}_2\text{O}_3$ ,  $\text{CO}$ ,  $\text{NO}_2$ ,  $\text{Cu}_2\text{O}$  and  $\text{N}_2\text{O}_5$

14. Marko carefully added hydrochloric acid to an erlenmeyer in which he had previously placed a piece of magnesium strip. What textual equation describes the chemical reaction taking place in the erlenmeyer?

- A. Magnesium + hydrochloric acid  $\rightarrow$  magnesium chloride + hydrogen

B. Magnesium + hydrochloric acid  $\rightarrow$  magnesium chloride + oxygen

C. Magnesium + hydrochloric acid  $\rightarrow$  magnesium chlorite + hydrogen

D. Magnesium + hydrochloric acid  $\rightarrow$  magnesium oxide + chlorine

15. Carbon, nitrogen and oxygen are nonmetals from the 14<sup>th</sup>, 15<sup>th</sup> and 16<sup>th</sup> group in the periodic table of elements, respectively. These three elements are arranged in the same period, one after the other. Based on this information, which of the following statements regarding the mass of the molecules is correct?

- A.  $\text{CO}_2 > \text{O}_3$   
B.  $\text{CO} > \text{CO}_2$   
C.  $\text{NO} > \text{CO}$   
D.  $\text{N}_2 > \text{O}_2$

16. Which of the following oxide molecules has the least number of atoms?

- A. Nitrogen(V) oxide.  
B. Nitrogen(II) oxide.  
C. Nitrogen(I) oxide.  
D. Nitrogen(III) oxide.

17. Circle the **false** statement concerning the formula  $5\text{Ca}_3(\text{PO}_4)_2$ :

- A. The compound calcium phosphate consists of the elements calcium, phosphorus and oxygen.  
B. The number 5 represent five formula units of  $\text{Ca}_3(\text{PO}_4)_2$ .  
C.  $5\text{Ca}_3(\text{PO}_4)_2$  contains 15 atoms of calcium.  
D.  $5\text{Ca}_3(\text{PO}_4)_2$  contains 8 atoms of oxygen.

18. Which of the following formulae / symbols correspond to simple substances i.e. compounds?

- I.  $\text{H}_2$       II.  $\text{CS}_2$   
III.  $\text{S}_8$       IV. Ar

A. Simple substance: IV; compounds: I, II and III.

B. Simple substances: I and IV; compounds: II and III.

C. Simple substances: II and III; compounds: I and IV.

D. Simple substances: I, III and IV; compound: II.



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19. Petar was making a project about the periodic table of elements. Which of the following information is **INCORRECT**?
- A. Hg is a metal that is in a liquid state at 20 °C.
  - B. The most pronounced metals are located in the upper right part of the periodic table.
  - C. Metallic properties increase down a group.
  - D. K is a metal and its compounds produce a characteristic purple color in a flame.

20. In the reaction between carbonate and an acid, what compounds are produced?
- A. Salt, hydrogen and carbon.
  - B. Salt, hydrogen and carbon dioxide.
  - C. Salt, water and carbon dioxide.
  - D. Salt, water and carbon.

21. What compound is produced when burning phosphorus?
- A.  $F_2O$
  - B. HF
  - C.  $H_3PO_3$
  - D.  $P_2O_5$

22. What gas is released in a reaction between iron and sulfuric acid?
- A. Hydrogen.
  - B. Oxygen.
  - C. Sulfur dioxide.
  - D. Water vapor.

23. Salts **CAN'T** be formed by a reaction between:

- A. Metal + nonmetal.
- B. Metal + acid.
- C. Metal + oxygen.
- D. Metal + base.

24. The name of the compound whose chemical formula is HF is:

- A. Fluoric hydrogen.
- B. Hydrogenic fluoride.
- C. Hydrogen fluoride.
- D. Fluoridium.

25. Marina has determined the pH of the solutions from the following products, using universal indicator.

Product	pH
Lemon juice	2,4
Milk	6,5
Liquid soap	10
Bleach	12

Which of the given statements is correct?

- A. The liquid soap solution is neutral.
- B. The universal indicator is colored red in the lemon juice solution.
- C. The universal indicator is colored blue in the milk solution.
- D. The most acidic is the bleach solution.