

1. Which of the following amino acids contains sulfur?

- a) asparagine -
- b) methionine +
- c) histidine -
- d) threonine -

2. What is the symbol of the element that is classified as an alkali metal and is in the fourth period of the periodic table?

- a) Ca -
- b) K +
- c) Br -
- d) Na -

3. A silver atom is converted to a silver ion when the atom

- a) gains one electron -
- b) gains two electrons -
- c) loses one electron +
- d) loses two electrons -

4. HClO is named

- a) hypochlorous acid +
- b) chlorous acid -
- c) chloric acid -
- d) perchloric acid -

5. What is the correct name for  $\text{KMnO}_4$ ?

- a) potassium(I) manganate -
- b) potassium manganate -
- c) potassium permanaganate +
- d) potassium manganese tetraoxide -

6. The formula of an ionic compound is  $\text{X}_2\text{Y}_3$ . Which pair of atoms is most likely to be X and Y, respectively?

- a) Na and S -
- b) Al and O +
- c) Ca and P -
- d) Cr and Cl -

7. How many molecules are present in 0.500 mol of  $\text{CH}_4$ ?

- a)  $3.01 \times 10^{23}$  molecules +
- b)  $6.02 \times 10^{23}$  molecules -
- c)  $8.00 \times 10^{23}$  molecules -
- d)  $5.00 \times 10^{22}$  molecules -

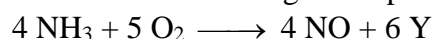
8. The reaction of glucose,  $\text{C}_6\text{H}_{12}\text{O}_6$ , with oxygen produces carbon dioxide and water. What is the sum of the stoichiometric coefficients in the balanced equation?

- a) 19 +
- b) 17 -
- c) 12 -
- d) 6 -

9. Given the reaction:  $2 \text{KClO}_3 \rightarrow 2 \text{KCl} + 3 \text{O}_2$ . How many moles of  $\text{O}_2$  are produced when 4.0 mol of  $\text{KCl}$  are produced?

- a) 1.5 mol -
- b) 3.0 mol -
- c) 4.5 mol -
- d) 6.0 mol +

10. Consider the following incomplete reaction. Choose the formula for the missing substance Y.



- a)  $\text{O}_3$  -
- b)  $\text{H}_2\text{O}$  +
- c)  $\text{H}_2$  -
- d)  $\text{H}_2\text{O}_2$  -

11. Which type of chemical bond involves the equal sharing of electrons?

- a) ionic -
- b) polar covalent -
- c) nonpolar covalent +
- d) London dispersion force -

12. What mass of sodium hydroxide will completely neutralize 2.5 mol of sulfuric acid?

- a) 2.50 g -
- b) 100.0 g -
- c) 50.0 g -
- d) 200.0 g +

13. What is the percentage by mass of a solution formed when 5.0 g of solute is dissolved in 40 g of water?

- a) 8.0 % -
- b) 11 % +
- c) 13 % -
- d) 14 % -

14. A buffer solution was prepared by mixing 200 ml of 0.1 M  $\text{CH}_3\text{COONa}$  and 100 ml of 0.5 M  $\text{CH}_3\text{COOH}$ . The  $\text{pK}_A$  of acetic acid is 4.74. What is the resulting pH of buffer?

- a) 3.74 -
- b) 4.34 +
- c) 5.74 -
- d) 7.00 -

15. What is the oxidation number of oxygen in  $\text{H}_2\text{O}_2$ ?

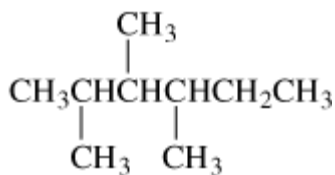
- a) -2 -
- b) 0 -
- c) +2 -
- d) +1 +

16. According to Le Châtelier's principle, a decrease in the temperature at which the following reaction  $\text{N}_2\text{O}_4(\text{g}) + 58.6 \text{ kJ} \rightleftharpoons 2\text{NO}_2(\text{g})$  takes place will

- a) shift the equilibrium to the left +
- b) shift the equilibrium to the right -
- c) have no effect on the equilibrium -
- d) increase number of  $\text{NO}_2$  moles -

17. Which compound is not an isomer of the others?

- a) 2,3,4-trimethylpentane -
- b) 3-ethylhexane -
- c) octane -
- d) 2,5-dimethylheptane +



18. The correct IUPAC name for the compound on the left is:

- a) isohexane -
- b) trimethylhexane -
- c) 2,3,4-trimethylhexane +
- d) 3,4,5-trimethylhexane -

19. One of the products of a particular dehydrogenation reaction is propene. The other product is:

- a) water -
- b) propane -
- c) hydrogen +
- d) cannot be determined from the information given -

20. Which of the following structural features is never associated with cis-trans isomerism?

- a) double bonds -
- b) ring systems -
- c) triple bonds +
- d) They are all associated with cis-trans isomerism -

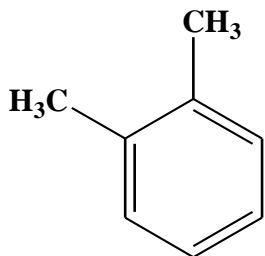
21. Hex-1-ene reacts with potassium permanganate and water to form a diol. What type of reaction is this?

- a) This is a substitution reaction -
- b) This is an oxidation reaction and an addition reaction +

- c) This is an oxidation reaction but not an addition reaction -  
 d) This is an addition reaction but not an oxidation reaction -

22. Which two names represent different compounds?

- a) toluene and methylbenzene -  
 b) 1,4-dibromobenzene and para-dibromobenzene -  
 c) phenol and hydroxybenzene -  
 d) 1,2-dichlorobenzene and meta-dichlorobenzene +



23. What is the name for the molecule on the left?

- a) ortho-toluene -  
 b) 1,2-dimethyltoluene -  
 c) ortho-phenol -  
 d) ortho-xylene +

24. The smallest tertiary alcohol contains:

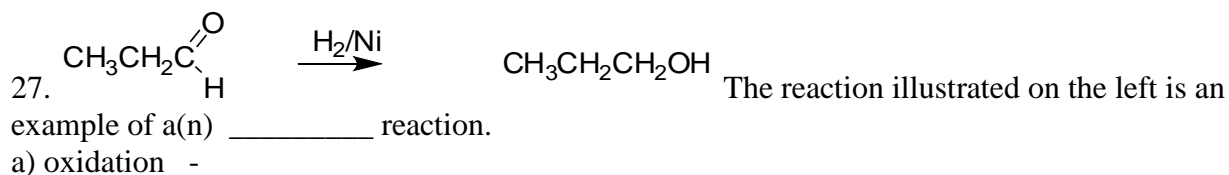
- a) two carbon atoms -  
 b) three carbon atoms -  
 c) four carbon atoms +  
 d) five carbon atoms -

25. Identify the common name for HOCH<sub>2</sub>CH<sub>2</sub>OH.

- a) ethylene glycol +  
 b) dihydroxyethane -  
 c) 1,3-ethanediol -  
 d) 2-hydroxyethanol -

26. Which of the following aldehydes is most soluble in water?

- a) methanal +  
 b) propanal -  
 c) pentanal -  
 d) heptanal -



- b) reduction +
- c) condensation -
- d) hydration -

28. The IUPAC name for acetic acid is

- a) ethanoic acid +
- b) formic acid -
- c) phenol -
- d) hydrogen acetate -

29. For a compound to be classified as a lipid, it must

- a) contain a glycerol unit -
- b) be soluble in nonpolar solvents +
- c) contain at least one fatty acid unit -
- d) be soluble in water -

30. Rank the following substances in order of increasing acid strength.

- a) acetic acid < phenol < nitric acid -
- b) phenol < nitric acid < acetic acid -
- c) phenol < acetic acid < nitric acid +
- d) acetic acid < nitric acid < phenol -