

## Chemistry

1. The number of atomic orbitals in the valence shell of Ca atom are:

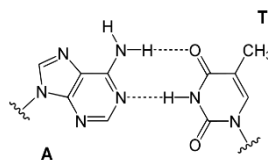
- a) 1
- b) 2
- c) 3
- d) 4

2. In which series of compounds the polarity of the chemical bounds increases:

- a) HF, HBr, HCl, HI
- b) HI, HBr, HCl, HF
- c) HI, HCl, HBr, HF
- d) HF, HCl, HBr, HI

3. How many are the donor atoms involved in formation of hydrogen bonds between adenine and thymine:

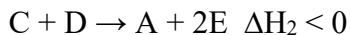
- a) one
- b) two
- c) four
- d) six



4. The enthalpy of neutralization of strong acid and strong base is  $-57.2 \text{ kJ/mol}$ :

- a) truth for  $\text{H}_2\text{SO}_4 + \text{Zn}(\text{OH})_2$
- b) truth for  $\text{HCl} + \text{NaOH}$
- c) truth for  $\text{CH}_3\text{COOH} + \text{NaOH}$
- d) there is not correct answer
- e)

5. Two consecutive steps of a chemical reaction are given below:



Which one of the following is true for this reaction:

- a) Reaction is:  $\text{A} + \text{B} + \text{D} \rightarrow 4\text{E}$
- b) It is endothermic
- c) A and C are catalysts
- d) there is not correct answer

6. At equilibrium the rate of reverse reaction is:

- a) higher than the rate of forward reaction
- b) lower than the rate of forward reaction
- c) equal to the rate of forward reaction
- d) there is no correct answer

7. How many grams NaCl are needed for 1L solution with concentration 0.9 %?

- a) 9 g
- b) 0.9 g
- c) 0.09 g
- d) 90 g

8. Which one of the following answers shows two compounds in solution, that when mixed will form precipitate:

- a)  $\text{HgCl}_2$  and  $\text{NaNO}_3$
- b)  $\text{CuBr}_2$  and  $(\text{NH}_4)_2\text{CO}_3$
- c)  $\text{AgNO}_3$  and  $\text{CH}_3\text{COONa}$
- d)  $\text{K}_2\text{SO}_4$  and  $\text{Fe}(\text{NO}_3)_2$

9. In the reaction  $\text{I}^- + \text{MnO}_4^- \longrightarrow \text{I}_2 + \text{MnO}_2$ , which one of the elements, if any, is oxidized?

- a) oxygen
- b) manganese
- c) iodide ion
- d) there is no correct answer

10. Which one of the substituents is meta director:

- a)  $-\text{CH}_3$
- b)  $-\text{NO}_2$
- c)  $-\text{NHCOR}$
- d)  $-\text{OH}$

11. 1-propanol and 2-propanol are?

- a) chain isomers
- b) positional isomers
- c) functional isomers
- d) not isomers

12. Which one of the following answers shows two compounds in solution, that when mixed will not react?

- a)  $\text{CaCl}_2$  and  $\text{NaNO}_3$
- b)  $\text{AgNO}_3$  and  $\text{HI}$
- c)  $\text{Hg}(\text{NO}_3)_2$  and  $\text{Na}_2\text{S}$
- d)  $\text{HCl}$  and  $\text{KOH}$

13. Which one of the statements below is *false*?

- a) Alkanes undergo combustion in air
- b) Alkenes react with hydrohalogenes (HX)
- c) Alkynes do not react with ozone
- d) Arenes react with  $\text{Br}_2$

14. Consider the following reaction:  $\text{Zn} + \text{Cu}(\text{NO}_3)_2 \longrightarrow \text{Zn}(\text{NO}_3)_2 + \text{Cu}$ .

Which one of the following statements is *true*?

- a)  $\text{Cu}(\text{II})$  nitrate is oxidizing agent
- b)  $\text{Cu}(\text{II})$  nitrate is reducing agent
- c) The zinc atom loses electrons; therefore, it is reduced.
- d) The reaction is not possible.

15. Which one of these choices is the formula for an *ether*?

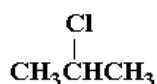
- a)  $\text{CH}_3\text{CHO}$

- b)  $\text{CH}_3\text{OCH}_3$
- c)  $\text{CH}_3\text{COCH}_3$
- d)  $\text{CH}_3\text{COOH}$

16. Esters are synthesized from two classes of organic compounds. Those two types of compounds are

- a) acids and bases.
- b) amines and alcohols.
- c) alcohols and acids.
- d) amines and alkenes.

17. What type of alkyl halide is this?

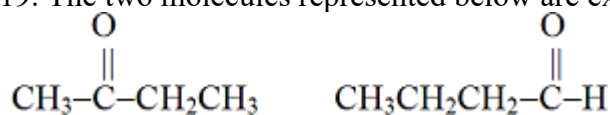


- a) Primary
- b) Secondary
- c) Tertiary
- d) Quaternary

18. A condensation polymerization produces a polymer and

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

19. The two molecules represented below are examples of



- a) isomers
- b) isotopes
- c) alcohols
- d) carboxylic acids

20. Organic compounds with the general formula  $\text{R}-\text{O}-\text{R}$  (where R is an alkyl group) are called

- a) organic acids.
- b) alcohols.
- c) ethers.
- d) aldehydes

21. Which type of organic compound does not contain a carbonyl group?

- a) alcohol
- b) esters
- c) ketones
- d) aldehydes

22. Aldehydes can be synthesized by the oxidation of

- a) Primary alcohols
- b) Secondary alcohols
- c) Organic acids
- d) Inorganic acids

23. A condensation polymerization reaction is best described as the

- a) Joining of monomers by the removal of oxygen
- b) Joining of monomers by the removal of water
- c) Oxidation of a hydrocarbon by oxygen
- d) Oxidation of a hydrocarbon by water

24. Amines are

- a) organic bases that react with water to produce ammonia.
- b) organic acids that react with water to produce ammonia.
- c) organic bases that react with acids to form ammonium salts.
- d) organic acids that react with bases to form ammonium salts.

25. The alcohol that contains two alkyl groups attached to the carbon bonded to the -OH group is a

- a) quaternary alcohol
- b) tertiary alcohol
- c) primary alcohol
- d) secondary alcohol