1. H₂O NH₃ CO₂ CF₄ Cl₂
   How many of the compounds above are polar?
   A) 4
   B) 3
   C) 1
   D) 2

2. Which of the following species is non-polar?
   A) H₂S
   B) CF₄
   C) CO
   D) HCl

3. A _______ change occurs when objects or substances undergo a change that does not change their chemical composition:
   A) physical
   B) potential
   C) chemical
   D) mixed

4. Which reaction below is a Synthesis reaction?
   A) Al + FeCl₃ → AlCl₃ + Fe
   B) 2Na + Cl₂ → 2NaCl
   C) CH₄ + O₂ → H₂O + CO₂
   D) 2H₂O → 2H₂ + O₂

5. Use the following to answer questions 5-9:
   Identify the major attractive force in each of the following:
   A) hydrogen bonding
   B) dipole-dipole
   C) London dispersion
   D) ionic

6. Use the following to answer questions 11-12:
   Zinc reacts with oxygen to form:
   A) ZnO
   B) Zn₂O
   C) ZnO₂
   D) ZnO

7. Use the following to answer questions 13-14:
   Which of the following compounds is a product of the reaction and what type of reaction is it CH₃ + O₂:
   A) Combustion CO₂ + H₂O
   B) Double displacement CO₂ + H₂O
   C) Single displacement CO₂ + H₂
   D) Synthesis CH₂OH

8. Use the following to answer questions 15-16:
   When balanced correctly, what is the number in front of the underlined and bold substance in each case?
   A) C₇H₈ + O₂(g) → CO₂(g) + H₂O(g)
   B) 8
   C) 4
   D) 5

9. Which of the following involves a physical change?
   A) cooking an egg
   B) Combusting methane
   C) boiling water
   D) Decomposing meat

10. Which of the following species exhibit hydrogen bonding?
    A) NO₂
    B) NH₃
    C) SF₆
    D) HBr

11. Which of the following is a chemical change?
    A) Melting metal
    B) Grinding graphite
    C) burning gasoline
    D) evaporating water

12. Which of the following is a chemical reaction?
    A) Solution
    B) Single Replacement
    C) Double Replacement
    D) Combustion

13. What type of reaction is the following: aluminum oxide added to iron (II) phosphate
    A) Synthesis
    B) Single Replacement
    C) Double Replacement
    D) Combustion

14. Predict the products: aluminum oxide added to iron (II) phosphate yields
    A) FeO + Al₂O₃
    B) FeO + AlPO₄
    C) Fe₂O + Al₄PO₁₂
    D) FeO + Al₂O₃

15. Which of the following involves a chemical property?
    A) Graphite is brittle
    B) Fluorine is very reactive.
    C) Silver is shiny.
    D) Carbon dioxide is a gas at room temperature.

16. Which of the following涉及 does not have a dipole (polar) moment?
    A) CH₃
    B) Cl-I
    C) C-O
    D) N-O

17. Which of the following involves a physical property?
    A) cooking an egg
    B) Combusting methane
    C) boiling water
    D) Decomposing meat

18. Which of the following species exhibit hydrogen bonding?
    A) NO₂
    B) NH₃
    C) SF₆
    D) HBr

19. Which of the following is a chemical reaction?
    A) Gas is produced
    B) The reactant is smaller.
    C) A color change occurs.
    D) Heat and light are produced

20. What type of reaction is the following: aluminum oxide added to iron (II) phosphate
    A) Synthesis
    B) Single Replacement
    C) Double Replacement
    D) Combustion

21. Predict the products: aluminum oxide added to iron (II) phosphate yields
    A) FeO + Al₂O₃
    B) FeO + AlPO₄
    C) Fe₂O + Al₄PO₁₂
    D) FeO + Al₂O₃

22. Which of the following involves a chemical property?
    A) Graphite is brittle
    B) Fluorine is very reactive.
    C) Silver is shiny.
    D) Carbon dioxide is a gas at room temperature.

23. Which of the following involves a physical property?
    A) cooking an egg
    B) Combusting methane
    C) boiling water
    D) Decomposing meat

24. Rank from lowest to highest boiling point:
    CH₄, CH₃, NH₃, C₂H₆
    A) CH₃ < CH₄ < NH₃ < C₂H₆
    B) CH₃ < CH₄ < C₂H₆ < NH₃
    C) NH₃ < CH₄ < C₂H₆ < CH₃
    D) C₂H₆ < CH₃ < CH₄ < NH₃

25. CF₄, H₂O, KCl, SeF₅, HBr
    How many of the compounds are polar?
    A) 4
    B) 1
    C) 2
    D) 3

26. Which of the following is non-polar?
    A) H₂S
    B) CF₄
    C) CO
    D) HCl

27. Which of the following should have the highest boiling point?
    A) C₂H₆
    B) C₂H₅Cl
    C) CH₃OH
    D) CO₂

28. Consider the following compounds:
    CO, NH₃, SiO₂, F₂
    Which compound has the lowest boiling point?
    A) SiO₂
    B) F₂
    C) NH₃
    D) CO

29. What is the boiling point of the following:
    CO, NH₃, SiO₂, F₂
    Which compound has the highest boiling point?
    A) SiO₂
    B) F₂
    C) NH₃
    D) CO

30. When the following equation is balanced using the smallest possible integers, what is the number in front of the substance in bold type?
    Al + NaOH + H₂O → NaAlO₂ + H₂
    A) 4
    B) 3
    C) 1
    D) 2