1. Oxides of the alkaline earth family form

   a. basic solutions.
   b. acidic solutions.
   c. gases with water.
   d. noble gas compounds.
   e. soluble sulfides.

2. In which reaction is $H_2PO_4^-$ acting as a base?

   a. $H_2PO_4^- + CN^- \rightarrow HCN + HPO_4^{2-}$
   b. $H_2PO_4^- + OH^- \rightarrow H_2O + HPO_4^{2-}$
   c. $H_2PO_4^- + HS^- \rightarrow H_2S + HPO_4^{2-}$
   d. $H_2PO_4^- + HF \rightarrow F^- + H_3PO_4$
   e. $H_2PO_4^- + NH_3 \rightarrow NH_4^+ + HPO_4^{2-}$

3. The hydronium ion concentration of a 0.00100 acetic acid solution is 1.34×10^{-4} M. The pH of the solution is

   a. 3.00.
   b. 3.40.
   c. 3.87.
   d. 4.00.
   e. 4.13.

4. The name of the coordination compound with the formula $(NH_4)_2[CuCl_4]$ is

   a. ammonium tetrachlorocuprate(II).
   b. diammonium copper(II) tetrachloride.
   c. ammonium copper(II) chloride.
   d. diammonium tetrachlorocopper(II).
   e. copper(II) diamminetetrachloride.

5. All of the following would be expected to function as reducing agents **EXCEPT**

   a. H_2.
   b. NH_3.
   c. Sn^{2+}.
   d. Mg.
   e. Al^{3+}.

6. All of the following reactions could be used to produce a protonic acid **EXCEPT**

   a. $SO_2 + H_2O \rightarrow$
   b. $SO_3 + H_2O \rightarrow$
   c. $N_2O_5 + H_2O \rightarrow$
   d. $CO_2 + H_2O \rightarrow$
   e. $Na_2O + H_2O \rightarrow$

7. When the expression

   $$C_5H_6NS(l) + O_2(g) \rightarrow CO_2(g) + H_2O + NO_2(g) + SO_2(g)$$

   is balanced, the sum of all the smallest whole number coefficients is

   a. 28
   b. 29
   c. 33
   d. 36
   e. 39

8. What is the oxidation number of the metal ion in $[Pt(NH_3)_2Cl_2]$?

   a. 0
   b. +2
   c. +4
   d. +6
   e. -1

9. How many unpaired electrons are present in the high spin complex $[Fe(H_2O)_6]^{2+}$?

   a. 8
   b. 6
   c. 4
   d. 2
   e. 0

10. Which of the following occur as native ores?

    1. Al
    2. K
    3. Au

    a. 1 only
    b. 2 only
    c. 3 only
    d. 1 and 2 only
    e. 1, 2, and 3

11. Which of the elements indicated below would be classed as transition elements?

a. $1s^2\ 2s^2\ 2p^5$
b. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6$
c. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^2\ 4s^2$
d. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^2\ 4p^1$
e. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^2\ 4p^6$

12. Transition metals can be distinguished from mail group metals by the fact that

a. main group metals only have +1 and +2 oxidation states.
b. main group metals have higher relative atomic masses than transition metals.
c. transition metals have higher relative atomic masses than the main group metals.
d. only the main group metals can form complex ions.
e. transition metals have a greater tendency to form colored compounds than main group metals.

13. What is the electron configuration of iron?

a. [Ar] $3d^6$
b. [Ar] $3d^6\ 4s^2$
c. [Ar] $3d^7\ 4s^1$
d. [Ar] $3d^8$
e. [Ar] $3d^5\ 4s^1$

14. The formula for a platinum(IV) complex is $[Pt(NH_2)_2Br_2]Cl_2$. In aqueous solution, it will dissociate into

a. 2 ions.
b. 3 ions.
c. 4 ions.
d. 5 ions.
e. 6 ions.

15. If a nucleus decays by successive α, α, β decay, the atomic number will

a. increase by four units.
b. increase by three units.
c. increase by 1 unit.
d. decrease by eight units.
e. decrease by three units.

16. All isotopes having an atomic number greater than that of the element _____ are radioactive.

a. lead
b. bismuth
c. strontium
d. radium
e. uranium

17. Which of the following particles causes a nuclear fission reaction in a uranium nucleus?

a. $^{0}_{-1}e$
b. $^{1}_{1}H$
c. $^{1}_{0}n$
d. $^{0}_{0}\gamma$
e. $^{0}_{+1}e$

18. What do scientists call the sequence of rapidly occurring reactions that results when a nuclear fission reaction produces enough neutrons to produce more fission reactions?

a. chain reaction
b. nuclear fusion
c. electron capture
d. binding energy
e. critical mass

19. Positron emission can give increased nuclear stability by

a. keeping the same n/p ratio.
b. decreasing the n/p ratio.
c. increasing the n/p ratio.
d. decreasing the mass ratio.
e. increasing the mass ratio.

20. What is the half-life of an isotope if the decay constant is 3.2/year?

a. 0.58 year
b. 1.6 year
c. 0.22 year
d. 8.7 year
e. 6.4 year