KEY

# Frequently Missed Questions: Midterm Review

## Nomenclature

1. Which of the following compounds contains the lead(II) ion?
   a. $Pb_2S$
   b. $Pb_2O$
   c. $PbCl_4$
   d. PbO

2. Which set of chemical name and chemical formula for the same compound is correct?
   a. magnesium dichromate, $MgCrO_4$
   b. lithium carbonate, $LiCO_3$
   c. iron(III) phosphate, $FePO_4$
   d. ammonium sulfite, $(NH_4)_2S$

3. What is the name of $H_2SO_4$?
   a. sulfuric acid
   b. sulfurous acid
   c. hyposulfuric acid
   d. hydrosulfuric acid

4. The first element in an ionic compound is what?
   a. The anion
   b. The cation
   c. A polyatomic ion
   d. A neutral atom

5. What is the correct name for $Ca_3N_2$?
   a. calcium (II) nitride
   b. tricalcium dinitride
   c. nitrogen calcide
   d. calcium nitride

| number | name | A | B | C | D |
|---|---|---|---|---|---|
| 6. | nitrogen gas | N | $N_2$ | $N^{3-}$ | Ni |
| 7. | barium hydroxide | BaH | BaOH | $BaOH_2$ | $Ba(OH)_2$ |
| 8. | lead(IV) carbonate | $PbCO_3$ | $Pb(CO_3)_2$ | $Pb(CO_3)_4$ | $Pb_3CO_4$ |
| 9. | mercury(II) sulfide | HgS | $Hg_2S$ | $HgS_2$ | $HgSO_3$ |
| 10. | zinc nitrate | $ZnNO_3$ | $Zn_2NO_3$ | $Zn(NO_3)_2$ | $Zn_2(NO_3)_3$ |
| 11. | sodium hydrogen sulfate | $NaHSO_4$ | $Na(SO_4)_2$ | $Na_2SO_4$ | $Na_2HSO_4$ |

What is the correct name of each substance? Put the letter of the correct name on your answer sheet.

12. _____ $Cl_2$
    A chloride
    B chlorine gas
    C chlorate
    D dichlorine

13. _____ $Mg(NO_2)_2$
    A magnesium(II) nitrite
    B magnesium nitrate
    C magnesium nitrite
    D magnesium dinitrite

14. _____ $Sn(SO_4)_2$
    A tin(IV) sulfate
    B tin(II) sulfate
    C tin bisulfate
    D tin sulfate

15. _____ MnS
    A manganese(I) sulfate
    B manganese(II) sulfide
    C manganese(I) sulfide
    D manganese sulfide

16. ____ $CuSO_4$

A copper(I) sulfate
B copper(II) sulfate
C copper sulfate
D copper sulfide

**Bonding**

17. What is the electron configuration of the calcium **ION** (that is formed when calcium obeys the octet rule)?
   a. $1s^2 2s^2 2p^6 3s^2 3p^6$
   b. $1s^2 2s^2 2p^6 3s^2 3p^4 4s^2$
   c. $1s^2 2s^2 2p^6 3s^2 3p^5 4s^1$
   d. $1s^2 2s^2 2p^6 3s^2$

18. What kind of molecular shape does $PH_3$ have?.
   a. Trigonal pyramid
   b. Trigonal planar
   c. Tetrahedral
   d. Bent

19. What is the net (overall) charge of the ionic compound calcium fluoride ($CaF_2$)?
   a. 0
   b. 1+
   c. 2-
   d. 1-

20. What is the formula and charge of the anion in the compound $CaCl_2$?
   a. $Ca^{2-}$
   b. $Ca^{1-}$
   c. $Cl^{2-}$
   d. $Cl^{1-}$

21. What characteristic of metals makes them good electrical conductors?
   a. They have mobile valence electrons.
   b. They have mobile cations.
   c. They have mobile protons.
   d. Their crystal structures can be rearranged easily.

22. Which of these elements does not exist as a diatomic molecule?
   a. I
   b. H
   c. Ne
   d. F

23. How do atoms form single covalent bonds?
   a. One atom completely loses two electrons to the other atom in the bond.
   b. Two atoms share two pairs of electrons.
   c. Two atoms share one electron.
   d. Two atoms share two electrons.

24. According to VSEPR theory, molecules adjust their shapes to keep which of the following as far apart as possible?
   a. inner shell electrons
   b. pairs of valence electrons
   c. mobile electrons
   d. the electrons closest to the nuclei

25. A bond formed between a beryllium atom (EN = 1.5) and an oxygen atom (EN = 3.5) is likely to be ____.
   a. polar covalent
   b. nonpolar covalent
   c. coordinate covalent
   d. ionic

26. Which of the following covalent bonds is the most polar? [Electronegativities: H = 2.1, Se = 2.4, C = 2.5, N = 3.0]

a. H—H
b. H—Se
c. H—C
d. H—N

27. What causes hydrogen bonding?

a. A covalent bond between hydrogen of one molecule and either F, O, or N of a different molecule.
b. An attraction between hydrogen of one molecule and either F, O, or N of a different molecule
c. A transfer of electrons between hydrogen and either F, O, or N.
d. An attraction between hydrogen and either F, O, or N within the same molecule.

28. Which molecule is INCORRECTLY paired with its shape?

a. $BCl_3$ - trigonal pyramidal
b. $PCl_3$ - trigonal pyramidal
c. $H_2Se$ - bent
d. $CH_4$ - tetrahedral

29. Which of the following bonds is ionic?
[Electronegativities: H = 2.1, F = 4.0, C = 2.5, N = 3.0]

a. H—N
b. H—F
c. H—C
d. H—H

**Periodic Table**

30. Which of the following elements is in the same period as phosphorus?

a. carbon
b. magnesium
c. nitrogen
d. oxygen

31. Each period in the periodic table corresponds to _____.

a. an energy sublevel
b. an energy level
c. a suborbital
d. an orbital

32. Which of the following is true about the electron configurations of the noble gases?

a. The highest occupied *s* and *p* sublevels are partially filled.
b. The highest occupied *s* and *p* sublevels are completely filled.
c. The electrons with the highest energy are in a *d* sublevel.
d. The electrons with the highest energy are in an *f* sublevel.

33. How does atomic radius change from left to right across a period in the periodic table?

a. It tends to increase.
b. It tends to decrease.
c. It first decreases, then increases.
d. It first increases, then decreases.

34. Which of the following elements has the smallest atomic radius?

a. selenium
b. bromine
c. sulfur
d. chlorine

35. What is the charge of a cation?
   a. a negative charge
   b. no charge
   c. a positive charge
   d. The charge depends on the size of the nucleus.

36. Which of the following statements is NOT true about ions?
   a. Cations are positively charged ions.
   b. Anions are common among nonmetals.
   c. Charges for ions are written as numbers followed by a plus or minus sign.
   d. When a cation forms, more electrons are transferred to it.

37. Which of the following elements has the smallest ***ionic*** radius?
   a. $Fe^{1+}$
   b. $Fe^{2+}$
   c. $Fe^{3+}$
   d. Fe

38. In which of the following groups of ions are the charges all shown correctly?
   a. $Li^{1-}$, $O^{2-}$, $S^{2+}$
   b. $Ca^{2+}$, $Al^{3+}$, $Br^{1-}$
   c. $K^{2-}$, $F^{-}$, $Mg^{2+}$
   d. $Na^{+}$, $I^{-}$, $Rb^{-}$

39. What is the element with the highest electronegativity value?
   a. calcium
   b. fluorine
   c. cesium
   d. helium

40. What is the energy required to remove an electron from an atom called?
   a. nuclear energy
   b. ionization energy
   c. shielding energy
   d. electronegative energy

41. Which of the following factors contributes to the increase in ionization energy from left to right across a period?
   a. an increase in the size of the atomic radius
   b. a decrease in the mass of the atom
   c. an increase in the number of protons
   d. fewer electrons in the highest occupied energy level

42. As you move from left to right across the second period of the periodic table _____.
   a. ionization energy increases
   b. atomic radii increase
   c. electronegativity decreases
   d. atomic mass decreases

43. Of the following elements, which one has the smallest first ionization energy?
   a. silicon
   b. aluminum
   c. carbon
   d. boron

44. Which is the most reactive nonmetal Family?
   a. Carbon
   b. Noble Gases
   c. Halogens
   d. Boron

45. What is the oxidation number of all of the elements in the Halogen Family?

a. 1-
b. 2-
c. 1+
d. 2+

46. What is brittle, gains electrons in chemical reactions, and is generally a gas at room temperature?

a. Metalloid
b. Nonmetal
c. Metal
d. Lithium

**Atomic Theory**

47. If red light was released, a hydrogen electron made which transition?

a) n = 6 to n = 3
b) n = 3 to n = 6
c) n = 2 to n = 3
d) n = 3 to n = 2

48. Which of the following elements has six valence electrons?

a) C
b) O
c) Ne
d) F

49. What is the number of valence electrons in an atom with the electron configuration of $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^4$?

a) 2
b) 4
c) 6
d) 8

50. An atom of carbon-14 has _____ than an atom of carbon-12.

a) fewer neutrons
b) more neutrons
c) fewer protons
d) more protons

51. For $^{48}V^{3+}$ you have _____ protons, _____ neutrons, and _____electrons.

a) 23, 25, 20
b) 23, 48, 23
c) 23, 48, 3+
d) 23, 25, 3+

52. After observing the results of Rutherford's gold foil experiment, which model of the atom was thought to be true?

a) Protons, electrons, and neutrons are evenly distributed throughout the volume of the atom.
b) The nucleus is made of protons, electrons, and neutrons.
c) Electrons are distributed around a tiny positively- charged nucleus.
d) The nucleus is made of electrons and protons. Neutrons circle around the nucleus like planets orbit the sun.

53. If you were to change the number of electrons in an atom you also significantly change the atom's:

a) mass
b) identity
c) charge
d) all the above

54. Which of the following has the smallest mass?

a) ${}^{1}_{1}H$
b) A helium nucleus
c) electrons
d) neutrons

55. Which of the following has 11 protons, 12 neutrons, and 10 electrons:

a) ${}^{23}_{11}Na^{-}$
b) ${}^{11}_{23}Na^{+}$
c) ${}^{23}_{11}Na^{+}$
d) ${}^{23}_{12}Mg^{+}$

56. For potassium-40, what is the mass number?

a) 19
b) 21
c) 39.10
d) 40

57. In the following isotope notation, what does the letter Z stand for?

a) number of electrons
b) mass number
c) atomic number
d) charge

58. Neutral atoms of the same element can differ in their number of:

a) electrons
b) beta particles
c) neutrons
d) protons

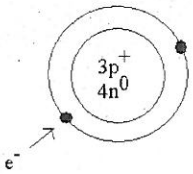
59. An ion with 5 protons, 6 neutrons, and a charge of 3+ has an atomic number of:

a) 5
b) 6
c) 8
d) 11

60. Which of the following is the heaviest?

a) An electron
b) A proton
c) A neutron
d) A helium nucleus

61. Which of the following describes the atom shown in the picture?




a) A neutral beryllium atom
b) A beryllium ion
c) A neutral lithium atom
d) A lithium ion

**Density and Conversions**

62. In an experiment, a student determines the mass of a metallic object to be 31.0g. In a graduated cylinder that initially contains 5.5mL of water, the student carefully submerges the object. If the level of the graduated cylinder rises to 9.0mL, what is the identity of the metal?

a) Cu
b) Fe
c) Pb
d) Au

Convert the following

63. 14.35 mg = .0001435 hg

K h d b d c m

64. 12000 kL = 120,000,000 dL

65. 500 cm = .5 dam