

Cell phones must be put away. If I see a phone = cheating = 0 on the exam.

Good luck.

- Complete the electromagnetic spectrum:
Gamma X ray _____ visible IR _____ radio
- As wavelength increases, frequency (increases or decreases) and energy (increases or decreases). Circle your answers.
- True or False? Electrons orbit the nucleus in discrete energy levels. The electrons must exist on an energy level – they cannot exist in between energy levels.
- True or False? When an electron absorbs heat or electrical energy, it can jump to a higher level. Then when it relaxes and jumps back inwards, it releases a photon of light.
- Answer the following regarding the sublevels, orbitals, and electrons in an atom.
 - How many electrons can fit into a d sublevel? _____
 - How many electrons can fit into the 3rd level total? _____
 - How many orbitals are on the second level? _____
 - How many electrons can fit into an orbital? _____
- Write electron configurations for the following atoms and ions:
 - F⁻¹ _____
 - P _____
 - K⁺¹ _____
 - B _____
- P³⁻ ion is isoelectronic with what atom? _____
- ³¹P³⁻ ion has _____ protons, _____ neutrons, and _____ electrons. (put numbers in the blanks)
- Potassium is in this group:]
 - Alkaline earth metals
 - alkali metals
 - noble gases
 - halogens
- Which atoms is the smallest?
 - Ga
 - O
 - B
 - Se
 - At
- Explain your answer to the previous question and do not quote the trend.

12. Why do metals have such low ionization energy compared to nonmetals?

13. Which atom has the highest electronegativity?

- a. F b. He c. H d. Fr e. Rn

14. True or False? Metals tend to gain electrons and form positive cations.

15. True or False? When a nonmetal gains electrons it becomes smaller in size.

16. Draw Lewis dot structures in the boxes below for the following molecules / ions.

PO_4^{3-}	SF_2
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17. The shape of the ion PO_4^{3-} is:

- a. Trigonal planar b. tetrahedral c. bent d. trigonal pyramid e. linear

18. The shape of SF_2 is:

- a. Trigonal planar b. tetrahedral c. bent d. trigonal pyramid e. linear

19. The molecule SF_2 is polar or nonpolar overall? _____

20. Is the molecule H_2O polar or nonpolar overall? _____

21. Circle the polar bonds in this list: H-F P-O C-H Se-Cl O-O

22. What is the name for the following compounds?

- a. $\text{Sr}(\text{NO}_2)_2$ _____
- b. MnS_2 _____
- c. P_2O_5 _____
- d. Na_3N _____
- e. $\text{Fe}_2(\text{SO}_4)_3$ _____

23. What is the formula for the following compounds?

- a. Cobalt (III) chloride _____
- b. Dihydrogen monoxide _____
- c. Sodium sulfite _____
- d. Magnesium acetate _____
- e. Silicon tetrafluoride _____

24. Give the formula for one of the strong acids: _____

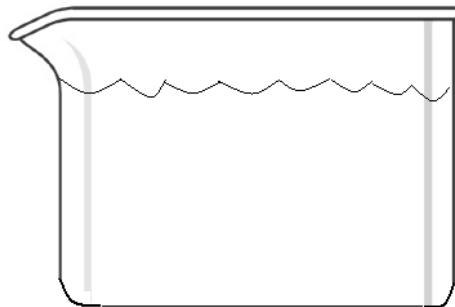
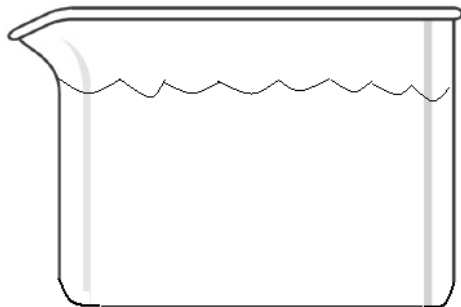
25. Arrhenius bases release this ion in water:

- a. H^+
- b. OH^-
- c. O^{2-}
- d. H^-
- e. OH^+

26. In this reaction what is the Brosted Lowry base? $\text{NH}_3(\text{aq}) + \text{HBr}(\text{aq}) \rightarrow \text{NH}_4^+(\text{aq}) + \text{Br}^-(\text{aq})$

- a. NH_3
- b. HBr
- c. NH_4^+
- d. Br^-

27. Draw HF and KOH in water below in the two beakers:



28. An acidic solution will have a pH of:

- a. Less than 7
- b. equal to 7
- c. greater than 7

29. Which of the following ionic compounds is insoluble in water?

- a. $\text{Ba}(\text{OH})_2$
- b. PbF_2
- c. NH_4Cl
- d. $\text{Al}(\text{NO}_3)_3$
- e. SrS

30. Which of the following is a strong electrolyte?

- a. $\text{H}_2\text{SO}_4(\text{aq})$
- b. $\text{HC}_2\text{H}_3\text{O}_2(\text{aq})$
- c. AgCl
- d. CH_4
- e. MgS

31. Which of the following are weak electrolytes?

- a. Strong bases
- b. covalent compounds
- c. insoluble ionic compounds

Bonus: True or False? When a bond is broken, heat energy is released.

Bonus: True or False? The bond length for a covalent bond is less than the sum of the two atomic radii.