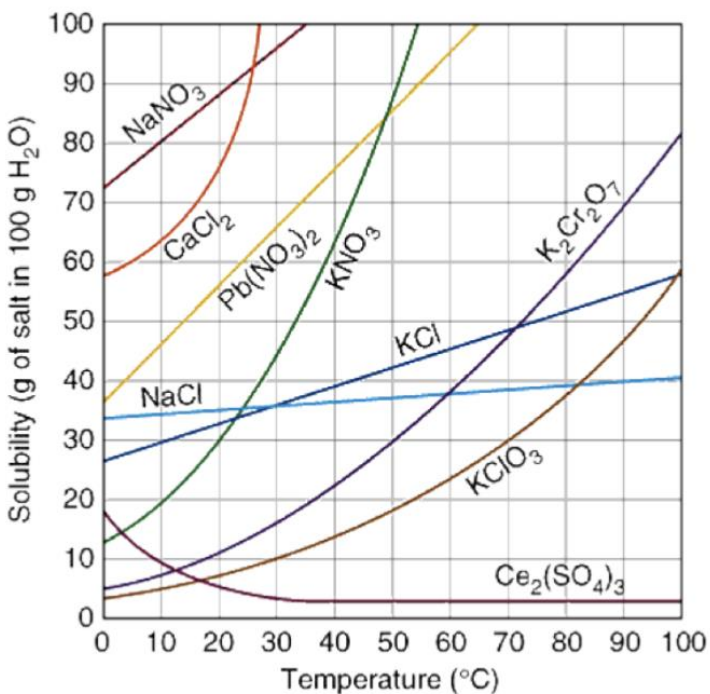


**CHM 1025 Exam 3 Review**  
**Fall 2022**  
**11/16/22 5:30-7:30 PM**

1. Which of the following sets of quantum numbers is not possible?
  - a) 2, 1, -1, +  $\frac{1}{2}$
  - b) 5, 0, 0, -  $\frac{1}{2}$
  - c) 1, 1, -1, -  $\frac{1}{2}$
  - d) 4, 3, -2,  $\frac{1}{2}$
  
2. Which of the following sets of quantum numbers could not describe a valence electron in neutral Cr in the ground state?
  - a) 3, 2, -2, + $\frac{1}{2}$
  - b) 4, 1, 0, + $\frac{1}{2}$
  - c) 4, 0, 0, - $\frac{1}{2}$
  - d) 3, 2, -1, + $\frac{1}{2}$
  
3. What are the n and l quantum numbers of the first and second electrons that get removed to form Cu<sup>2+</sup> from neutral Cu?  
  
First: n=      l=  
  
Second: n=      l=
  
4. What is the maximum number of electrons that can be held in the 3<sup>rd</sup> energy level?
  - a) 2
  - b) 8
  - c) 18
  - d) 32
  
5. Which of the following pairs of atoms/ions are isoelectronic?
  - I. Cs<sup>+</sup>, I<sup>-</sup>
  - II. Al<sup>3+</sup>, Ne
  - III. Cl<sup>-</sup>, K
  - IV. Zn<sup>+</sup>, Cu
  - a) I, II, III, IV
  - b) I, II only
  - c) I only
  - d) I, II, IV
  
6. Write the noble gas electron configuration of the Pt<sup>4+</sup> cation.

7. Which of the following correctly lists the radii of the following atoms/ions in increasing order?
- $\text{Ca} < \text{Ca}^+ < \text{Ca}^{2+}$
  - $\text{S} < \text{Cl} < \text{Ar} < \text{K} < \text{Ca}$
  - $\text{Ca}^{2+} < \text{K}^+ < \text{Ar} < \text{Cl}^- < \text{S}^{2-}$
- III only
  - I, II, III
  - II, III only
  - II only
  - None
8. Which of the following elements has the greatest first ionization energy?
- Li
  - Sb
  - N
  - Cs
  - Co
9. Which of the following statements regarding atomic radii is **false**?
- Anions have larger atomic radii than their neutral atoms
  - Isoelectronic atoms/ions have the same radius as each other
  - Atoms that have larger  $n$ , principle quantum number, have larger radii
  - Atomic radius decreases across a period because atomic number increases, and the valence electrons are in the same energy level

Use the following solubility diagram for questions 10-11



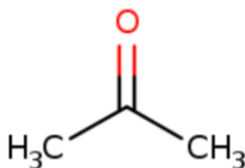
10. In a lab, a student tries to dissolve 1028 g of lead (II) nitrate in 1.37 L of water ( $d=1\text{g/mL}$ ), but there is still some undissolved solid in the solution at room temperature (25 C). The student begins heating the solution until all of the solid is dissolved. What is the minimum temperature (in C) at which all of the lead (II) nitrate is dissolved?
- 30 C
  - 40 C
  - 50 C
  - 60 C
  - 70 C
11. At which temperature does potassium dichromate have a higher solubility in water than sodium chloride and potassium chloride?
- 92 C
  - 34 C
  - 63 C
  - 55 C
12. Which of the following is most likely to be soluble in benzene ( $\text{C}_6\text{H}_6$ )?
- Acetic acid ( $\text{CH}_3\text{COOH}$ )
  - Acetone ( $\text{CH}_3\text{COCH}_3$ )
  - Ethane ( $\text{C}_2\text{H}_6$ )
  - Ethanol ( $\text{CH}_3\text{CH}_2\text{OH}$ )
13. A student mixes 47.0 mL of Solution A (0.783 M  $\text{AgNO}_3$ ) with 92.0 mL of Solution B (0.592 M  $\text{CaCl}_2$ ) and a precipitate forms. What is the maximum mass of the precipitate that can be formed from the reaction?
14. How many moles of  $\text{MgBr}_2$  are needed to produce a 200 g aqueous solution that is 17.1% (m/m)  $\text{MgBr}_2$ ?

15. What is the molarity of  $\text{Br}^-$  ions in the solution in question 14? (assume the density of the solution is 1 g/mL)

16. What is the electronic geometry and molecular geometry, respectively, of  $\text{XeF}_2$ ?

- a) Tetrahedral, Bent
- b) Trigonal bipyramidal, Seesaw
- c) Octahedral, Linear
- d) Trigonal bipyramidal, Linear

17. What are the bond angles of the central carbon in acetone (structure shown below)?



- a) 120
- b) 109.5
- c) <120
- d) <109.5

18. Which of the following bonds is the most polar?

- a) C—N
- b) C—F
- c) H—N
- d) H—F
- e) H—C

19. Which of the following has polar bonds but is not a polar molecule?

- a)  $\text{CH}_2\text{Cl}_2$
- b)  $\text{NH}_3$
- c)  $\text{CO}_2$
- d)  $\text{PF}_3$

20. Which of the following pairs of compounds is written in order of increasing bond angle about the central atom?

- I.  $\text{BrI}_3, \text{SO}_4^{2-}$

- II.  $\text{CH}_4, \text{H}_2\text{O}$
- III.  $\text{BH}_3, \text{NH}_3$
- IV.  $\text{CCl}_4, \text{CS}_2$
- a) I, II, III, IV
- b) II and IV only
- c) IV only
- d) I and IV only
- e) None