

Name: _____

Final Test

8. Which ion has the smallest radius in the first ionized state? (5 points)
A) Li^+ B) Mg^+ C) Be^+ D) Ag^+ E) Xe^+
9. What symbol corresponds to an ion or atom with 13 electrons, 14 protons and 16 neutrons? (5 points)
A) $^{30}\text{S}^{3+}$ B) $^{30}\text{N}^+$ C) ^{14}Si D) $^{14}\text{N}^+$ E) $^{30}\text{Si}^+$
10. Which cation forms soluble salts regardless of the anion present? (5 points)
A) Fe^{3+} B) Rb^+ C) Ca^{2+} D) Ag^+ E) Sr^{2+}
11. Which molecule has carbon in a state of sp^2 hybridization? (5 points)
A) CH_4 B) CO_2 C) CO D) CH_3Cl E) H_2CO
12. Which of the following compounds has the smallest lattice energy? (5 points)
A) CaS B) SrS C) RbI D) RbF E) LiF
13. Write the formula or name of the following compounds (as appropriate) and circle the solubility. (16 points)
- | | | |
|-------------------------|------------------------|--------------------------|
| MgSO_4 | _____ | <u>soluble/insoluble</u> |
| NH_4ClO | _____ | <u>soluble/insoluble</u> |
| _____ | titanium (IV) chloride | <u>soluble/insoluble</u> |
| _____ | strontium nitrite | <u>soluble/insoluble</u> |
14. Which atom, sulfur (S) or phosphorus (P), has the larger first ionization energy? Explain using electron configuration and effective charge arguments. (10 points)

Name: _____

Final Test

15. A 12.34 g sample of pure gaseous hydrocarbon (a molecule made of only C and H) with molecular weight 26.037 amu was burned in excess oxygen to generate 41.71 g of CO_2 and 8.54 g of H_2O and 609 kJ of heat.

A) Calculate the molecular formula of the hydrocarbon. (10 points)

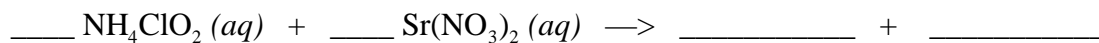
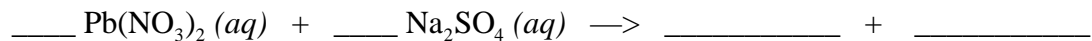
B) Calculate H_f for this compound. (15 points, $H_f = -393$ kJ/mol and -242 kJ/mol for CO_2 and H_2O respectively.)

16. How much $\text{NH}_4\text{MgPO}_4 \cdot 6\text{H}_2\text{O}$ precipitate would be formed if 2.512 g of K_2HPO_4 was reacted with excess NH_3 and MgSO_4 ? (10 points)

Name: _____

Final Test

17. Balance the following two equations and write out a final net ionic equations. (12 points)



18. Explain how the atomic orbitals of O atoms are involved in creating the bond(s) in O_2 . Describe both the π and σ parts separately as appropriate. (8 points)

19. Write the ground state electron configuration for Li, Ge^{2+} and Co^{2+} . (9 points)

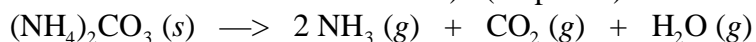
20. Calculate the De Broglie wavelength of an electron ($m_e = 9.501 \times 10^{-31}$ kg) moving at a speed of 2.5×10^3 m/s. (10 points)

Name: _____

Final Test

21. Draw the Lewis dot structure (showing resonance structures if appropriate) for PO_4^{3-} , indicating formal charges on each atom in each structure. (10 points)

22. The ΔH for the following reaction is $+55.2 \text{ kJ mol}^{-1}$. Calculate the mass of H_2O gas which may be produced if excess ammonium carbonate is heated by 350.0 kJ of energy (assume constant temperature and all heat is used to drive the reaction). (15 points)



23. A piece of aluminum foil measuring 12.0 m by 15.5 m has a mass of 51.75 g. Aluminum has a density of 2.70 g/cm^3 . What thickness is the aluminum foil in millimeters? (15 points)