Gen chem study guide

Science, Physics

A. WORK-OUT PROBLEMS: Write formulas for the following: calcium nitratephosphorous pentafluoride aluminum carbonatestrontium hydroxide methanepotassium oxide lithium chloridebarium sulfate phosphate iondinitrogen tetroxide Give the complete electron configurations of: S, O2-, and Mn. For the following molecules/ions, give the Lewis structure, molecular geometry, and electron pair geometry: NO2-SF4 Write Lewis structures to represent all resonance forms of CO32-. 5. How many joules of heat energy are lost when a 100-gram sample of a metal (with a specific heat of 0. 312 J/(g?

C) cools from 80. 0? C to 30. 0? C? Calculate the number of moles in: 4. 20 X 1024 molecules of SO2 240 grams of NaOH 5. 00 liters of H2 gas at 0? C and 1. 00 atm. 1. 7 liters of Ar gas at STP 7. How many grams of AlCl3 can be prepared from 50. 0 g of Al and 100. 0 g of Cl2 according to the equation: 2 Al + 3 Cl2 ? 2 AlCl3 ? How many neutrons are there in 131I? Which bond is the most polar? I-ClI-Br I-SI-I Circle the molecules that are polar (have a dipole moment): CCl4CH4H2ONH3HBrCHCl3 CCl2F2 How many unpaired electrons does the Si atom have?

Write the correct Lewis structure for CS2. Write the formal charges on each atom in [F-S= F]2+ (lone pairs are not shown). How many ions are formed when Ca3(PO4)2 dissolves? How many protons, neutrons, and electrons are there in 19F- ion? Discuss the properties of molecules used as liquid crystals. (ignore this question) What is the molarity of the solution made when 1. 25 grams of sodium chloride are dissolved in 500 mL of water? What is the hybridization of the carbon atom C2H2 ? What is the molecular formula of a

compound with 30. 5% N and 69. 5% S, and it has a molar mass of 184 g/mol?

How many electrons are found at the sublevel 1= 2? How many sigma and how many pi bonds does carbon dioxide have? How many milliliters of 2. 5M solution are needed to prepare 500 mL of 0. 08M solution? How many milliliters of 1. 25M hydrochloric acid are needed to neutralize 50. 0 millimeters of 0. 55M barium hydroxide? The vapor pressure of $SiCl_4$ is 100 mmHg at 5. 4? C and the normal boiling point is 56. 8? C. What is ? Hvap for $SiCl_4$ in kJ/mol? B. MULTIPLE CHOICE A 34. 6 g sample of calcium oxide is a. 0. 0346 molb. 0. 617 molc. 1. 23 mold. 34. 6 mol 2.

When the following equation is balanced, the total number of nitrogen atoms on the reactant side is: $BaCl_2(aq)$ + $AgNO_3(aq)$? $Ba(NO_3)_2(aq)$ + $AgCl(s)$ a. 2b. 3c. 4d. 6 Given that 4 $HNO_3(aq)$? $4NO_2(aq)$ + 2 $H_2O(l)$ + $O_2(g)$, the amount of NO_2 which could be produced from 3. 00 mol HNO_3 is: a. 138 gb. 177 gc. 184 g d. 236 g Given that 3 $CuCl_2(aq)$ + 2 Al(s) ? 3 Cu(s) + 2 $AlCl_3(aq)$, the amount of Al required to produce 42. 4 g of Cu is: a. 12. 0 gb. 28. 3g c. 40. 5 gd. 42. 4 g The type of substance least likely to appear as a product in a net ionic equation is a soluble saltc. weak electrolyte an insoluble saltd. an insoluble gas When a solution of $NiBr_2$ is mixed with a solution of $(NH_4)_2CO_3$ the net ionic equation is: a. $NiBr_2(aq)$ + $(NH_4)_2CO_3(aq)$? $NiCO_3(s)$ + 2 $NH_4Br(aq)$ b. Ni^{2+} (aq) + $2Br^-$ (aq) ? 2 NH_4^+ (aq) + CO_3^{2-} (aq)? $NiCO_3(s)$ + 2 NH_4^+ (aq) + 2 Br^- (aq) c. Ni^{2+} (aq) + $CO_3^{2-}(aq)$? $NiCO_3(s)$ d. $Br^-(aq)$ + NH_4^+ (aq) ? $NH_4Br(aq)$ When a sample of chlorine gas at 35? C doubles in volume, its pressure stays the samec. is half

as great doubles d. increases fourfold A 385-mL sample of oxygen gas collected at 747 mm Hg and 27. 4?

C would occupy what volume at STP? a. 344 mLb. 356 mLc. 416 mLd. 431 mL A 9. 74 g sample of CO2 will occupy 6. 37 L at 0. 829 atm only if the temperature is a. 17. 6? Cb. 6. 61? Cc. 564? C d. above 100? C A sample of N2 would obey the ideal gas law most closely at 0. 68 atm and –68? Cc. 680 atm and –68? C 0. 68 atm and 680? Cd. 680 atm and 680? C A 50. 0 g sample of an unknown substance absorbed 1. 64 kJ as its temperature changed from 36? C to 98? C. The specific heat of the unknown is: a. 0. 53 J/(g? C)b. 0. 76 kJ/(g? C)c. 1. 3 kJ/(g? C)d. 1. 9 kJ/(g?

C) The formation reaction in this list is a. Sn(s) + 2Cl2(g) ? SnCl4(l)c. 2C2H5OH(l) + 7O2(g) ? 4CO2(g) + 6H2O(l) b. 2HNO2(l) + NO(g) ? 3NO2(g) + H2O(l) d. 2Cl2O(g)? 2Cl2(g) + O2(g) For CH4(g) + 4Cl2(g) ? CCl4(g) + 4HCl(g), ? H? =-402 kJ. How much HCl was formed when 201 kJ were given off? a. 18. 2 gb. 72. 9 gc. 146 gd. 292 g Use the thermochemical equations below to calculate the enthalpy of reaction for NOCl(g) + Cl(g) ? NO(g) + Cl2(g) N2(g) + O2(g) + Cl2(g) ? 2NOCl(g)? H? = 105. 2 kJ N2(g) + O2(g) ? 2NO(g)? H? = 180. 7 kJ Cl2(g) ? 2Cl(g)?

H? = 243. 2 kJ a. 529. 1 kJb. 264. 6 kJc. -83. 85 kJd. –167. 7 kJ The energy of a photon of electromagnetic radiation is directly proportional to its a. speed in a vacuum c. frequency b. wavelength d. diffraction The volume in space where an electron with a particular energy is likely to be found is called a wave functionc. the spin quantum number a photond. an orbital The frequency of a microwave with a wavelength of 12. 2 cm is a. 8. 08 x 10-33

Hzc. 2. 46 x 107 Hz b. 3. 66 x 109 Hzd. 2. 46 x 109 Hz The number of orbitals in the 4p subshell is a. 1b. 3c. 5d. 18

The energy difference between the two energy levels responsible for the 451 nm blue-violet line the emission of indium is a. 6. 65 x 105 Jc. 2. 27 x 1018 J b. 1. 50 x 105 Jd. 4. 40 x 10-19 J The maximum number of electrons contained in a 3d subshell is a. 2b. 6c. 10d. 18 The number of valence electrons shown in the Lewis formula for SF4 is a. 40b. 34c. 32d. 5 The formal charge on O in the compound H2O2 (in the order HOOH) is a. 0b. –2c. –1d. –3 The resonance structures for SO2 include each of these except a. O= S-Ob. O-S= Oc. O= S= Od. S-O= O The O-S-O bond angle in SO2 is closest to a. 0? b. 109. 5? c. 120? d. 180? Of the following substances, the least polar bonds are those found in a. H2b. H2Oc. H2Sd. CH4 Matter is said to be transparent to those wavelengths it a. absorbs b. diffractsc. cyclesd. transmits In formaldehyde (H2CO) the electron pairs are located about the central atom in which type of arrangement? a. pyramidal b. tetrahedralc. trigonal planard. bent The molecular geometry of SO3 is best described as a. linearb. trigonal planarc. tetrahedrald. bent The molecular geometry of CO32- is best described as a. linearb. trigonal planerc. tetrahedrald. bent

Of the following, which has a molecular geometry that is not planar? a. CH4b. H2COc. C2H4d. SO3 When a solution of sodium chloride and a solution of lithium nitrate are mixed a precipitate forms a new salt is formed a gas is evolved no reaction occurs When solutions of barium chloride and sodium sulfate are mixed, the spectator ions in the resulting reaction are a. only Ba2+b. only SO42-c. Only Na+d. both Na+ and Cl- Which of the following ionic compounds is insoluble in water? a. NH4Clb. AgNO3c. KId. Na2S Given

that Fe2O3(s) + 3CO(g) ? 2Fe(s) + 3CO2(g), when 45. 3 g of CO reacts quantitatively with 79. g of Fe2O3, the amount of Fe formed is a. 45. 3 gb. 55. 8 gc. 60. 2 gd. 79. 8 g For the above reaction, when 45. 3 g of CO reacts quantitatively with 79. 8 g of Fe2O3, the amount of leftover reactant is a. 34. 5 gb. 24. 0 gc. 17. 8 gd. 3. 2 g 36. The oxidation numbers of P, S and Cl in H2PO2-, H2S and KClO4 are, respectively a) -1, -1, +3 b) +1, -2, +7 c) +1, +2, +7 d) -1, -2, +7 e) -1, -2, +3 37. Identify the oxidizing agent in the following redox reaction. Hg2+(aq) + Cu(s) > Cu2+(aq) + Hg(l) a) Hg2+(aq) b) Cu(s) c) Cu2+(aq) d) Hg(l) e) Hg2+(aq) and Cu2+(aq)