

The test will be cumulative but mainly focus on material in Chapters 7, 8, 9, 10, and 12. Study your lecture notes, and homework assignments. Expect to solve problems. Test yourselves by doing problems similar to the homework under time constraints. **MAKE SURE YOU BRING SCANTRONS.**

The following sample questions are meant to get you started in review and to touch on topics covered in these chapters. The actual exam will most likely be multiple choice.

TRUE OR FALSE: (IF THE STATEMENT IS FALSE, WRITE DOWN THE TRUE STATEMENT)

Chapter 7: Liquids and solids

- 1) The order of increasing strength for intermolecular interactions is: dispersion forces, hydrogen bonding, ionic compounds, dipole interaction. **F, it's disp, dipol, Hbond, ionic**
- 2) The only intermolecular forces in a crystal of sugar is: ionic interactions. **F: it's Hbonding mostly, no ionic.**
- 3) The only compressible states of matter are liquids and gases. **F: only gases are compressible.**
- 4) The molar heat of vaporization of acetic acid is 5.81 kcal/mol. To vaporize 10.0 g of acetic acid would require 968 cal. (FW=60g/mol) **F. $(10/60)(5.81) = .968 \text{ kcal} = 968 \text{ cal}$.**
- 5) To heat 20 g of 80°C water (C=1.0 cal/g°C) to 100°C water would require 20 calories. **F $(20)(1)(20) = 400$**
- 6) Water has many unusual properties mainly because of intermolecular interactions called dispersion forces. **F**
- 7) Melting and vaporization are both endothermic but sublimation is exothermic. **F; all require breaking intermol bonds and are endothermic.**

Chapter 8: Solutions

- 1) CH₃CH₂CH₂Cl is expected to dissolve easily in water. **F. It's nonpolar. Can't H-bond.**
- 2) O₂ becomes more soluble in water as the temperature increases. **F. for gases, solubility drops as T increases.**
- 3) A 250 mL solution containing 1.5 moles of solute has a concentration of 3 M. **F: $1.5/.25 = 6 \text{ M}$**
- 4) To prepare 500 mL of a 2 M NaCl solution (FW=58.5g/mol) would require 2x58.5 g of NaCl. **F: $(2)(.5)(58.5)$**
- 5) A 5% Pb(NO₃)₂ solution can be prepared by dissolving 15 g of the solute in 300 mL of solution. **T**
- 6) A 1.0 M CaCl₂ solution exerts a lower osmotic pressure than a 2.0 M NaCl solution. **F, CaCl₂ has more osmol**
- 7) Examples of colligative properties are: osmotic pressure, boiling point depression and freezing point elevation. **F: should be freezing point depression and boiling point elevation.**

Chapter 9: Acids and Bases I

- 1) Bases can be described as proton givers and have a pleasant taste. **F: bitter and proton acceptors**
- 2) The compound CH₃NH₂ reacts with water to form H₃O⁺. Therefore the compound acts as a base. **F: acts acid**
- 3) A good example of a weak acid is HBr. **F: strong acid halide.**

- 4) MgO is an acid anhydride. **F: it's a base anhydride. bases form bases: $H_2O + MgO \rightarrow Mg(OH)_2$**
- 5) The conjugate base of NH_3 is NH_4^+ . **F: conjugate base of NH_3 is NH_2^- .**
- 6) A strong acid is best described as a highly concentrated acid solution. **F: strong acid=100% ionizable.**
- 7) The names of $HClO_4$, HNO_2 and Na_2SO_3 are perchloric acid, nitrous acid and sodium sulfate. **F:nitric.**

Chapter 10: Acids and Bases II

- 1) 50 mL of 10 M HCl is needed to prepare 200 mL of 2M HCl. **F: need 40mL of 10M**
- 2) If it takes 25 mL of 0.10 M HCl to neutralize 20 mL of NaOH, then $[NaOH] = 0.250M$. **F:(25)(.10)/(20)=.125**
- 3) The pH of a solution with $[OH^-] = 10^{-4}M$, is 4. **F: pOH=4; pH=14-4=10**
- 4) A solution of potassium acetate, $CH_3CH_2O_2K$, is acidic. **F: acetate is conj base of acetic acid. solution basic.**
- 5) The pH of a buffer consisting of 1.0M NH_3 and 0.1 M NH_4^+ would be 6 if the pK_a of NH_4^+ is 5. **T**
- 6) A solution with a pH 2 is 10 times more acidic than a solution with a pH 4. **F: it is $10^2=100$ times more.**
- 7) A solution of pH 3 has $[OH^-] = 1 \times 10^{-3}M$. **F: pOH=14-3=11 so $[OH^-]=10^{-11}$**
- 8) The correct equilibrium expression for the reaction : $4Fe + 3O_2 \rightleftharpoons 2Fe_2O_3$ is $[Fe]^4[O_2]^3/[Fe_2O_3]^2$. **F:invert**
- 9) The $[H^+]$ of a 1.0 M HCN solution ($K_a=6.2 \times 10^{-10}$) is $2.5 \times 10^{-5}M$. **T**

Chapter 12:

- 1) Beta particles are the same as helium nuclei. **F: same as electrons. alphas are like He nuclei.**
- 2) When an atom emits a positron, it becomes a new isotope of the same element. **F: Z drops by 1. same mass.**
- 3) The atomic number decreases by 4 during alpha decay. **F: A decreases by 4 but Z only by 2.**
- 4) When ${}_{90}^{234}Th$ undergoes beta decay, it becomes ${}_{91}^{234}Pa$. **T**
- 5) After 3 half-lives, only 1/6 of the original radioactive element remains. **F: $(1/2)^3 = 1/8$**
- 6) The energy released by the sun is due to nuclear fission. **F: nuclear fusion.**
- 7) The measure of biological damage in humans produced by a particular dose of radiation is the roentgen. **F:rem**
- 8) During the process of electron capture, a gamma ray is emitted. **F:Xray is emitted.**