Name:	_					
СНМ	CHM 101 Final Exam					
True/F		hether the statement is true or false.				
	1.	The formula weight of an ionic compound is analogous (similar) to a molecular weight of a covalent compound.				
	2.	Absolute zero is O°C.				
	3.	Fe ²⁺ and Fe ³⁺ are isoelectronic.				
	4.	The name for the compound formed between Co ³⁺ and O ²⁻ is cobalt(II) oxide.				
	5.	Attractive forces between solute and solvent molecules are an important factor in solution formation.				
	6.	The reactions NaOH + HCl \rightarrow H ₂ O + NaCl and Ca(OH) ₂ + 2HBr \rightarrow 2H ₂ O + CaBr ₂ have the same net ionic equation.				
	7.	Neutral isotopes of the same element have the same number of electrons.				
	8.	One mole of an element would weigh the same as a mole of an isotope of the same element.				

9. In the reaction $Zn + Cu(NO_3)_2 \rightarrow Cu + Zn(NO_3)$, the Zn is reduced.

10. The number twelve, representing a dozen, has two significant figures.

11. If 6526 is added to 15.0, the answer should have two significant figures.

13. In an exothermic reaction, heat is liberated to the surroundings.

Doubling the volume of a 12 M sample with water will produce a 6 M solution.

Short Answer

14. If 5 grams of CO and 5 grams of O_2 are combined according to the reaction $2CO + O_2 \rightarrow 2CO_2$, which is the limiting reagent?

12. There is a 12 M aqueous HCl solution in the stock room, but a 6 M solution is required for an experiment.

15. A sample of gas collected at 21.0°C and a pressure of 0.698 atm has a volume of 1.83 liters. What volume in liters will the gas occupy at 38.0°C under a pressure of 0.658 atm?

16. Given the equation 2CO + O₂ → 2CO₂, how many grams of CO₂ form if 34.0 grams of CO are combined with excess oxygen?

- 17. If urine has a density of 1.08 g/mL, what would be the mass of a 125 mL urine sample?
- 18. A 0.488 g sample of an unknown acid (monoprotic) requires 40.7 ml of 0.100 M NaOH for complete neutralization. What is the molecular weight of the acid in g/mol?

19. At 1.500 atm and 20 degrees C, it was found that 11.15 L of a gas weighed 30.76 g. What is its molecular mass in grams?

20. How many moles of Na_2CO_3 would be needed to react with 750 mL of 0.250 M H_2SO_4 solution? $Na_2CO_3 + H_2SO_4 \rightarrow Na_2SO_4 + CO_2 + H_2O$

21. Naturally occurring neon (Ne) has the following isotopic composition (the mass of each isotope is given in parenthesis). Calculate the atomic weight of neon in u from these data.

neon-20, 90.92% (19.99 u); neon-21, 0.257% (20.99 u); neon-22, 8.82% (21.99 u)

Identify th	e choice that best completes the statement or answers the question.
22.	The primary intermolecular attractions between CH ₃ -OH and H ₂ O are a. dispersion forces. b. hydrogen bonds. c. dipolar forces. d. covalent bonds.
23.	Which of the following electronic changes will cause a Group VA (15) element to achieve a noble gas configuration? a. lose three electrons b. gain one electron c. gain three electrons d. gain two electrons
24.	The correct formula for the ionic compound containing Al^{3+} and PO_4^{3-} would be a. $AlPO_4$ b. $Al_3(PO_4)_2$ c. $Al_3(PO_4)_3$ d. $Al_2(PO_4)_3$
25.	 Two pure substances A and B react to form a new pure substance C. From this, we may conclude that a. A, B, and C are all compounds b. A and B are both elements c. C is an element, A and B are compounds d. C is a compound, A and B may or may not be elements
26.	The formula for dinitrogen monoxide is N_2O . If a sample of the oxide was found to contain 0.0800 g of oxygen, how many grams of nitrogen would it contain? a. 0.0700 b. 0.560 c. 0.140 d. 0.280
27.	Arrange the following bonds in order of increasing bond polarity.

a. C1-O < C-O < P-O

b. P-O < Cl-O < C-O

solute. a. 1.71 M b. 0.583 M

Multiple Choice

c. C-O < Cl-O < P-O

d. C-O < P-O < Cl-O

28. Express the following concentration of solution in terms of molarity: 3.00 L of solution contains 1.75 mol of

 _ 29.	Which of the following correctly arranges 1.00 M solutions of the strong electrolytes in order of increasing boiling point (lowest to highest)?
	a. $Al(NO_3)_3 < Mg(NO_3)_2 < NaNO_3$ c. $Mg(NO_3)_2 < Al(NO_3)_3 < NaNO_3$
	b. $NaNO_3 < Mg(NO_3)_2 < Al(NO_3)_3$ d. all have the same boiling point.
_ 30.	What is the volume of a solid that has a density of 3.14g/cm³ and has a mass of 7.04 grams? a. 2.242 cm³ b. 22.11 cm³ c. 2.24 cm³ d. 22.1 cm³
31.	What pressure will 3.20 mol of N_2 gas exert if confined in a 15.0 L container at 100°C? a. 13.0 atm b. 6.53 atm c. 3.27 atm d. 1.75 atm
32.	How many unpaired electrons in As?
	a. 3 c. 1
	b. 4 d. 2
33.	What is the oxidation number of Mn in KMnO ₄ ?
	a. +4 b. +7 c. +5 d. +9
34.	Iodine, I ₂ , is very slightly soluble in water, a polar solvent, but quite soluble in toluene, a nonpolar solvent. What can be inferred about the nature of the I ₂ molecule? a. It is polar. b. It is ionic. c. It is nonpolar. d. Nothing can be inferred.
 35.	Which element is represented by the distinguishing electron configuration $5d^{9}$?
	a. Pd b. Au c. Ag d. Pt
 36.	A solution is made by dissolving 5.84 grams of NaCl in enough distilled water to give a final volume of 1.00 L. What is the molarity of the solution? a. 0.400 b. 1.00 c. 0.100 d. 0.0250
27	d. 0.0230
 37.	How many electrons are in the outer shell of element 15? a. 3 b. 2 c. 5 d. 15
 38.	What is the shell number for the outer shell electrons in bromine, Br? a. 6 b. 5 c. 3 d. 4
 39.	Which of the following distinguishing electron configurations is characteristic of noble gases? a. ns^2 b. nd^{10} c. nf^{14} d. np^6

carried out. Express the answer to the correct number of significant figures. \[\frac{57.675 \text{ g} - 3.047 \text{ g}}{25.65 \text{ mL} - 0.15 \text{ mL}} = 2.1422745098 \text{ g/mL} \] a. 2.1 \text{ g/mL} \text{ c. 2.142 \text{ g/mL}} \] b. 2.14 \text{ g/mL} \text{ d. 2.1423 \text{ g/mL}} \] 43. The limit of physical subdivision of pure \text{ H}_2O is a. the element b. the atom c. a proton d. the molecule 44. NH ₃ (ammonia) would have what electron group geometry according to VSEPR theory? a. tetrahedral b. pyramidal c. trigonal planar d. none of these 45. Ethylene dichloride is an effective cooling agent when allowed to evaporate. The heat of vaporization is		The radius of a K atom is a Ca atom. a. smaller than b. inverted from c. larger than d. equal to In the reaction $2H_2O \rightarrow 2H_2 + O_2$, 2.0 mol water will produce how many grams of O_2 ?
	42.	Based on data obtained in an experiment, to determine the density of a metal, the following calculation is
b. 2.14 g/ml d. 2.1423 g/mL 43. The limit of physical subdivision of pure H ₂ O is a. the element b. the atom c. a proton d. the molecule 44. NH ₃ (ammonia) would have what electron group geometry according to VSEPR theory? a. tetrahedral b. pyramidal c. trigonal planar d. none of these 45. Ethylene dichloride is an effective cooling agent when allowed to evaporate. The heat of vaporization is Joules per gram. How much heat could be removed from the skin if 2.70 grams of ethylene dichloride w sprayed on and allowed to evaporate? a. 31.6 J b. 0.126 J c. 57.8 J d. 7.93 J 46. Which element has the largest atomic radius? a. Cs b. Li c. I d. F		
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