Practice Exercises Final Exam, Fall 2000 Dr. Palmer Graves

Unit 1 Basic Concepts Review

- 1: Which of the following statements are true?
 - i. Si, Gd, and Mg are the symbols for silicon, gold, and magnesiumii. P, As, and Ca are the symbols for potassium, arsenic, and
 - calcium.
 - iii. mercury, copper, and selenium are symbolized by Hg, Cu, and Se.

A: ionly B: iionly C: iiionly D: i&ii E: i&iii

2: An aluminum cylinder has a diameter of 2.00 cm and a mass of

42.57g. If the density of aluminum is 2.71 g/cm 3 , what is the height of the cylinder?

(the volume of a cylinder is; $V = r^2 h$)

- A: 8.67 cm
- B: 15.7 cm
- C: 3.05 cm
- D: 1.25 cm
- E: 5.00 cm
- 3: Which statement is true regarding the symbol below?

 ${}^{90}_{38}X$

- i. The atom has 90 electrons
- ii. The atom has 38 neutrons
- iii. The element is Sr
- iv. The element has 52 neutrons

| A: i only | B: ii only | C: ii and iv |
|--------------|---------------|--------------|
| D: i and iii | E: iii and iv | |

- 4: Which of the following is the correct formula for calcium nitride?
 - A: CaN
 - B: CaN₂
 - C: Ca₂N
 - D: Ca_3N_2
 - $E: Ca_2N_3$
- 5: Which of the following pairs correctly match the formula with the name of a polyatomic ion?
 - A: sulfite; SO_4^{2}
 - B: ammonium; NH3⁺
 - C: nitrate; NO3²⁻
 - D: perchlorate; CIO₄⁻
 - E: hypochlorate; CIO₂⁻
- 6: What is the **sum** of the coefficients when the following equation is balanced using the lowest, whole numbered coefficients?

 $_FeCO_3 + _HNO_3 ---> _Fe(NO_3)_2 + _CO_2 + _H_2O$ A: 5 B: 6 C: 7 D: 8 E: 11 7: Diborane, B_2H_6 , can be prepared according to the following reaction. If 18.9 g of NaBH₄ is used in a reaction and 7.50 g of B_2H_6 gas is produced, what is the percent yield of B_2H_6 ?

3 NaBH₄ + 4 BF₃ ---> 3 NaBF₄ (aq) + 2 B₂H₆ A: 9.00 % B: 11.1 % C: 81.4 % D: 92.4 % E: 75.0 %

8: If 2.70 g Al is reacted with 4.05 g Cl_2 according to the following reaction, how much AlCl₃ would be produced.

2 Al (s) + 3 Cl₂ (g) --> 2 AlCl₃ (s) A: 13.3 g B: 53.4 g C: 45.7 g D: 7.67 g E: 5.08 g

- 9: What is the concentration of a solution made by mixing 2.50 g NaOH in enough water to make 500.0 mL of solution?
 - A: 0.0625 M B: 0.125 M C: 1.25 x 10⁻⁴ M D: 0.00500 M E: 5.00 M
- 10: What is the concentration of a solution made by mixing 25 mL of water into 5 mL of a 0.050M HCl solution?
 - A: 0.010 M
 B: 0.25 M
 C: 0.045 M
 D: 0.0083 M
 E: 0.00010 M

- 11: A piece of copper wire is 10.0 cm long and has a diameter of 0.400 cm. If the density of copper is 8.92 g/cm³, how many moles of copper are contained in the piece of wire? (The volume of a cylinder can be calculated with the formula $V = r^2 h$ where h can be the length of the wire.)
 - A: 0.176 mol
 - B: 8.82 mol
 - C: 0.00221 mol
 - D: 11.2 mol
 - E: 6.35 mol
- 12: A solution contains sodium carbonate and sodium perchlorate. Which of the following reagents could be used to separate the two anions contained in the solution?
 - A: HCI
 - B: NaOH
 - C: CaCl₂
 - D: NH_4NO_3
 - E: KCH₃CO₂

13: Which of the following reactions is a (are) redox reaction(s)?

i. $2 \text{ HCIO}_2(aq) + \text{Ca}(\text{OH})_2(aq) \dots > 2 \text{ H}_2\text{O}(l) + \text{Ca}(\text{CIO}_2)_2(aq)$ ii. Mg (s) + 2 HCl (aq) \dots MgCl_2 + H_2 (g) iii. Ba(OH)_2(aq) + H_2SO_4(aq) \dots BaSO_4(s) + H_2O (l) A: i only B: ii only C: iii only D: i & ii E: i & iii 14: Which of the following reactions correctly balances the redox reaction shown below, in an acidic solution? As₂O₃ (s) + NO₃⁻ (aq) --> H₃AsO₄ (aq) + NO (g)
i. 3 H₂O + As₂O₃ + NO₃⁻ --> 2 H₃AsO₄ + NO
ii. 7 H₂O + 4H⁺ + 3As₂O₃ + 4 NO₃⁻ --> 6 H₃AsO₄ + 4 NO
iii. 3 H⁺ + 3As₂O₃ + 4 NO₃ + 3 OH⁻ --> 6 H₃AsO₄ + 4 NO
A: i B: ii C: iii D: i and ii E: none
15: A shade of yellow light has a wavelength of 590 nm. What is its frequency

A: 1.97×10^{-15} Hz B: 5.08×10^{-4} Hz C: 5.1×10^{5} Hz D: 5.08×10^{14} Hz E: .0051 Hz

- 16: Calculate the frequency of a photon released from a hydrogen atom during a transition from n=7 to n=4
 - A: 2.34×10^{14} HzB: 583 nmC: 9.2×10^{-19} HzD: 142 pmE: 1.38×10^{14} Hz
- 17: Identify the element with the following electron configuration:

| [Ar] 4s ² 3d ¹⁰ 4p ⁴ | | |
|---|-------------|-----------|
| A: tin | B: selenium | C: sulfur |
| D: aluminum | E: cobalt | |

18: How many photons of frequency 1.50 x 10¹⁴ Hz are needed to supply 20.1 J of energy?

| A: | 2.02 x 10 ²⁰ photons | B: 9.94 x 10 ⁻²⁰ photons |
|----|---------------------------------|-------------------------------------|
| C: | 3.2 x 10 ²⁰ photons | D: 9.94 x 10 ²⁰ photons |
| E: | 5.83 x 10 ²⁰ photons | |

- 19: What is the final molarity of a solution made by mixing 25 mL of a 16M HNO₃ solution with 475 mL of water?
 - A: 0.84 M
 - B: 1.19 M
 - C: 1.25 M
 - D: 4.00 M
 - E: 0.80 M
- 20: How many electrons can occupy the orbitals having the principle quantum number of 6?
 - A: 2
 - B: 18
 - C: 72
 - D: 36
 - E: 92
- 21: Which of the following atoms would be polar?
 - A: CCI4
 - B: BF₃
 - C: PCI5
 - D: SF₆
 - E: SF₄
- 22: What is the correct geometry about the iodine atom in ${\rm ICl}_4^-$ (no CI-CI bonds)?
 - A: tetrahedral

- B: square planar
- C: square pyramid
- D: see saw
- E: face centered cubic

23: Which of the following Lewis Structures correctly shows the structure of XeF₂?



24: Which of the following statements are true?

i. the electron and the molecular geometries must be the sameii. the electron geometry and the number of bonds determines the molecular geometry

iii. a molecule with see-saw geometry has triangular bipyramid electronic geometry

A: i only B: ii only C: iii only D: i and ii E: ii and iii

- 25: What is q, if enough energy is added to a beaker of water to raise the temperature of 500 g of water from 25.0°C to 50.0 °C?
 - A: -52.3 kJ
 B: 12.5 kJ
 C: 52.3 kJ
 D: -12.5 kJ
 E: 5000 J
- 26: Oxygen gas can be produced in the following reaction:

 $2 \text{ KClO}_3(s) \longrightarrow 2 \text{ KCl}(s) + 3 \text{ O}_2(g) \text{ H}^\circ = -89.4 \text{ kJ}$

How much heat is released if the reaction produces 4.80g of oxygen?

A: 8.94 kJ
B: 4.47 kJ
C: 26.8 kJ
D: 89.4 kJ
E: 430 kJ

- 27: What is the specific heat of copper if adding 192.5 J of heat energy to 5.00 grams of copper causes the temperature of the metal to increase from 20.0°C to 120.0°C?
 - A: 9.62 J/g°C
 B: .385 J/g°C
 C: 4.20 J/g°C
 D: 39 J/g°C
 E: .004 J/g°C

| Answer Sheet for Test "FOO Final Review", 12/8/0 | | | | |
|--|---|---------|--|--|
| Chapter/ | Test | Correct | | |
| Question | Question | Answer | | |
| | The following questions are in section "Unit 1" | | | |
| 1-1 | 1 | С | | |
| 1-12 | 2 | E | | |
| 2-3 | 3 | E | | |
| 2-10 | 4 | D | | |
| 2-11 | 5 | D | | |
| 3-1 | 6 | В | | |
| | The following questions are in section "Unit 2" | | | |
| 3-5 | 7 | С | | |
| 3-7 | 8 | E | | |
| 3-9 | 9 | В | | |
| 3-11 | 10 | D | | |
| 3-14 | 11 | A | | |
| 4-9 | 12 | С | | |
| 4-15 | 13 | В | | |
| 4-19 | 14 | В | | |
| 5-1 | 15 | D | | |
| 5-4 | 16 | E | | |
| 5-7 | 17 | В | | |
| 5-9 | 18 | A | | |
| 5-17 | 19 | E | | |
| 5-19 | 20 | C | | |
| | The following questions are in section "Unit 3" | | | |
| 7-5 | 21 | E | | |
| 7-9 | 22 | В | | |
| 7-17 | 23 | В | | |
| 7-19 | 24 | E | | |
| 8-3 | 25 | C | | |
| 8-6 | 26 | В | | |
| 8-17 | 27 | В | | |