PART 1

1&2. Of the following symbol/name combinations of elements, which is WRONG?
(a) lead/Pb   (b) sulfur/S   (c) carbon/C
(d) strontium/Sr   (e) iron/Ir

3&4. In Rutherford's gold foil experiment, which of the following statements is/are TRUE?
(1) Most of the bombarding particles were deflected straight back by the gold foil.
(2) The experiment showed that the atom is mostly empty space.
(3) The gold foil was bombarded with positively charged He nuclei.
(a) 1, 2, 3   (b) 1, 3   (c) 2, 3   (d) 3 only   (e) 1, 2

5&6. Which of the following is a covalent compound?
(a) (NH₄)₂S   (b) HCl   (c) NaSO₄   (d) Zn(CN)₂   (e) Cu

7&8. A Brønsted-Lowry base:
(a) has an H and produces H⁺ ions in aqueous solution
(b) has an OH and produces OH⁻ ions in aqueous solution
(c) is a proton acceptor
(d) is a proton donor
(e) contains a cation and an anion
9&10. The name of the 7A group is:
   (a) alkali metals     (b) alkaline earths     (c) metalloids
   (d) transition metals (e) halogens

11&12. In 3 moles of Cu(SO\textsubscript{4})\textsubscript{2}, there are
   (a) 24 x Avogadro’s number of atoms of O
   (b) 6.0 x 10\textsuperscript{23} moles of Cu
   (c) 3 Cu\textsuperscript{2+} cations
   (d) 3 formula units of Cu(SO\textsubscript{4})\textsubscript{2}
   (e) 4 moles of SO\textsubscript{4}\textsuperscript{-} anions

13&14. The \textsuperscript{79}Br\textsuperscript{-} ion has:
   (a) 35 p, 35 n, 36 e     (b) 35 p, 44 n, 36 e     (c) 35 p, 44 n, 34 e
   (d) 79 p, 79 n, 1 e      (e) some other combination of p, n, e

15&16. Which of the following is a weak electrolyte in aqueous solution?
   (a) MgCO\textsubscript{3}     (b) HClO\textsubscript{4}     (c) NaCl
   (d) HBrO                (e) NaOH

17&18. The following particle view of the end result of a gas phase reaction, where \(\bigcirc\) represents the reactant and \(\bullet\) represents the product, illustrates that it was:
   (a) a reaction that went to completion.
   (b) a reaction that did not occur at all.
   (c) a product-favored equilibrium reaction.
   (d) a reactant-favored equilibrium reaction.
   (e) a typical precipitation reaction.

19&20. If the empirical formula of an organic compound was CH\textsubscript{3}, the molecular formula could be:
   (a) C\textsubscript{2}H\textsubscript{6}     (b) C\textsubscript{2}H\textsubscript{8}     (c) C\textsubscript{6}H\textsubscript{6}
   (d) C\textsubscript{2}H\textsubscript{7}     (e) C\textsubscript{6}H\textsubscript{12}
21&22. Identify the element if 5.11 moles of this element has a mass of 138 grams.
   (a) magnesium     (b) aluminum     (c) silicon     (d) phosphorus     (e) sulfur

23&24. What is the formula weight of Co(ClO₄)₂•5H₂O?
   (a) 275           (b) 315           (c) 336          (d) 359           (e) 348

25&26. What is the empirical formula for an oxide of phosphorus that is 52.5% P by mass?
   (a) PO            (b) P₄O₇           (c) P₃O₅          (d) PO₂           (e) P₂O₅
27&28. Consider the hypothetical element, Sulrossium (AW = 51.2 amu/atom). It consists of two isotopes: $^{50}\text{Su}$ with a mass of 50.2 amu and $^{54}\text{Su}$ with a mass of 54.2 amu. What is the % abundance of the lighter isotope, Su-50?

(a) 25%  (b) 50%  (c) 35%  (d) 85%  (e) 75%

29&30. Calculate the % fluorine by mass in the compound, SF$_4$.

(a) 20.%  (b) 80.%  (c) 65%  (d) 70.%  (e) 30.%

31&32. What mass of SF$_4$ (in mg) has $6.1 \times 10^{20}$ atoms of F? (Don’t forget the relationship between F and SF$_4$)

(a) 27 mg  (b) 6.2 mg  (c) 1.1 mg  (d) 19 mg  (e) 16 mg
PART 2

Please read and sign: “On my honor, as an Aggie, I have neither given nor received unauthorized aid on this exam.”

(10 pts) 33. Give the appropriate IUPAC name or formula for the following compounds:
   (a) hydroiodic acid ________________________
   (b) cobalt(II) bromide ______________________
   (c) potassium sulfite ________________________
   (d) SF₄ _________________________________
   (e) Ni(IIO)₂ ___________________________________

(4 pts) 34. Balance the following equation using whole number coefficients.
   Al + O₂ → Al₂O₃

35. Predict the products and balance the reaction for this precipitation reaction:
   (2 pts) Na₂CO₃(aq) + Ca(NO₃)₂(aq) → ______________(s) + ______________(aq)

(2 pts) What is the net ionic equation?

(2 pts) What is/are the spectator ion(s)? ______________________________