Chapter 3 MC Review

1. What is the average mass, in grams, of one atom of iron?
   A. $6.02 \times 10^{23}$ g   C. $9.28 \times 10^{-23}$ g
   B. $1.66 \times 10^{-24}$ g   D. $55.85$ g

2. Which of these quantities does not represent 1.00 mol of the indicated substance?
   A. $6.02 \times 10^{23}$ C atoms   C. $12.01$ g C
   B. $26.0$ g Fe   D. $65.4$ g Zn

3. One nanogram doesn't seem like a very large number. How many magnesium atoms are there in 1.00 ng of magnesium?
   A. $4.11 \times 10^{-11}$ atoms   C. $1.46 \times 10^{34}$ atoms
   B. $2.48 \times 10^{13}$ atoms   D. $6.83 \times 10^{-35}$ atoms

4. How many atoms are in 5.54 g of $F_2$?
   A. $6.02 \times 10^{23}$ atoms   C. $8.78 \times 10^{22}$ atoms
   B. $0.146$ atoms   D. $1.76 \times 10^{23}$ atoms

5. Determine the number of moles of aluminum in 96.7 g of Al.
   A. $0.279$ mol   C. $7.43$ mol
   B. $3.58$ mol   D. $4.21$ mol

6. How many moles of $CF_4$ are there in 171 g of $CF_4$?
   A. $0.51$ mol   C. $4.07$ mol
   B. $1.94$ mol   D. $88.0$ mol

7. Which of the following samples contains the greatest number of atoms?
   A. $100$ g of Pb   C. $0.1$ mole of Fe
   B. $2.0$ mole of Ar   D. $5$ g of He

8. How many sodium atoms are there in 6.0 g of Na$_3$N?
   A. $3.6 \times 10^{24}$ atoms   C. $1.3 \times 10^{23}$ atoms
   B. $0.072$ atoms   D. $0.217$ atoms

9. Boron obtained from borax deposits in Death Valley consists of two isotopes. They are boron-10 and boron-11 with atomic masses of 10.013 amu and 11.009 amu, respectively. The atomic mass of boron is 10.81 amu (see periodic table). Which isotope of boron is more abundant, boron-10 or boron-11?
   A. This cannot be determined from data given.
   B. Neither, their abundances are the same.
   C. Boron-10
   D. Boron-11

10. The percent composition by mass of a compound is 76.0% C, 12.8% H, and 11.2% O. The molar mass of this compound is 284.5 g/mol. What is the molecular formula of the compound?
    A. $C_{18}H_{35}O_2$   C. $C_{18}H_{28}O_4$
    B. $C_9H_8O$   D. $C_{20}H_12O_2$

11. Balance the equation below using the smallest set of whole numbers. What is the coefficient of $H_2O$?
    \[ \text{PCl}_3(l) + \text{H}_2\text{O}(l) \rightarrow \text{H}_3\text{PO}_3(aq) + \text{HCl}(aq) \]
    A. 1   C. 3
    B. 2   D. 5

12. A gold wire has a diameter of 1.00 mm. What length of this wire contains exactly 1.00 mol of gold?
    [Given: density of Au = 17.0 g/cm$^3$]
    A. 2630 m   C. 251 m
    B. 3.69 m   D. 14.8 m

The following 3 questions refer to the mass spectrum of Atom Y as shown below:

13. Based on the mass spectrum of atom Y, which of the following statements is false?
    A. peak D comes from an atom with 4 more protons than the atom that gave peak B
    B. peak A and peak D come from atoms that have the same number of electrons
    C. there are seven isotopes of atom Y
    D. peak C comes from the most abundant isotope of atom Y

14. The identity of compound Y is:
    A. zirconium
    B. molybdenum
    C. americium
    D. einsteinium

15. Which peak comes from an atom with the greatest number of neutrons?
    A. A
    B. all peaks in the spectrum have the same number of neutrons
    C. C
    D. D