The Mole: Problems II

1. Calculate the molar mass of...
   a) Na_3PO_4 b) $Al_2(SO_4)_3$ c) $Ca_3(PO_4)_2$ d) K_2CO_3 e) $Fe(CH_3COO)_3$

2. Name the chemicals in question 1.

3. Given 490 g of sulphuric acid, H_2SO_4, answer the following...
   a) How many moles of H_2SO_4 are present?
   b) How many molecules H_2SO_4 are present?
   c) How many hydrogen atoms are present?
   d) How many sulphur atoms are present?
   e) How many oxygen atoms are present?

4. How many moles of oxygen atoms are there in 4.0 moles of $Cu(NO_3)_2$?

5. Calculate the number of moles of molecules contained in 5.38 g of $CuCl_2$?

6. How many oxygen atoms are contained in 3.6 moles of $(NH_4)_3PO_4$?

7. What is the mass of 1.204×10^{24} molecules of $K_2Cr_2O_7$?

8. Calculate the mass of 2.23 moles of trinitrotoluene, (TNT), $CH_3C_6H_2(NO_2)_3$?

9. Calculate the number of moles in 50.0 g of each of the following...
   a) penicillin , $C_{16}H_{18}N_2O_4S$ b) cholesterol, $C_{27}H_{46}O$

10. Hydrocarbons and various oxides of nitrogen react photochemically (a chemical process that requires light) to form a variety of pollutants. The formula of one of the pollutants, peroxyacetylnitrate, is : $CH_3COOONO_2$.
    a) What is the molecular mass of this compound?
    b) How many moles are there in 24.2 g of $CH_3COOONO_2$?
    c) How many oxygen atoms are there in 24.2 g of $CH_3COOONO_2$?
    d) What is the percentage of oxygen in $CH_3COOONO_2$?

11. You are told that a sealed flask contains a mole of oxygen gas. Describe what you would find in the container. Sketch.

12. The sugar substitute sodium benzosulphimide (sodium saccharin) has a sweetness of about 500 times that of sucrose. You are told that a sachet of commercial saccharin contains 5.0 g.
    What can be deduced about the number of saccharin molecules present in this sachet? Explain.

13. Calculate the number of ...
    a) K^+ in 3.00 moles of K_2O b) Cl^- in 2.5 g of $AlCl_3$ c) Tl^+ in 5.0 g Tl_2SO_4

14. Calculate the percentage of H_2O in $Na_2SO_4.10\,H_2O$.