

Unit 5 Problems

to be worked on in class and finished at home.
You **MUST** show your Hup, Two, Three, Fours!

1. Calculate the molecular or formula masses of the following compounds, **all in g/mol (amu)**:

a. C_2H_6 , b. $SiCl_4$, c. $MgCO_3$, d. $Ca_3(PO_4)_2$, e. K_2S ,
f. CH_2CHCH_2OH , g. $Pb_3(AsO_4)_2$, h. $C_{12}H_{22}O_{11}$.

Answers, **all in g/mol**: a=30, b=170, c=84, d=310, e=110,
f=58, g=899, h=342.

Make the following conversions: *Hup, Two, Three, Four!*

2. 1.00×10^{26} molecules of $SnCl_2$ to moles. Ans: 1.66×10^2 mol.
3. 0.400 moles of H_2O to molecules. Ans: 2.41×10^{23} molecules.
4. 76.0 grams $CaBr_2$ to moles. Ans: 0.380 mol. Or 3.80×10^{-1} mol.
5. 18.0 grams HBr to moles. Ans: 0.222 mol. Or 2.22×10^{-1} mol.
6. 9.30 moles SiH_4 to molecules. Ans: 5.60×10^{24} molecules.
7. Find the mass of one atom of Na. Ans. 3.82×10^{-23} g/atom.
8. Find the mass of one molecule of H_2SO_4 .
Ans. 1.63×10^{-22} g/molecule.

Compute the molarity of the following solutions:

9. 145 g NH_4Cl in 500 ml of solution. Ans: 5.4 M
10. 41.3 g $Fe(NO_3)_2$ in 100 ml of solution. Ans: 2.3 M
11. 35.0 g $MnSiF_6$ in 50.0 ml of solution. Ans: 3.56 M

SHOW YOUR METHOD, the *Hup, Two, Three, Four!*

Describe the preparation of the following solution:

12. 500 ml of 1.50 M AgF. Ans: Dissolve 95.3 g of AgF in enough water to make 500 ml of solution.

Find the percentage composition of the following:

13. CsF. Ans: 87.5%; 12.5%.

14. Bi₂O₃. Ans: 89.7%, 10.3%.

15. BaH₂. Ans: 98.6%, 1.44%.

Find the empirical formulas of the following compounds:

16. 1.67 g Ce, 4.54 g I. Ans: CeI₃

17. 6.27 g Ca, 1.46 g N. Ans: Ca₃N₂

18. The molecular mass of benzene is 78 and its empirical formula is CH. What is the molecular formula for benzene? Ans: C₆H₆

19. What is the molecular formula of dichloroacetic acid, if the empirical formula is CHOCl and the molecular mass is 129g/mol? Ans: C₂H₂O₂Cl₂

Find the formulas for the following hydrates:

20. 95.3 g LiNO₃, 74.7 g H₂O. Ans: LiNO₃•3H₂O

21. 89.2% BaBr₂, 44.6% H₂O (*Note: %-ages may be replaced with grams because they are in the same ratio*). Ans: BaBr₂•6H₂O

22. Explain the difference between the terms mole and molarity.

23. Explain the difference between an empirical formula and a molecular formula.