Moles, Moles, and More Moles! (Mole Packet) Name: _____

Show all work using dimensional analysis, with units at every step. Draw a box around your final answer.

Section A: Convert to <u>moles</u>.

1. 6.02×10^{23} molecules CO_2
2. 1.806×10^{23} molecules Cl_2
3. 1.51×10^{23} molecules H_2O
4. 1000 molecules P_4O_{10}
5. 1 molecule NH_3
6. 34 grams NH_3
7. 50.0 grams $CaCO_3$
8. 360 grams H_2O
9. 9.00 grams H_2SO_4
10. 1.00 gram NaCl

Section B: Convert to <u>mass (in grams)</u>.

11. 5.0 moles NH_3
12. 4.50 moles NaCl
13. 0.30 mole HCl
14. 0.00200 mole Na_2SO_4
15. 1.50×10^{-4} mole AgCl
16. 2.0 moles CO_2
17. 1.8 moles PCl_3
18. 35.0 moles NH_3
19. 0.0500 mole SO_2
20. 1.00×10^{-3} mole CO

Section C: Convert to <u>moles</u>. **Name: _____**

21. 12.04×10^{23} atoms He

22. 3.01×10^{23} atoms Cu

23. 3.612×10^{23} atoms Fe

24. 100 atoms Ar

25. 1 atom S

26. 24 grams C

27. 59.3 grams Sn

28. 98.9 grams Na

29. 5000 grams K

30. 0.00500 gram Ne

Section D: Convert to <u>mass (in grams)</u>.

31. 10.0 moles Na

32. 2.20 moles Sn

33. 5.00 moles Ag

34. 0.000300 mole Au

35. 1.00×10^{7} moles B

Section E: Convert to <u>number of atoms</u>.

36. 3.00 moles Ar

37. 8.50 moles Fe

38. 25.0 moles Ar

39. 0.00100 mole Na

40. 1.0×10^{-5} mole Al

Section F: Convert to <u>mass (in grams)</u>.

41. 6.02×10^{23} atoms Ca

42. 1.204×10^{23} atoms Bi

43. 3.01×10^{23} atoms Ni

44. 1000 atoms Al

45. 1 atom Na

Section G: Convert to <u>number of atoms</u>.

46. 540 grams Al

47. 294 grams Au

48. 6.35 grams Cu

49. 2000 grams Mg

50. 1.00 gram Li

Section H: Convert to <u>number of molecules</u>.

51. 72 grams HCl

52. 9.0 grams H_2O

53. 22 grams CO_2

54. 500 grams NO

55. 1.00 gram CCl_4

Section I: Convert to <u>mass (in grams)</u>.

56. 6.02×10^{23} molecules Cl_2

57. 3.01×10^{23} molecules SO_2

58. 1.81 x 10^{24} molecules CO_2

59. 1000 molecules H_2S

60. 1 molecule H_2O

Section J: Convert from _____ to _____...

61. 5,432 molecules of O_2 to moles of O_2

62. 685 grams of SO_2 to moles of SO_2

63. 5.1 x 10^{30} moles of Na to atoms of Na

64. 5.00 mol of SF_6 to grams of SF_6

65. 201.7 grams of H_2 to moles of H_2

66. 15.00 grams of C to atoms of C

67. 6.02 x 10^{23} molecules of H_2O to grams of H_2O

68. 4.56 mol of Fe to atoms of Fe

69. 0.0182 g of NaCl to moles of NaCl

70. 5.88 x 10^{18} atoms of He to moles of He

71. 3.00 x 10^{41} atoms of Cu to grams of Cu

72. 0.867 moles of CO to grams of CO

73. 2.34 grams of N_2O to molecules of N_2O

74. 0.0054 moles of Hg to grams of Hg

75. 10.04 grams of Cl_2 to molecules of Cl_2

More difficult problems:

1. How many moles are present in each of the following quantities?

    a. 20.0mg of caffeine, $C_8H_{10}O_2$

    b. $2.72 * 10^{27}$ molecules of ethanol, C_2H_5OH

2. Arrange the following in order of increasing number of atoms present: 4.00g hydrogen gas, 4.00g helium gas, 1.0 mol of fluorine gas, 44.00g of carbon dioxide gas, and 146.0g sulfur hexafluoride gas.

3. How many atoms of nitrogen are present in 5.00 g of each of the following: glycine: C_5H_5ON, magnesium nitride: Mg_3N_2, calcium nitrate: $Ca(NO_3)_2$, dinitrogen tetroxide: N_2O_4

4. The EPA sets maximum allowable limits of certain chemicals in drinking water. Ethylbenzene, $C_6H_5CH_2CH_3$, is limited to a maximum concentration of .7 mg/L in drinking water. How much water would a person need to drink in order to ingest 1 gram of ethylbenzene? 10g? 1mole of Ethylbenzene?

5. EPA estimated the threshold Blood Lead Levels (BLL) for a decrease in hemoglobin to be 50 μg/dL for occupationally exposed adults and approximately 40 μg/dL for children. Assume blood density is 1060 kg/m^3 and the average human is ~7% blood by mass. How many molecules of lead are present in a 30kg child and a 85kg adult with BLL equivalent to the EPA thresholds?