



## Mole Day Challenge

Chem Honors

Name \_\_\_\_\_  
Period \_\_\_\_\_ Date \_\_\_\_\_

### How Big is a Mole?

- 1) If the average penny is 2.0 mm thick, how far will a stack of ONE MOLE of pennies reach? Give total distance in units of km (use good dimensional analysis):
- 2) Which of the following measurements is the best approximation for the distance spanned by a mole of pennies?
  - a) The distance from the earth to the moon--  $4 \times 10^5$  km
  - b) The distance from the earth to pluto--  $6 \times 10^9$  km
  - c) The distance from the earth to the closest star outside our galaxy--  $4 \times 10^{13}$  km
  - d) The distance that is spanned by the local cluster of galaxies that we are in (including the Milky Way and Andromeda, 5 million light years across) --  $4.8 \times 10^{19}$  km
- 3) How much would the mole of pennies be worth, in dollars? *Use good dimensional analysis.*
- 4) The size of the world economy was estimated to be \$142,005.65 trillion in 2014 (1 world economy =  $\$142.00565 \times 10^{12}$ ). How many world economies would the amount calculated above be worth? (This is the number of earth-like planets you would need to have 1 mole of pennies.) *Use good dimensional analysis.*
- 5) A mole of African elephants would have a mass equal to how many times the mass of Pluto? [*Hint: set up good dimensional analysis first finding the mass of 1 mole of elephants.*] The average mass of 1 African elephant = 5,443 kg; the mass of Pluto =  $1.309 \times 10^{22}$  kg.
- 6) A mole of baseballs would fill how many holes the volume of the moon. The diameter of a baseball = 7.40 cm and the diameter of the moon = 3,474.2 km. Remember, for a sphere,  $V = 4/3\pi r^3$ .