

Chem Honors WKS
Dimensional Analysis 2: Metric Conversions,
Double Units & Squared/Cubed Units

NAME _____
Period _____ Date _____

Use the prefix conversions chart on the reference sheet to convert the measurements in part A. **Show all steps** needed to convert from starting units to ending units. You must use the proper number of sig figs in your answer.

A. Metric System

- | | |
|--|-----------------|
| 1) 40. mL to L | 4) 2.50 kg to g |
| 2) 85 g to μg | 5) 544 ns to s |
| 3) 6300 m to km | 6) 1.92 L to mL |
| 7) 74.0 cm to km | |
| 8) 4.13×10^{-4} MW to μW (W = watts, the SI unit of power) | |
| 9) 1.50×10^3 TB to GB (B = bytes, a unit of computer memory) | |

B. Double Units & Squared/Cubed Units

- 10) In the US, milk is sold by the gallon, while in Denmark it is sold by the liter. Milk in the US costs \$3.29/gal. What is the equivalent cost in Danish Krone per liter (the exchange rate is 6.655 DKK/\$1.00 as of Sept. 22, 2016)?
- 11) The speed of sound in dry air at sea level and 20°C is 343.2 m/s. What would this be in km/day?

- 12) The energy released when propane (C_3H_8) burns is 2,044 kJ/mol (kilojoules/mole). What is this amount in picojoules/molecule (pJ/mlcl)? (Use the conversion factor $1 \text{ mol} = 6.022 \times 10^{23} \text{ mlcl}$)
- 13) At an altitude of 10,000 m, the density of air is $4.20 \times 10^{-4} \text{ g/cm}^3$. Convert this to $\mu\text{g/mm}^3$ (remember, to convert a cubed unit, put the *entire* conversion factor into parentheses and cube it).
- 14) In problem #10 you found that milk in Denmark costs 5.79 DKK/L. If the average Danish family uses 208 L of milk each year, how much do they spend, in DKK, on milk in one year?
- 15) The speed of light in a vacuum is $2.998 \times 10^8 \text{ m/s}$. The average distance from the sun to the earth is $1.496 \times 10^8 \text{ km}$. How much time, in minutes, does light take to travel this distance?
- 16) Gold has a density of 19.31 g/cm^3 . An explorer finds a large, pure gold statue and determines its mass to be 11.6 kg. What is the volume, in m^3 , of this statue? (Remember to cube the conversion factor from $\text{cm} \rightarrow \text{m}$.)
- 17) The average neon (Ne) atom has a mass of 20.18 atomic mass units/atom (atomic mass unit = amu). There are $1.661 \times 10^{-24} \text{ g/amu}$. If the typical Ne light holds 1.00×10^{15} Ne atoms, what mass of neon, in kg, is in the Ne light?

Answers: 1) 0.040 L ; 2) $8.5 \times 10^7 \mu\text{g}$; 3) 6.3 km ; 4) $2.50 \times 10^3 \text{ g}$; 5) $5.44 \times 10^{-7} \text{ s}$; 6) 1920 mL ; 7) $7.40 \times 10^{-4} \text{ km}$; 8) $4.13 \times 10^8 \mu\text{W}$; 9) $1.50 \times 10^6 \text{ GB}$; 10) 5.79 DKK/L ; 11) $2.965 \times 10^4 \text{ km/day}$; 12) $3.394 \times 10^{-6} \text{ pJ/mlcl}$; 13) $0.42 \mu\text{g/mm}^3$; 14) $1.20 \times 10^3 \text{ DKK}$; 15) 8.317 min ; 16) $6.01 \times 10^{-4} \text{ m}^3$; 17) $3.35 \times 10^{-11} \text{ kg}$