**Chem 1984 Supplemental Note #1**

**Converting Between Different Prefixed Metric Measures**

**v.1.0 Fall 2013**

1. **Selected Prefixes used in the SI (metric) system (see also: text Table R.2 page 3)**

 **magnitude prefix symbol**



**You are responsible to get these into your heads.**

1. **Two Examples of Metric-metric conversion problems**
2. **How many ng are in 5 mg?**
3. **How many THz are in 30 MHz?**
4. **Three Different Ways to Solve Metric-metric conversion problems**

 **Method 1: Factor label (Common High School Approach)**

 ***Problem A* Problem B**

**5 ~~mg~~ \* 1\*10‑3 ~~g~~  \* 1 ng = 5\*10+6 ng 30 ~~MHz~~ \* 1\*106 ~~Hz~~ \*1 THz = 3\*10-5 THz**

 **1 ~~mg~~  10-9 ~~g~~ 1 ~~MHz~~  10+12 ~~Hz~~**

 **Method 2: Algebraic (often the fastest method)**

 ***Problem A*  *Problem B***

**i)Set up equation: 5 mg = x ng 30 MHz = x THz**

**ii)Divide to isolate `x’ 5 mg = x 30 MHz = x**

 **ng THz**

**iii)Substitute symbols 5\*10-3 g = x 30\*106 Hz = x**

 **with magnitudes 10‑9 g 1012 Hz**

**iv) compute value 5\*10+6 = x 3\*10-5** = **x**

**Method 3: Exponent Walk & Count (for visual learners)**

Write prefix/magnitudes like this

**T G M k d c m μ n p**

**12 9 6 3 -1 -2 -3 -6 -9 -12**

***Problem A* 5 mg 5\*10x**

 **x = (START- FINISH) = -3-(-9)=+6**

***Problem B* 30\*10x 30 MHz => 5\*10+6**

**x= (START-FINISH) = (6-12) = -6**

**=> 30\*10-6 =3\*10-5**

**Practice exercises with answers**

**Convert**

1. **10 ms 🡪 ds**
2. **23 cg🡪 ng**
3. **400 km 🡪 Mm**
4. **0.6 kHz 🡪 pHz**
5. **96 TH 🡪 kH**
6. **3 kfoozles🡪 Gfoozles**

**Answers**

1. **10\*10‑2 ds = 10-1 ds**
2. **23\*10+7 ng = 2.3\*108 ng**
3. **400\*10-3 Mm = 4\*10-1 Mm**
4. **0.6\*10+15 pHz = 6\*1014 pHz**
5. **96\*109 kH = 9.6\*1010 kH**
6. **3\*10-6 kfoozles**