South Pasadena • Chemistry

Name_____
Period___ Date ___/___/___

2 • What Can We Measure About Chemicals?

TIME PROBLEMS & DIMENSIONAL ANALYSIS

Philosophy:

As chemistry students, you have two goals with problems. First, get the correct answer. Second, be able to show others WHY your answer is correct. Dimensional analysis meets both of these goals.

Dimensional analysis problems always involve a **Given** value and one or more **conversion factors** that allow you to determine the **Desired** value.

Any mathematical fact can serve as a conversion factor. 1 hour = 60 minutes $\approx \boxed{\frac{1\text{ hour}}{60\text{ min}}}$ or $\boxed{\frac{60\text{ min}}{1\text{ hour}}}$

Ex. Convert 1.25 years into seconds.

1. Convert 2.83 days into seconds.

2. Convert 7.72 years into days.

3. Convert 0.0035 weeks into seconds.

4. Convert 180 days into minutes.

5. Convert your age into seconds

Answers as shown in class:

Ex. Convert 1.25 years into seconds.

$$1.25 \text{ years} \times \frac{365 \text{ days}}{1 \text{ year}} \times \frac{24 \text{ hours}}{1 \text{ day}} \times \frac{60 \text{ min}}{1 \text{ hour}} \times \frac{60 \text{ sec}}{1 \text{ min}} = \boxed{39{,}420{,}000 \text{ seconds}}$$

1. Convert 2.83 days into seconds.

$$2.83 \text{ days} \times \frac{24 \text{ hours}}{1 \text{ day}} \times \frac{60 \text{ min}}{1 \text{ hour}} \times \frac{60 \text{ sec}}{1 \text{ min}} = \boxed{244{,}512 \text{ seconds}}$$

2. Convert 7.72 years into days.

$$7.72 \text{ years} \times \frac{365.25 \text{ days}}{1 \text{ year}} = \boxed{2{,}819.73 \text{ days}}$$ [Note: 365.25 days/year takes into account leap years]

3. Convert 0.0035 weeks into seconds.

$$0.0035 \text{ weeks} \times \frac{7 \text{ days}}{1 \text{ week}} \times \frac{24 \text{ hours}}{1 \text{ day}} \times \frac{60 \text{ min}}{1 \text{ hour}} \times \frac{60 \text{ sec}}{1 \text{ min}} = \boxed{2{,}116.8 \text{ seconds}}$$

4. Convert 180 days into minutes.

$$180 \text{ days} \times \frac{24 \text{ hours}}{1 \text{ day}} \times \frac{60 \text{ min}}{1 \text{ hour}} = \boxed{259{,}200 \text{ minutes}}$$

5. Convert your age into seconds

$$16 \text{ years} \times \frac{365.25 \text{ days}}{1 \text{ year}} \times \frac{24 \text{ hours}}{1 \text{ day}} \times \frac{60 \text{ min}}{1 \text{ hour}} \times \frac{60 \text{ sec}}{1 \text{ min}} = \boxed{504{,}921{,}600 \text{ seconds}}$$