



Chemistry

Name: _____

Section _____ %Err Metrics WS Date: _____

Percent Error: Calculate the percent error for these data sets. Include units. Show all equations, substitutions, and then solve for the answer.

1. Experimental value = 1.24 g and the accepted value = 1.30 g.

$$\%_{err} = \frac{\text{measured} - \text{accepted}}{\text{accepted}} \times 100\% = \frac{1.24 \text{ g} - 1.30 \text{ g}}{1.30 \text{ g}} \times 100\% = -4.6\% \text{ or } -5\%$$

2. Experimental value = 1.24×10^{-2} g and the accepted value = 9.98×10^{-3} g.

$$\%_{err} = \frac{\text{measured} - \text{accepted}}{\text{accepted}} \times 100\% = \frac{1.24 \times 10^{-2} \text{ g} - 9.98 \times 10^{-3} \text{ g}}{9.98 \times 10^{-3} \text{ g}} \times 100\% = 24\%$$

3. Experimental value = 252 mL and the accepted value = 225 mL.

$$\%_{err} = \frac{\text{measured} - \text{accepted}}{\text{accepted}} \times 100\% = \frac{252 \text{ mL} - 225 \text{ mL}}{225 \text{ mL}} \times 100\% = 12\%$$

4. Experimental value = 22.2 L and the accepted value = 22.4 L.

$$\%_{err} = \frac{\text{measured} - \text{accepted}}{\text{accepted}} \times 100\% = \frac{22.2 \text{ L} - 22.4 \text{ L}}{22.4 \text{ L}} \times 100\% = -0.89\% \text{ or } -0.9\%$$

5. Experimental value = 125.2 mg and the accepted value = 124.8 mg.

$$\%_{err} = \frac{\text{measured} - \text{accepted}}{\text{accepted}} \times 100\% = \frac{125.2 \text{ mg} - 124.8 \text{ mg}}{124.8 \text{ mg}} \times 100\% = 0.32\% \text{ or } 0.3\%$$

Temperature Conversions: Show equations, substitutions, and units.

1. $0^{\circ}\text{C} = \underline{\hspace{2cm}}$ K $^{\circ}\text{C} + 273 = \text{K} = 0^{\circ}\text{C} + 273 = 273 \text{ K}$

2. $100 \text{ K} = \underline{\hspace{2cm}}$ $^{\circ}\text{C}$ $^{\circ}\text{C} + 273 = \text{K} = ^{\circ}\text{C} + 273 = 100 \text{ K}, ^{\circ}\text{C} = -173^{\circ}\text{C}$

3. $450 \text{ K} = \underline{\hspace{2cm}}$ $^{\circ}\text{C}$ $^{\circ}\text{C} + 273 = \text{K} = ^{\circ}\text{C} + 273 = 450 \text{ K}, ^{\circ}\text{C} = 177^{\circ}\text{C}$

4. $100^{\circ}\text{C} = \underline{\hspace{2cm}}$ K $^{\circ}\text{C} + 273 = \text{K} = 100^{\circ}\text{C} + 273 = 373 \text{ K}$

5. $-273^{\circ}\text{C} = \underline{\hspace{2cm}}$ K $^{\circ}\text{C} + 273 = \text{K} = -273^{\circ}\text{C} + 273 = 0 \text{ K}$

6. $294 \text{ K} = \underline{\hspace{2cm}}$ $^{\circ}\text{C}$ $^{\circ}\text{C} + 273 = \text{K} = ^{\circ}\text{C} + 273 = 294 \text{ K}, ^{\circ}\text{C} = 21^{\circ}\text{C}$

7. $0 \text{ K} = \underline{\hspace{2cm}}$ $^{\circ}\text{C}$ $^{\circ}\text{C} + 273 = \text{K} = ^{\circ}\text{C} + 273 = 0 \text{ K}, ^{\circ}\text{C} = -273^{\circ}\text{C}$

8. $225 \text{ K} = \underline{\hspace{2cm}}$ $^{\circ}\text{C}$ $^{\circ}\text{C} + 273 = \text{K} = ^{\circ}\text{C} + 225 = 273 \text{ K}, ^{\circ}\text{C} = -48^{\circ}\text{C}$

9. $37^{\circ}\text{C} = \underline{\hspace{2cm}}$ K $^{\circ}\text{C} + 273 = \text{K} = 37^{\circ}\text{C} + 273 = 310 \text{ K}$

10. $-40^{\circ}\text{C} = \underline{\hspace{2cm}}$ K $^{\circ}\text{C} + 273 = \text{K} = -40^{\circ}\text{C} + 273 = 233 \text{ K}$

Metric Conversions: Show conversion factors and units.

1. 35 mL = 35 000 000 nL $35 \text{ mL} \times \frac{10^{-3} \text{ L}}{1 \text{ mL}} \times \frac{1 \text{ nL}}{10^{-9} \text{ L}} = 3.5 \times 10^6 \text{ nL}$
2. 950 g = 0.95 kg $950 \text{ g} \times \frac{1 \text{ kg}}{10^3 \text{ g}} = 0.95 \text{ kg}$
3. 275 mm = 27.5 cm $275 \text{ mm} \times \frac{10^{-3} \text{ m}}{1 \text{ mm}} \times \frac{1 \text{ cm}}{10^{-2} \text{ m}} = 2.75 \times 10^1 \text{ cm}$
4. 1000 L = 1 kL $1000 \text{ L} \times \frac{1 \text{ kL}}{10^3 \text{ L}} = 1 \text{ kL}$
5. 1000 mL = 1 L $1000 \text{ mL} \times \frac{10^{-3} \text{ L}}{1 \text{ mL}} = 1 \text{ L}$
6. 4500 mg = 4.5 g $4500 \text{ mg} \times \frac{10^{-3} \text{ g}}{1 \text{ mg}} = 4.5 \text{ g}$
7. 25 cm = 250 mm $25 \text{ cm} \times \frac{10^{-2} \text{ m}}{1 \text{ cm}} \times \frac{1 \text{ mm}}{10^{-3} \text{ m}} = 250 \text{ mm}$
8. 0.005 kg = 5000 mg $0.005 \text{ kg} \times \frac{10^3 \text{ g}}{1 \text{ kg}} \times \frac{1 \text{ mg}}{10^{-3} \text{ g}} = 5000 \text{ mg}$
9. 0.075 m = 7.5 cm $0.075 \text{ m} \times \frac{1 \text{ cm}}{10^{-2} \text{ m}} = 7.5 \text{ cm}$
10. 15 g = 15 000 mg $15 \text{ g} \times \frac{1 \text{ mg}}{10^{-3} \text{ g}} = 15 000 \text{ mg}$