

Unit 1 Review questions Chemistry 11

Answers

1. How many significant figures are there in the following measurements?

- a) 0.0012 2 b) 106 3 c) 0.001060 4 d) 1.0013 5
 e) 4.900×10^{-2} 4 f) 100. 3 g) 1.0×10^2 2

2) Given the following measurement: 59000000 m, express it to show

- a) 1 significant figure 6×10^7 or 60000000
 b) 4 significant figure 5.900×10^7
 c) 10 significant figure 5.900000000×10^7 or 59000000.00

3) Perform the following operation: Note that all numbers are measurements.

a) $(9.03 - 8.23 + 21.977) / 3.1416 = (22.78) / 3.1416 = 7.251$

b) $88.33 + 11.6711 = 100.00$

c) $3.449 \times 10^{-2} \times 1.00 \times 10^{-3} = 3.45 \times 10^{-5}$

d) $\frac{4.55 \times 10^{-3} \times 1.003 \times 10^{-3}}{2.00 \times 10^{-3}} = 2.28 \times 10^{-3}$

4. Unit conversions. Remember to show your work!

a) How many nanometers are there in 6.50×10^2 micrometers?

$$6.50 \times 10^2 \mu\text{m} \times \frac{1 \text{ m}}{10^6 \mu\text{m}} \times \frac{10^9 \text{ nm}}{1 \text{ m}} = 6.50 \times 10^5 \text{ nm}$$

b) How many picograms are there in 1.04 micrograms?

$$1.04 \mu\text{g} \times \frac{1 \text{ g}}{10^6 \mu\text{g}} \times \frac{10^{12} \text{ pg}}{1 \text{ g}} = 1.04 \times 10^6 \text{ pg}$$

c) One Angstrom, A, is equal to 1×10^{-8} cm. If two atoms in a molecule are 134 pm apart, what is the distance in nanometers and Angstroms?

$$134 \text{ pm} \times \frac{1 \text{ m}}{10^{12} \text{ pm}} \times \frac{10^9 \text{ nm}}{1 \text{ m}} = 0.134 \text{ nm}$$

$$134 \text{ pm} \times \frac{1 \text{ m}}{10^{12} \text{ pm}} \times \frac{10^{10} \text{ \AA}}{1 \text{ m}} = 1.34 \text{ \AA}$$

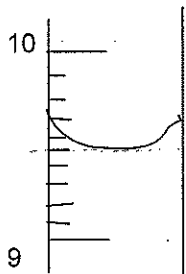
d) What is 45 miles per hour in terms of m/s. Note that 1 mile = 1600 m.

$$\frac{45 \text{ miles}}{1 \text{ hr}} \times \frac{1600 \text{ m}}{1 \text{ mile}} \times \frac{1 \text{ hr}}{3600 \text{ sec}} = 20 \text{ m/s}$$

5. The density of aluminium is 2.70 g/cm^3 . What is the volume of a piece of aluminium that has a mass of 4.5 g ?

$$V = \frac{m}{d} = \frac{4.5 \text{ g}}{2.70 \text{ g/cm}^3} = 1.7 \text{ cm}^3$$

6.



9.50 mL

Given the following burette, record the volume of water.

6. In the opening scenes of the movie Raiders of the Lost Ark, Indiana Jones tries to remove a gold idol from a booby-trapped pedestal. He replaces the idol with a bag of sand of approximately equal volume. Given the density of gold = 19.32 g/cm^3 and the density of sand being about 3 g/cm^3 ,

- a) Did he have a reasonable chance of not activating the mass-sensitive booby trap?

No - because the bag of sand would have a mass less than $\frac{1}{6}$ the mass of the gold.

- b) In a later scene he and an unscrupulous guide play catch with the idol. Assume that the volume of the idol is about 1.0 L . If it were solid gold, what mass would the idol have? Is playing catch with it plausible?

$$1 \text{ cm}^3 = 1 \text{ mL}$$

$$\frac{19.32 \text{ g}}{1 \text{ cm}^3} \times \frac{1000 \text{ cm}^3}{1 \text{ L}} = 19320 \text{ g} \text{ or } 19.32 \text{ kg}$$

No, imagine playing catch with a 4 year old child!