

- a. What is this velocity in kilometers per hour?
 - b. What is this velocity in kilometers per day?
18. A chemistry teacher needs to determine what quantity of sodium hydroxide to order. If each student will use 130 g and there are 60 students, how many kilograms of sodium hydroxide should the teacher order?
19. The teacher in item 18 also needs to order plastic tubing. If each of the 60 students needs 750 mm of tubing, what length of tubing in meters should the teacher order?
20. Convert the following to the required units.
- a. 550 $\mu\text{L/h}$ to milliliters per day
 - b. 9.00 metric tons/h to kilograms per minute
 - c. 3.72 L/h to cubic centimeters per minute
 - d. 6.12 km/h to meters per second
21. Express the following in the units indicated.
- a. 2.97 kg/L as grams per cubic centimeter
 - b. 4128 g/dm² as kilograms per square centimeter
 - c. 5.27 g/cm³ as kilograms per cubic decimeter
 - d. 6.91 kg/m³ as milligrams per cubic millimeter
22. A gas has a density of 5.56 g/L.
- a. What volume in milliliters would 4.17 g of this gas occupy?
 - b. What would be the mass in kilograms of 1 m³ of this gas?
23. The average density of living matter on Earth's land areas is 0.10 g/cm². What mass of living matter in kilograms would occupy an area of 0.125 ha?
24. A textbook measures 250. mm long, 224 mm wide, and 50.0 mm thick. It has a mass of 2.94 kg.
- a. What is the volume of the book in cubic meters?
 - b. What is the density of the book in grams per cubic centimeter?
 - c. What is the area of one cover in square meters?
25. A glass dropper delivers liquid so that 25 drops equal 1.00 mL.
- a. What is the volume of one drop in milliliters?
 - b. How many milliliters are in 37 drops?
 - c. How many drops would be required to get 0.68 L?
26. Express each of the following in kilograms and grams.
- a. 504 700 mg
 - c. 122 mg
 - b. 9 200 000 μg
 - d. 7195 cg
27. Express each of the following in liters and milliliters.
- a. 582 cm³
 - c. 1.18 dm³
 - b. 0.0025 m³
 - d. 32 900 μL
28. Express each of the following in grams per liter and kilograms per cubic meter.
- a. 1.37 g/cm³
 - d. 38 000 g/m³
 - b. 0.692 kg/dm³
 - e. 5.79 mg/mm³
 - c. 5.2 kg/L
 - f. 1.1 $\mu\text{g/mL}$
29. An industrial chemical reaction is run for 30.0 h and produces 648.0 kg of product. What is the average rate of product production in the stated units?
- a. grams per minute
 - b. kilograms per day
 - c. milligrams per millisecond
30. What is the speed of a car in meters per second when it is moving at 100. km/h?
31. A heater gives off energy as heat at a rate of 330 kJ/min. What is the rate of energy output in kilocalories per hour? (1 cal = 4.184 J)
32. The instructions on a package of fertilizer tell you to apply it at the rate of 62 g/m². How much fertilizer in kilograms would you need to apply to 1.0 ha? (1 ha = 10 000 m²)
33. A water tank leaks water at the rate of 3.9 mL/h. If the tank is not repaired, what volume of water in liters will it leak in a year? Show your setup for solving this. Hint: Use one conversion factor to convert hours to days and another to convert days to years, and assume that one year has 365 days.
34. A nurse plans to give flu injections of 50 μL each from a bottle containing 2.0 mL of vaccine. How many doses are in the bottle?

Significant Figures: Chap. 2, Sec. 2

35. Determine the number of significant figures in the following measurements.
- a. 640 cm³
 - b. 200.0 mL
 - c. 0.5200 g
 - d. 1.005 kg
 - e. 10 000 L
 - f. 20.900 cm
 - g. 0.000 000 56 g/L
 - h. 0.040 02 kg/m³
 - i. 790 001 cm²
 - j. 665.000 kg•m/s²
36. Perform the following calculations, and express the result in the correct units and number of significant figures.
- a. 47.0 m \div 2.2 s
 - b. 140 cm \times 35 cm
 - c. 5.88 kg \div 200 m³
 - d. 0.00 50 m² \times 0.042 m
 - e. 300.3 L \div 180. s
 - f. 33.00 cm² \times 2.70 cm
 - g. 35 000 kJ \div 0.250 min
37. Perform the following calculations and express the results in the correct units and number of significant figures.
- a. 22.0 m + 5.28 m + 15.5 m
 - b. 0.042 kg + 1.229 kg + 0.502 kg
 - c. 170 cm² + 3.5 cm² - 28 cm²
 - d. 0.003 L + 0.0048 L + 0.100 L
 - e. 24.50 dL + 4.30 dL + 10.2 dL
 - f. 3200 mg + 325 mg - 688 mg
 - g. 14 000 kg + 8000 kg + 590 kg

Mixed Review

38. Determine the number of significant figures in the following measurements.
- a. 0.0120 m
 - b. 100.5 mL
 - c. 101 g
 - d. 350 cm²
 - e. 0.97 km
 - f. 1000 kg
 - g. 180. mm
 - h. 0.4936 L
 - i. 0.020 700 s
39. Round the following quantities to the specified number of significant figures.
- a. 5 487 129 m to three significant figures
 - b. 0.013 479 265 mL to six significant figures