PRACTICE PROBLEMS

1. Add 0.5 kg, 50 mg, and 2.5 dg. Reduce the result to grams.
2. Add 7.25 L and 875 cL. Reduce the result to milliliters.
3. Add 0.0025 kg, 1750 mg, 2.25 g, and 825,000 μg, and express the answer in grams.
4. Reduce 1.256 g to micrograms, to milligrams, and to kilograms.
5. Are the terms mcg/mL and mg/L equivalent or not equivalent?
6. A low-strength aspirin tablet contains 81 mg of aspirin per tablet. How many tablets may be prepared from 1 kg of aspirin?
7. Adhesive tape made from fabric has a tensile strength of not less than 20.41 kg/2.54 cm of width. Reduce these quantities to grams and millimeters.
8. A liquid contains 0.25 mg of a substance per milliliter. How many grams of the substance will 3.5 L contain?
9. An inhalation aerosol contains 225 mg of metaproterenol sulfate, which is sufficient for 300 inhalations. How many micrograms of metaproterenol sulfate would be contained in each inhalation?
10. TRIPHASIL-28 birth control tablets are taken sequentially, 1 tablet per day for 28 days, with the tablets containing the following:

    Phase 1—6 tablets, each containing 0.05 mg levonorgestrel and 0.03 mg ethinyl estradiol;
    Phase 2—5 tablets, each containing 0.075 mg levonorgestrel and 0.04 mg ethinyl estradiol;
    Phase 3—10 tablets, each containing 0.125 mg levonorgestrel and 0.03 mg ethinyl estradiol; then, 7 inert tablets (no drug).

    How many total milligrams each of levonorgestrel and ethinyl estradiol are taken during the 28-day period?
11. How many colchicine tablets, each containing 600 mcg, may be prepared from 30 g of colchicine?
12. The following clinical laboratory data are within normal values for an adult. Convert each value to mcg/mL:
    (a) ammonia, 30 mcg/dL
    (b) folate, 18 pg/mL
    (c) serum creatinine, 1.0 mg/dL
    (d) prostate specific antigen (PSA), 3 ng/mL
    (e) cholesterol, total, 150 mg/dL
13. The package insert for DONNATAL EXTENTABS indicates the amount of phenobarbital present in each tablet, in milligrams and in the equivalent weight (3/4 grains) in the Apothecary system. Refer to Appendix A and calculate the milligrams of phenobarbital present in each tablet.
14. Levothyroxine sodium tablets (SYNTHROID) are available in 12 different strengths ranging from 25 to 300 μg. Express this range in (a) mg and (b) ng.
15. Norgestrel and ethinyl estradiol tablets are available containing 0.5 mg of norgestrel and 50 μg of ethinyl estradiol. How many grams of each ingredient would be used in making 10,000 tablets?
16. Approximately 0.02% of a 100-mg dose of the drug miglitol (GLYSET) has been shown to appear in human breast milk. Calculate the quantity of drug detected, in milligrams, following a single dose.
17. How many grams of digoxin (LANOXIN) would be required to make 25,000 tablets each containing 250 mcg of digoxin?
18. Adalimumab (HUMIRA), a recombinant human monoclonal antibody, is available in a prefilled syringe containing 40 mg/0.8 mL of injection.

Calculate the concentration of drug on a mg/ mL basis.

19. If an injectable solution contains 25 μg of a drug substance in each 0.5 mL, how many milliliters would be required to provide a patient with 0.25 mg of the drug substance?

20. A patient is instructed to take one 50 μg tablet of pergolide mesylate (PERMAX) a day for the first two days of treatment; 150 μg/day on the third, fourth, and fifth days of treatment; 250 μg/day on the sixth, seventh, and eighth days; and 350 μg on the ninth day and return to the physician for assessment. During this treatment period, how many milligrams of drug were taken?

21. An oral liquid concentrate of sertraline hydrochloride (ZOLOFT) contains 20 mg/mL of the drug. How many grams of sertraline hydrochloride are in each 60-mL container of the concentrate?

22. Digoxin (LANOXIN) is available for parenteral pediatric use in a concentration of 0.1 mg/mL. How many milliliters would provide a dose of 40 μg?

23. A liquid oral concentrate of morphine sulfate contains 2.4 g of morphine sulfate in a 120-mL bottle. Calculate the concentration of morphine sulfate on a mg/mL basis.

24. The starting dose of sodium oxybate oral solution (XYREM) is 4.5 g/night divided into two equal doses and administered 2.5 to 4 hr apart. How many milliliters of the oral solution containing sodium oxybate, 500 mg/mL, should be administered in each divided dose?

25. An intravenous solution contains 500 μg of a drug substance in each milliliter. How many milligrams of the drug would a patient receive from the intravenous infusion of a liter of the solution?

26. If an intravenous solution containing 123 mg of a drug substance in each 250-mL bottle is to be administered at the rate of 200 μg of drug per minute, how many milliliters of the solution would be given per hour?

27. An oral inhalation (DULERA) to treat asthma provides, in each inhalation, 100 μg of mometasone furoate and 5 μg of formoterol fumarate. The recommended dose is "two inhalations twice daily (morning and evening)." Calculate the quantity of each drug inhaled daily and express the answers in milligrams.

28. One milligram of streptomycin sulfate contains the antibiotic activity of 650 μg of streptomycin base. How many grams of streptomycin sulfate would be the equivalent of 1 g of streptomycin base?

29. A commercial package contains thirty-six 200-mg tablets of ibuprofen. How many kilograms of ibuprofen were used in the manufacture of 1000 packages of the product?

30. A gas chromatographic column measures 1.8 m in length and 3 mm in internal diameter. Convert these measurements to inches.

31. A prefilled syringe contains 20 mg of drug in 2 mL of solution. How many micrograms of drug would be administered by an injection of 0.5 mL of the solution?

32. A vial contains 80 mg of drug in 2 mL of injection. How many milliliters of the injection should be administered to obtain 0.02 g of drug?

33. One-half liter of solution for intravenous infusion contains 2 g of drug. How many milliliters of the solution would contain 0.5 mg of drug?

34. A 125-mL container of amoxicillin contains 600 mg/5 mL. How many milliliters would be used to administer 400 mg of amoxicillin?

35. An effervescent tablet has the following formula:

Acetaminophen	325 mg
Calcium Carbonate	280 mg
Citric Acid	900 mg
Potassium Bicarbonate	300 mg
Sodium Bicarbonate	465 mg

(a) Calculate the total weight, in grams, of the ingredients in each tablet.

(b) How many tablets could be made with a supply of 5 kg of acetaminophen?

36. A new analytic instrument is capable of detecting picogram quantities of a chemical substance. How many times more capable is this instrument than one that can detect nanogram quantities of the same chemical?

37. The dimensions of a nicotine transdermal patch system are 4.7 cm by 4.8 cm. Express these dimensions in corresponding inches if 1 inch is equivalent to 25.4 mm.

38. If an albuterol inhaler contains 18 mg of albuterol, how many inhalation-doses can be delivered if each inhalation-dose contains 90 μg?

39. Acetaminophen, in amounts greater than 4 g per day, has been associated with liver toxicity. What is the maximum number of 500-mg tablets of acetaminophen that a person may take daily and not reach the toxic level?

40. Prochlorperazine (COMPAZINE) for injection is available in 10-mL multiple dose vials containing 5 mg/mL. How many 2-mg doses can be withdrawn from the vial?

41. The recommended dose for a brand of nicotine patch is one 21-mg dose per day for 6 weeks, followed by 14 mg per day for 2 weeks, and then 7 mg per day for 2 more weeks. What total quantity, in grams, would a patient receive during this course of treatment?

42. A medical device is sterilized by gamma radiation at 2.5 megarads (Mrad). Express the equivalent quantity in rads.

43. A round transdermal patch measures 4.3 cm in diameter. Convert this dimension to inches and millimeters.

44. A solution for direct IV bolus injection contains 125 mg of drug in each 25 mL of injection. What is the concentration of drug in terms of μg/μL?

45. The total number of human genomic characters is 3.5 billion. Express this quantity numerically without using a decimal point.

46. Conjugated estrogens tablets (PREMARIN) are available in strengths of 0.3 mg, 0.45 mg, 0.625 mg, 0.9 mg, and 1.25 mg. If patient "A" took one tablet daily of the lowest dose and patient "B" took one tablet daily of the highest dose, what is the difference in the total quantities taken between patients "A" and "B" over a period of 30 days?

(a) 2.85 mg
(b) 2850 mcg
(c) 2.85 cg
(d) 2.85 dg

47. Teratogenic studies of insulin glargine were undertaken in rats at doses up to 0.36 mg/kg/day. This is equivalent to which of the following?

(a) 360 cg/lb/day
(b) 792 mcg/lb/day
(c) 360 mg/lb/day
(d) 163.6 mcg/lb/day

48. Pharmacy students, traveling to attend a national pharmacy meeting, were on an airplane with an average air speed of 414 miles per hour. Which is the closest equivalent air speed?

(a) 6 mi/min
(b) 257 km/h
(c) 666 km/h
(d) 180 m/sec

49. The product of biotechnology, filgrastim (NEUPOGEN), is available in vials containing 0.3 mg of drug in each milliliter. Which choice is equivalent in concentration?
(a) 0.03 mg/0.1 dL
(b) 300 mcg/0.01 dL
(c) 3 mcg/0.01 cL
(d) 300 mcg/10 cL

50. In a clinical study of finasteride (PROSCAR), a single oral dose of 5 mg resulted in an average blood concentration of 37 ng of drug per milliliter (37 ng/mL) of blood plasma. This is equivalent to which of the following?
(a) 37,000 mcg/mL
(b) 0.037 mcg/mL
(c) 0.000037 mg/cL
(d) 0.0037 mcg/dL

mg, dopamine, first hour:

$$\frac{500 \text{ mcg}}{1 \text{ min}} \times \frac{60 \text{ min}}{1 \text{ h}} \times \frac{1 \text{ mg}}{1000 \text{ mcg}}$$

$= 30$ mg/h, *answer*.

Infusion duration:

$$400 \text{ mg} \times \frac{1 \text{ min}}{500 \text{ mcg}} \times \frac{1000 \text{ mcg}}{1 \text{ mg}}$$

$= 800$ min $= 13$ h, 20 min, *answer*.

Practice Problems

1. 500.3 g
2. 16,000 mL
3. 7.325 g
4. 1,256,000 mcg
   1256 mg
   0.001256 kg
5. equivalent
6. 12,345 tablets
7. 20,410 g/25.4 mm
8. 0.875 g
9. 750 mcg metaproterenol sulfate
10. 1.925 mg levonorgestrel
    0.68 mg ethinyl estradiol
11. 50,000 tablets
12. (a) ammonia, 0.3 mcg/mL
    (b) folate, 0.000018 mcg/mL
    (c) serum creatinine, 10 mcg/mL
    (d) prostate specific antigen (PSA), 0.003 mcg/mL
    (e) cholesterol, 1500 mcg/mL
13. 48.75 mg phenobarbital
14. (a) 0.025 to 0.3 mg and (b) 25,000 to 30,000 ng levothyroxine sodium
15. 5 g norgestrel
    0.5 g ethinyl estradiol
16. 0.02 mg miglitol
17. 6.25 g digoxin
18. 50 mg/mL
19. 5 mL
20. 1.65 mg pergolide mesylate
21. 1.2 g sertraline hydrochloride
22. 0.4 mL
23. 20 mg/mL morphine sulfate
24. 4.5 mL oxybate oral solution
25. 500 mg
26. 24.39 mL
27. 0.4 mg mometasone furoate, and 0.02 mg formoterol fumarate
28. 1.538 g streptomycin sulfate
29. 7.2 kg
30. 70.866 or 70.9 inches
    0.118 or 0.12 inches
31. 5000 mcg
32. 0.5 mL
33. 0.125 mL
34. 3.33 mL
35. (a) 2.27 g
    (b) 15,384 tablets
36. 1000 times
37. 1.85 inches × 1.89 inches
38. 200 doses
39. 8 tablets
40. 25 doses
41. 1.176 g nicotine
42. 2,500,000 rads
43. 1.69 inches and 43 mm
44. 5 µg/µL
45. 3,500,000,000 or 35×10^8
46. (c) 2.85 cg
47. (d) 163.6 mcg/lb/day
48. (c) 666 km/h
49. (b) 300 mcg/0.01 dL
50. (b) 0.037 mcg/mL