Kilogram and density

CHAPTER 1 1. List the seven SI base quantities, units, and symbols. TIME Second (s) 2. Give the correct SI derived units of the following quantities. Density Speed Acceleration Force Pressure kg/m3 Energy 3. Convert the following: ? m (Ans. 1. 22) a. 1. 22 x 10-9 km = b. 6. 523 x 10-4 nm = c. 2. 5x 10-9 nm3 = d. 30. 5 cm/? s = e. 9. 6 ng/mm2 = 4. Mm (Ans. 6. 523 x 10-19) mm3 (Ans. 2. 5 x 10-27) km/h (Ans. 1. 09 x 106) kg/m2 (Ans. 9. 6 x 10-6) Perform the following calculations and report each answer with the correct number of significant figures and units. b. 2. 457 m x 1. 2 m x 2. 45 m d. 3. 6050 cm x (24. 10 cm - 23. 0 cm) a. 3. 45 m – 3. 4 m c. (50. 214 g – 49. 93 g) x 1. 224 cm / 55. 22 cm3 e. 4. 0 x 102 cm – 3 cm f. ? 2. 7612g ? 2. 7601g ? 2. 20cm 3 g 26. 167m ? 83m 5. 100m h. 12. 64 cm – 48 mm + 0. 246 m (answer in meters) 7. 87 g/m2 (16. 1 m – 8. 44 m) i. Ans. a) 0. 1 m; b) 7. 2 m3; c) 6. 3 x 10-3 g/cm2; d) 3. 61 cm2; e) 4. 0 x 102 cm; f) 5. 0 x 10-4 g/cm3; g) 21. 4 g/m3; h) 0. 324 m ; i) 1. 03 g/cm3 5. The element beryllium is considered toxic at a concentration of 3. 0 x 10-12 g/cm3. What is this concentration in ng/m3? (Ans. 3. 0 x 103) 6. The average density of the earth is 5. 52 g/cm 3. What is its density in: a) ? /mm3? (Ans. 5. 52 x 103) b) lb/ft3? (1 lb = 453. 6 g; 1 in = 2. 54 cm) (Ans. 345) 7. Diamond has a density of 3. 513 g/cm3. The mass of diamonds is often measured in “ carats” where 1 carat = 200 mg. What is the volume (in cm 3) of a 2. 5 carat diamond? (Ans. 0. 14) The density of a liquid alcohol is 0. 79 g/cm 3. A tank measuring 3. 2 m x 0. 0020 km x 4. 1 mm is filled with the alcohol. What is the mass of the contents in kg? (Ans. 21) The density of gold is 19. 3 g/ cm 3. A 3. 4 mg sample of gold is hammered into a square foil that is 8. 6 ? 10? 6 cm thick. What is the length of a side of the square, in cm? Ans. 4. 5) A 14-karat gold ring contains 58. 3% gold and weighs 12. 41 g. If gold sells for $276.

00/ounce, what is the value of the gold in the ring? (1 oz = 28. 35 g) (Ans. $70. 4) A packing material has a density of 12. 8 kg/m 3. How many lbs of this material are needed to fill a 2. 00 ft3 box? (1lb = 454 g; 1in = 2. 54 cm) (Ans. 1. 60 lb) 8. 9. 10. 11. 12. A jogger runs at an average speed of 6. 5 mi/h. (1 mile = 1. 609 km; 1 in = 2. 54 cm) a) How fast is she running in m/s? (Ans. 2. 91 m/s) b) How many kilometers does she run in 98 min? (Ans. 17 km) c) How long should it take her to cover 12 km? (Ans. 1. h) d) If she starts a run at 11: 15 am, what time is it after she covers 4. 75 x 10 4 ft? (Ans 12: 38pm) 13. Manganese makes up 1. 3 x 10-4 percent by mass of the elements found in a normal healthy body. How many grams of manganese would be found in the body of person weighing 183 lbs? (2. 2 lb = 1. 0 kg) (Ans. 0. 11 g) If 5. 00 lbs of mercury cost $175 and mercury has a density of 13. 6 g/cm3, what is the cost of 2. 00 L of mercury? (1 lb = 454 g) (Ans. $ 2. 10 x 103) If a raindrop weighs 65 mg on average and 5. 1 x 10 5 raindrops fall on a lawn every minute. What mass (in kg) of rain falls on a lawn in 2. h? (Ans. 5. 0 x 103 kg) A concentrated sulfuric acid solution has a density of 1. 84 g/cm3 and contains is 95. 7% H2SO4 by mass. (Note: density of a solution means mass of solution divided by volume of solution.) a) How many grams of pure H 2SO4 are contained in 1. 00 gallon of this solution? 3. 785 L) (Ans. 6. 66 x 103) (1 gallon = 14. 15. 16. b) How many mm3 of this solution contain 100. 0 mg of pure H2SO4? (Ans 56. 8 mm3) 17. A gold alloy has a density of 12. 4 g/ml and contains 75. 0% gold by mass. Calculate the volume of this alloy that can be made from 255 g of pure gold. (Ans. 27. 4 mL) 18.

Whole milk contains 8. 0 % butterfat by mass. If 5. 0 g butterfat supplies 15 calories, how many calories are contained in 1. 45 gallons of whole milk (density of milk = 0. 8 g/ml; 1 gallon = 3. 785 L) (Ans. 1. 1 x 103 cal) Earth’s oceans have an average depth of 3. 800 x 10 3 m, a total area of 3. 63 x 108 km2, and an average concentration of dissolved gold equal to 5. 80 ng/L. 19. a) Caculate the volume of the oceans in cm3. (Ans. 1. 38 x 1024) b) How many kilograms of gold are in the oceans? (Ans. 8. 00 x 109 kg) c) If a recent price of gold was $370. 00/troy oz, what is the value of gold in the oceans? 1 troy oz = 31. 1g) (Ans. $ 9. 52 x 1013) 20. When combining the masses 0. 0562 kg, 124. 213 g and 1635 mg, the total should be reported to _____ significant figures. (Ans. 4) 21. What is the best answer to report for the following mathematical operation? 15. 415 ? 14. 515 + 0. 0402597 (Ans. 0. 300) 3. 465 22. How many vials of volume 24. 2 mm 3 can be filled from a bulk sample of 0. 525 kg of a liquid of density 0. 900 g/cm3? (Ans. 2. 41 x 104) It is estimated that uranium is relatively common in the earth’s crust, occurring in amounts of 4 g/metric ton. A metric ton is 1000 kg.

At this concentration, what mass of uranium is present in 1. 0 mg of the earth’s crust? A. B. C. D. E. 4 nanograms 4 micrograms 4 milligrams 4 x 10-5 g 4 centigrams 23. 24. Which of the following are intensive properties? W. mass X. density Y. volume Z. boiling point Which one of the following is not a physical property of water? A. B. C. D. E. It exists in solid, liquid, and gaseous forms It reacts with sodium to form sodium hydroxide It is clear and colorless It freezes at 100? C at 1 atm pressure It boils at 100? C at 1 atm pressure 25. ----------ANSWERS: 23 A; 24 X and Z; 25 B.