

**Given:** specific heat of water = 1.00 cal/g·°C

Heat of fusion of H<sub>2</sub>O = 80. cal/g      Heat of vaporization of H<sub>2</sub>O = 540 cal/g

Caloric values:      carbohydrate, 4 kcal/g      fat, 9 kcal/g      protein, 4 kcal/g

**PART 1. MULTIPLE CHOICE and FILL IN THE BLANK.** Circle the best answer or fill in the blank. **CAUTION:** Some questions may appear similar to homework questions but are probably not exactly the same.

1. The state of matter that has a definite volume and definite shape is the \_\_\_\_\_ . (2 pts.)
2. Vaporization is the change of state from \_\_\_\_\_ to \_\_\_\_\_ . (2 pts.)
3. In the Scientific Method, what is a “theory” and what is a “hypothesis”? (4 pts.)
4. The changing of a gas into a solid is called \_\_\_\_\_ . (2 pts.)
5. \_\_\_\_\_ is the amount of heat needed to raise the temperature of 1 g of a substance by 1°C. (2 pts.)
6. What is the definition of the Heat of Fusion? (2 pts.)

7. What is the definition of density? Please also show the equation. (2 pts.)

8. The Last Significant Place (LSP) in the number 3200 is in the \_\_\_\_\_ place.  
You may also point to the LSP. (1 pts.)

9. Fill in the blanks with the conversion factor.

\_\_\_\_\_ micrometers = \_\_\_\_\_ meters (1 pts.)

10. Fill in the blanks with the conversion factor.

\_\_\_\_\_ milliliters = \_\_\_\_\_ liter. (1 pt.)

11. Write the number 5400 in scientific notation. (1 pt.) \_\_\_\_\_

12. Write the number 0.0073 in scientific notation. (1 pt.) \_\_\_\_\_

13. What is  $2.8 \times 10^4$  written in conventional decimal notation? (1 pt.) \_\_\_\_\_

14. Identify how many significant figures are in each of the following numbers: (1 pt. each)

a) 7000 \_\_\_\_\_ b) 0.030 \_\_\_\_\_

c) 40.0 \_\_\_\_\_ d) 40 \_\_\_\_\_

e) 520 \_\_\_\_\_

15. Identify each of the following as measurements of length, area, volume, mass, density, time, or temperature: (1 pt. each)

a) 1800 ng \_\_\_\_\_

b) 8 dm \_\_\_\_\_

c)  $2.7 \text{ g/cm}^3$  \_\_\_\_\_

d)  $170 \text{ }\mu\text{m}^2$  \_\_\_\_\_

e)  $15 \text{ mm}^3$  \_\_\_\_\_

16. What is the best answer to the following expression?  $(11.2 + 3.04 + 121)$   
(2 pts.) (Follow significant figure rules.)

17. What is the best answer to the following expression?  $(151-120) =$  \_\_\_\_\_  
(2 pts.)

18. What is the best answer to the following expression?  $\frac{(0.21)(70)}{(0.0035)}$  (2 pts.)

19. What is the best answer to the following expression?  $\frac{(12.11-12.01)}{583}$  (2 pts.)

20. Fill in the **chemical name** of the given chemical symbol. (1 pt. each)

- |             |             |
|-------------|-------------|
| a) Mn _____ | b) Na _____ |
| c) Ag _____ | d) Cl _____ |
| e) Pt _____ | f) Ti _____ |
| g) S _____  | h) B _____  |

21. Fill in the **chemical symbol** of the given chemical name. (1 pt. each)

- |                    |                   |
|--------------------|-------------------|
| a) gold _____      | b) helium _____   |
| c) potassium _____ | d) arsenic _____  |
| e) barium _____    | f) fluorine _____ |
| g) iron _____      | h) copper _____   |

**PART 2. PROBLEMS. Show all units. Show all answers to correct significant figures. SHOW WORK for Partial Credit.**

22. )  $82 \text{ K} = \underline{\hspace{2cm}} \text{ } ^\circ\text{C}.$  (3 pts.)

23. )  $103^\circ\text{F} = \underline{\hspace{2cm}} \text{ } ^\circ\text{C}.$  (4 pts.)

24. )  $820 \text{ mg} = \underline{\hspace{2cm}} \text{ g}$  (3 pts.)

25. )  $84 \text{ cm} = \underline{\hspace{2cm}} \text{ ft}.$  (4 pts.)

26. )  $7400 \text{ } \mu\text{L} = \underline{\hspace{2cm}} \text{ mL}$  (4 pts.)

27. ) A sample is weighed in lab giving 42.223 g, and the volume was measured to be 3.18 mL. What is the density of this sample? (4 pts.)

28. ) Gold has a density of 19.3 g/mL. What is the mass of a 10.0 mL sample of gold? (5 pts)

29. ) A fish tank holds 71.8 L of water. What is this volume in cubic feet? (5 pts.)

30. ) How many kilocalories of heat must be added to change 73.0 g of water at 100°C to gas at 100°C? (4 pts.)
31. ) How many kilocalories of heat must be added to heat a 82.0 g sample of water from 22.0°C to 100.0°C? (4 points)
32. ) A popular meal replacement bar contains 2.5 g of fat, 4.0 g of protein, and 22 g of carbohydrate. How many kilocalories does this serving have? How many Food Calories is this? Please report answers to 3 sig. figs. (4 pts.)