

Homework – Chapter 02 Chemistry 51

Los Angeles Mission College

- 2.63 Calculate each of the following temperatures in degrees Celsius:
- The highest recorded temperature in the continental United States was 134 °F in Death Valley, California, on July 10, 1913.
 - The lowest recorded temperature in the continental United States was -69.7 °F in Rodgers Pass, Montana, January 20, 1954.
- 2.64 Calculate each of the following temperatures in degrees Fahrenheit:
- The highest recorded temperature in the world was 58.0 °C in El Azizia, Libya, on September 13, 1922.
 - The lowest recorded temperature in the world was -89.2 °C in Vostok, Antarctica, on July 21, 1983.
- 2.65 What is -15 °F in degrees Celsius and in kelvins?
- 2.66 The highest recorded body temperature that a person has survived is 46.5 °C. Calculate that temperature in degrees Fahrenheit and in kelvins.
- 2.67 Classify each of the following as an element, a compound, or a mixture:
- carbon in pencils
 - carbon dioxide (CO₂) we exhale
 - orange juice
 - neon gas in lights
 - salad dressing of oil and vinegar
- 2.68 Classify each of the following as a homogeneous or heterogeneous mixture:
- hot fudge sundae
 - herbal tea
 - vegetable oil
 - water and sand
 - mustard
- 2.69 Identify each of the following as a solid, a liquid, or a gas:
- vitamin tablets in a bottle
 - helium in a balloon
 - milk in a glass
 - the air you breathe
 - charcoal briquettes on a barbecue
- 2.70 Identify each of the following as a solid, a liquid, or a gas:
- popcorn in a bag
 - water in a garden hose
 - a computer mouse
 - air in a tire
 - hot tea
- 2.71 Identify each of the following as a physical or chemical property:
- Gold is shiny.
 - Gold melts at 1064 °C.
 - Gold is a good conductor of electricity.
 - When gold reacts with yellow sulfur, a black compound forms.
- 2.72 Identify each of the following as a physical or chemical property of a candle:
- The candle is 20 cm high with a diameter of 3 cm.
 - The candle burns.
 - The wax of the candle softens on a hot day.
 - The candle is blue.
- 2.73 Identify each of the following as a physical or chemical change:
- A plant grows a new leaf.
 - Chocolate is melted for a dessert.
 - Wood is chopped for the fireplace.
 - Wood burns in a fireplace.
- 2.74 Identify each of the following as a physical or chemical change:
- A medication tablet is broken in two.
 - Carrots are grated for use in a salad.
 - Malt undergoes fermentation to make beer.
 - A copper pipe reacts with air and turns green.
- 2.75 A hot-water bottle contains 725 g of water at 65 °C. If the water cools to body temperature (37 °C), how many kilocalories of heat could be transferred to sore muscles?
- 2.76 A pitcher containing 0.75 L of water at 4 °C is removed from the refrigerator. How many kilojoules are needed to warm the water to a room temperature of 22 °C?
- 2.77 Calculate the Cal (kcal) in 1 cup of whole milk: 12 g of carbohydrate, 8 g of fat, and 8 g of protein. (Round off the answers to the tens place).
- 2.78 Calculate the Cal (kcal) in 1/2 cup of soft ice cream that contains 18 g of carbohydrate, 11 g of fat, and 4 g of protein. (Round off the answers to the tens place).

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Answers...

2.63 Calculate each of the following temperatures in degrees Celsius: (Given that $1.8T_C + 32 = T_F$)

- a. The highest recorded temperature in the continental United States was 134°F in Death Valley, California, on July 10, 1913.

$$\frac{9}{5}T_C + 32^\circ = T_F$$

$$T_C = \frac{5}{9}(T_F - 32^\circ)$$

$$T_C = \frac{5}{9}(134^\circ - 32^\circ)$$

$$T_C = \frac{5}{9} * 102^\circ$$

$$T_C = 56.66666^\circ$$

$$T_C = 56.7^\circ\text{C}$$

- b. The lowest recorded temperature in the continental United States was -69.7°F in Rodgers Pass, Montana, January 20, 1954.

$$\frac{9}{5}T_C + 32^\circ = T_F$$

$$T_C = \frac{5}{9}(T_F - 32^\circ)$$

$$T_C = \frac{5}{9}((-69.7^\circ) - 32^\circ)$$

$$T_C = \frac{5}{9} * (-101.7^\circ)$$

$$T_C = -56.5^\circ$$

$$T_C = -56.50^\circ\text{C}$$

2.64 Calculate each of the following temperatures in degrees Fahrenheit: (Given that $1.8T_C + 32 = T_F$)

- a. The highest recorded temperature in the world was 58.0°C in El Azizia, Libya, on September 13, 1922.

$$\frac{9}{5}T_C + 32^\circ = T_F$$

$$\frac{9}{5}(58.0^\circ) + 32^\circ = T_F$$

$$104.4^\circ + 32^\circ = T_F$$

$$104^\circ + 32^\circ = T_F$$

$$T_F = 136^\circ\text{F}$$

- b. The lowest recorded temperature in the world was -89.2°C in Vostok, Antarctica, on July 21, 1983.

$$\frac{9}{5}T_C + 32^\circ = T_F$$

$$\frac{9}{5}(-89.2^\circ) + 32^\circ = T_F$$

$$-161 + 32^\circ = T_F$$

$$-161^\circ + 32^\circ = T_F$$

$$T_F = -129^\circ\text{F}$$

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2.65 What is -15°F in degrees Celsius and in kelvins? (Given that $1.8T_C + 32 = T_F$)

$$\frac{9}{5}T_C + 32^{\circ} = T_F$$

$$T_C = \frac{5}{9}(T_F - 32)$$

$$T_C = \frac{5}{9}(-15 - 32)$$

$$T_C = -\frac{5}{9}(47)$$

$$T_C = -26^{\circ}\text{C}$$

$$T_K = T_C + 273$$

$$T_K = (-26^{\circ}\text{C}) + 273$$

$$T_K = 247\text{ K}$$

2.66 The highest recorded body temperature that a person has survived is 46.5°C . Calculate that temperature in degrees Fahrenheit and in kelvins. (Given that $1.8T_C + 32 = T_F$)

$$\frac{9}{5}T_C + 32^{\circ} = T_F$$

$$\frac{9}{5}(46.5^{\circ}) + 32^{\circ} = T_F$$

$$83.7^{\circ} + 32^{\circ} = T_F$$

$$T_F = 116^{\circ}\text{F}$$

$$T_K = T_C + 273$$

$$T_K = (46.5^{\circ}\text{C}) + 273$$

$$T_K = 319\text{ K}$$

2.67 Classify each of the following as an element, a compound, or a mixture:

- a. carbon in pencils.....element
- b. carbon dioxide (CO_2) we exhalecompound
- c. orange juicemixture
- d. neon gas in lights.....element
- e. salad dressing of oil and vinegarmixture

2.68 Classify each of the following as a homogeneous or heterogeneous mixture:

- a. hot fudge sundae.....heterogeneous mixture
- b. herbal tea.....homogeneous mixture
- c. vegetable oil.....homogeneous mixture
- d. water and sand.....heterogeneous mixture
- e. mustard.....heterogeneous mixture

2.69 Identify each of the following as a solid, a liquid, or a gas:

- a. vitamin tablets in a bottleSolid
- b. helium in a balloon.....Gas
- c. milk in a glassLiquid
- d. the air you breathe.....Gas
- e. charcoal briquettes on a barbecue.....Solid

2.70 Identify each of the following as a solid, a liquid, or a gas:

- a. popcorn in a bagSolid
- b. water in a garden hoseLiquid
- c. a computer mouseSolid
- d. air in a tireGas
- e. hot teaLiquid

2.71 Identify each of the following as a physical or chemical property:

- a. Gold is shinyphysical
- b. Gold melts at 1064 °Cphysical
- c. Gold is a good conductor of electricityphysical
- d. When gold reacts with yellow sulfur, a black compound formschemical property

2.72 Identify each of the following as a physical or chemical property of a candle:

- a. The candle is 20 cm high with a diameter of 3 cmphysical
- b. The candle burnschemical property
- c. The wax of the candle softens on a hot dayphysical
- d. The candle is bluephysical

2.73 Identify each of the following as a physical or chemical change:

- a. A plant grows a new leafchemical change
- b. Chocolate is melted for a dessertphysical
- c. Wood is chopped for the fireplacephysical
- d. Wood burns in a fireplacechemical change

2.74 Identify each of the following as a physical or chemical change:

- a. A medication tablet is broken in twophysical
- b. Carrots are grated for use in a saladphysical
- c. Malt undergoes fermentation to make beerchemical change
- d. A copper pipe reacts with air and turns greenchemical change

2.75 A hot-water bottle contains 725 g of water at 65°C. If the water cools to body temperature (37°C), how many kilocalories of heat could be transferred to sore muscles? (Given 1 cal = 1 g°C)

$$Q = mc\Delta t$$

$$Q = 725g * \frac{1 \text{ cal}}{g^\circ\text{C}} * (37^\circ\text{C} - 65^\circ\text{C})$$

$$Q = -20,300 \text{ cal}$$

$$Q = -20,000 \text{ cal}$$

$$Q = -20,000 \text{ cal} * \frac{1 \text{ Kcal}}{1,000 \text{ cal}}$$

$$Q = -20 \text{ Kcal (Heat Lost from hot water bottle)}$$

$$Q = 20 \text{ Kcal (Heat transferred to sore muscles)}$$

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2.76 A pitcher containing 0.75 L of water at 4°C is removed from the refrigerator. How many kilojoules are needed to warm the water to a room temperature of 22 °C? (Given 1 cal = 1 g°C & 1 cal = 4.18400 joules)

$$Q = mc\Delta t$$

$$Q = 0.75L * \frac{1000 \text{ ml}}{L} * \frac{1g}{1ml} * \frac{1 \text{ cal}}{g^{\circ}\text{C}} * (22^{\circ}\text{C} - 4^{\circ}\text{C}) * \frac{4.184 \text{ Joules}}{\text{cal}} * \frac{1 \text{ kJoules}}{1,000 \text{ Joules}}$$

$$Q = 56.484 \text{ kJoules}$$

$$Q = 56 \text{ kJoules}$$

Q = 56 kJ (Heat needed to warm the water)

2.77 Calculate the Cal (kcal) in 1 cup of whole milk: 12 g of carbohydrate, 8 g of fat, and 8 g of protein. (Round off the answers to the tens place). (Given that: Carbohydrate 4 kcal/g, Fat 9 kcal/g, Protein 4 kcal/g)

	4 Kcal/g	*	12 g	Carbohydrates
	9 Kcal/g	*	8 g	Fat
+	4 Kcal/g	*	8 g	Protein
<hr/>				
	50 Kcal			Carbohydrates
	70 Kcal			Fat
+	30 Kcal			Protein
<hr/>				
	150 Kcal			
<hr/>				
	150 Cal			

2.78 Calculate the Cal (kcal) in 1/2 cup of soft ice cream that contains 18 g of carbohydrate, 11 g of fat, and 4 g of protein. (Round off the answers to the tens place). (Given that: Carbohydrate 4 kcal/g, Fat 9 kcal/g, Protein 4 kcal/g)

	4 Kcal/g	*	18 g	Carbohydrates
	9 Kcal/g	*	11 g	Fat
+	4 Kcal/g	*	4 g	Protein
<hr/>				
	70 Kcal			Carbohydrates
	100 Kcal			Fat
+	20 Kcal			Protein
<hr/>				
	190 Kcal			
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	200 Kcal			
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	200 Cal			