CHEM 130
Problem Set Ch.1

Key begins on page 3.

1. In each case, tell whether the underlined property is a **physical** or **chemical** property.

a) the normal color of bromine is red-orange _____

b) iron is transformed into rust in the presence of air and water. _____

c) Dynamite can explode when it interacts with oxygen. _____

d) the density of uranium is 19.07 g/cm^3 _____

e) aluminum metal melts at 660°C. _____

2. Indicate the number of significant figures in each of the following expressions.

a) 0.00070 _____

b) 8.0×10^3 _____

c) 1.002 _____

d) 1,802 _____

e) 760.0 _____

3. The maximum speed limit in the United States is 65 mph. What is this speed in km/hr.

_____

4. If the density of water is 1.00 g/mL, what is the value in pounds/in^3 ? (1 in^3 = 16.4 mL)

_____

5. Common sugar has a density of 1.587 g/cm^3. What would be the volume (in cm^3) of 1.00 pound of sugar?

_____

6. One quart of olive oil has a mass of 820.0 grams. Calculate its density in g/mL.

_____

7. Briefly explain the difference between **kinetic energy** and **potential energy**.

8. Briefly describe the difference between **accuracy** and **precision**.

9. Oxygen freezes to a solid at -218^{o}C. What is this temperature in ^{o}F?

_____

10. An iron skillet weighing 1.51 kg is heated on a stove to 178^{o}C. Suppose the skillet is cooled to 21^{o}C. How many joules must be removed to effect this cooling? (sp.ht. of iron = 0.450 J/g^{o})

_____

KEY.

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Problem Set Ch.1

1. In each case, tell whether the underlined property is a **physical** or **chemical** property.

a) the normal color of bromine is red-orange — physical

b) iron is transformed into rust in the presence of air and water. — chemical

c) Dynamite can explode when it interacts with oxygen. — chemical

d) the density of uranium is 19.07 g/cm^3 — physical

e) aluminum metal melts at 660°C. — physical

2. Indicate the number of significant figures in each of the following expressions.

a) 0.00070 — 2

b) 8.0 x 10^3 — 2

c) 1.002 — 4

d) 1,802 — 4

e) 760.0 — 4

3. The maximum speed limit in the United States is 65 mph. What is this speed in km/hr.

$$65\ \frac{mi}{HR}\left(\frac{5280\ ft}{1\ mi}\right)\left(\frac{12\ in}{1\ ft}\right)\left(\frac{2.54\ cm}{1\ in}\right)\left(\frac{1\ m}{100\ cm}\right)\left(\frac{1\ km}{1000\ m}\right) = 105$$

105 km/HR.

4. If the density of water is 1.00 g/mL, what is the value in pounds/in^3 ? (1 in^3 = 16.4 mL)

$$1.00\ \frac{g}{mL}\left(\frac{1\ lb.}{454\ g}\right)\left(\frac{16.4\ mL}{1\ in^3}\right) = 0.0361$$

0.0361 $\frac{\text{POUNDS}}{IN^3}$

5. Common sugar has a density of 1.587 g/cm^3. What would be the volume (in cm^3) of 1.00 pound of sugar?

1 lb = 454 g

$$V = \frac{m}{D} = \frac{454\ g}{1.587\ g/cm^3} = 286\ cm^3$$

286 cm^3

6. One quart of olive oil has a mass of 820.0 grams. Calculate its density in g/mL.

(946 mL)

$$D = \frac{m}{V} = \frac{820.0\,g}{946\,mL} = 0.867\ g/mL$$

0.867 g/mL

7. Briefly explain the difference between **kinetic energy** and **potential energy**.

POTENTIAL ENERGY - STORED ENERGY

KINETIC ENERGY - ENERGY OF MOTION

8. Briefly describe the difference between **accuracy** and **precision**.

IN TEXT (OR LAB MANUAL)

9. Oxygen freezes to a solid at -218°C. What is this temperature in °F?

$$°F = (1.8)°C + 32$$

$$= (1.8)(-218) + 32 = -360.4°F$$

-360.4 °F

10. An iron skillet weighing 1.51 kg is heated on a stove to 178°C. Suppose the skillet is cooled to 21°C. How many joules must be removed to effect this cooling? (sp.ht. of iron = 0.450 J/g°)

$$q = (\text{SP.HT } J/g°C)(\text{MASS, g})(178° - 21°)$$

q (HEAT); ΔT

$$= (0.450\ J/g°)(1510\,g)(157°)$$

$$= 106,681.5 \text{ Joules}$$

~107,000 Joules

(3 SIG. FIGS)