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1.

The heat of combustion of *n*-octane, C₈H₁₈, is -4.79×10^7 J/kg. What is the heat of combustion expressed in kJ/g?

Student Response

1. -4.79×10^3 kJ/g
2. -4.79×10^1 kJ/g
3. -4.79×10^4 kJ/g
4. -4.79×10^{10} kJ/g
5. -4.79×10^7 kJ/g

2.

The number of significant figures in 9.3002×10^{-2} g is

Student Response

1. 3.
2. 4.
3. 5.
4. 6.
5. 7.

3.

One-hundredth of a centigram is

Student Response

1. 0.01 g.
2. 100 g.
3. 0.00001 g.
4. 0.0001 g.
5. 0.001 g.

4.

The heat of combustion of benzoic acid is -26.4 kJ/g. What is the heat of combustion expressed in joules per kilogram?

Student Response

1. -2.64×10^7 J/kg
2. -2.64×10^4 J/kg
3. -2.64×10^1 J/kg

4. -2.64×10^{10} J/kg

5. -2.64×10^3 J/kg

5.

The smallest identifying unit of an element is

Student Response

1. a photon.
2. a mole.
3. an atom.
4. anti-matter.
5. a proton.

6.

Weight is

Student Response

- A. measured in moles.
- B. a measurement of the gravitational force on a body.
- C. measured in pounds according to the SI system of measurements.
- D. a measure of the amount of matter in a body.
- E. none of the above.

7.

How many scruples are there in 25.8 lb? Which of the following represents a correct setup to solve the problem? Some equivalents that may be helpful are given below:

1.00 scruple = 20.0 grains

1.00 g = 15.4 grains

1.00 grain = 0.0648 g

1.00 lb = 453.6 g

1.00 kg = 2.205 lb

Student Response

1. $\frac{1.00 \text{ scruple}}{20.0 \text{ grains}} \times \frac{15.4 \text{ grains}}{1.00 \text{ g}} \times \frac{453.6 \text{ g}}{1.00 \text{ lb}} \times 25.8 \text{ lb}$
2. $\frac{20.0 \text{ grains}}{1.00 \text{ scruple}} \times \frac{1.00 \text{ g}}{15.4 \text{ grains}} \times \frac{1.00 \text{ grain}}{0.0648 \text{ g}} \times \frac{453.6 \text{ g}}{1.00 \text{ lb}} \times 25.8 \text{ lb}$
3. $\frac{1.00 \text{ scruple}}{20.0 \text{ grains}} \times \frac{15.4 \text{ grains}}{1.00 \text{ g}} \times \frac{0.0648 \text{ g}}{1.00 \text{ grain}} \times \frac{453.6 \text{ g}}{1.00 \text{ lb}} \times 25.8 \text{ lb}$
4. $\frac{1.00 \text{ scruple}}{20.0 \text{ grains}} \times \frac{1.00 \text{ grain}}{0.0648 \text{ g}} \times \frac{1.00 \text{ kg}}{2.205 \text{ lb}} \times \frac{1.00 \text{ lb}}{453.6 \text{ g}} \times \frac{1000 \text{ g}}{1 \text{ kg}} \times 25.8 \text{ lb}$
5. $\frac{1.00 \text{ scruple}}{20.0 \text{ grains}} \times \frac{1.00 \text{ grain}}{0.0648 \text{ g}} \times \frac{1.00 \text{ kg}}{2.205 \text{ lb}} \times 25.8 \text{ lb}$

8.

The distance between atoms is sometimes given in picometers where 1 pm is equivalent to 1×10^{-12} m. If the distance between the layers of atoms in a particular compound is given as 340 pm, what is the distance in cm?

Student Response

1. 3.40×10^{-6} cm
2. 3.40×10^{-8} cm
3. 3.40×10^{-10} cm
4. 3.40×10^{-12} cm
5. 3.40×10^{-14} cm

9.

Convert 16.9 μ L to L.

Student Response

1. 1.69×10^{-11} L
2. 1.69×10^7 L
3. 1.69×10^{-5} L
4. 1.69×10^{10} L
5. 1.69×10^{-8} L

10.

What is the mass of H_2SO_4 in a 48.1-cm^3 sample of sulfuric acid that has a density of 1.44 g/cm^3 and consists of 46.2% H_2SO_4 ?

Student Response

1. 150 g
2. 1.38 g
3. 32.0 g
4. 69.3 g
5. 15.4 g

11.

The speed of a car is 52.7 miles per hour. What is its speed in units of km/s? (1 km = 0.6214 mi)

Student Response

1. 9.10×10^{-3} km/s
2. 2.36×10^{-2} km/s
3. 3.05×10^5 km/s
4. 1.18×10^5 km/s
5. 1.41×10^0 km/s

12.

Which of the following sets of units is *not* in the order of increasing size?

Student Response

1. cPa < dPa < kPa
2. μL < dL < L
3. μg < mg < cg
4. ns < ms < s
5. pm < mm < nm

13.

How many rundlets are there in 226 in³? Some conversion factors that may be useful are given below:

- 1.00 barrel = 42.0 gallons
- 1.00 gallon = 231 in³
- 1.00 gallon = 3.78 liters
- 1.00 rundlet = 6.81×10^4 mL
- 1.00 liter = 1000.0 mL
- 1.00 barrel = 4.00 firkins

Student Response

1. 941000
2. 0.543
3. 13,400,000
4. 25,200
5. 0.0543

14.

A certain substance makes up 2.2×10^{-4} percent by mass of a normal healthy human being. How many grams of that substance would be found in the body of a person weighing 140 lb? (1.0 kg = 2.2 lb.)

Student Response

1. 0.14 g
2. 1.4 g
3. 310 g
4. 140 g
5. 0.7 g

15.

What is the best answer to report for $\frac{3.478 \text{ g} \times 1.164 \text{ g}}{2.00 \text{ mL}} + 0.402 \text{ g/mL}$?

Student Response

1. 2.43 g/mL
2. 3 g/mL

3. 2.4 g/mL
4. 2.4262 g/mL
5. 2.426 g/mL

16.

Which of the following is *not* a step of the scientific method?

Student Response

1. Making observations
2. Creating a hypothesis
3. Designing experiments
4. Writing a grant
5. Formulating a question

17.

What is the correct answer to the following expression?

$$3.54 \times 10^{-10} + 2.68 \times 10^{-12}$$

Student Response

- A. 3.5668×10^{-10}
- B. 3.567×10^{-10}
- C. 3.57×10^{-10}
- D. 3.6×10^{-10}
- E. None of the above

18.

The number of significant figures in 0.074100×10^{-4} is

Student Response

1. 6.
2. 5.
3. 3.
4. 4.
5. 7.

19.

Convert 47.4 m^3 to pm^3 .

Student Response

1. $4.74 \times 10^{13} \text{ pm}^3$
2. $4.74 \times 10^{-23} \text{ pm}^3$
3. $4.74 \times 10^{-35} \text{ pm}^3$
4. $4.74 \times 10^{25} \text{ pm}^3$

5. $4.74 \times 10^{37} \text{ pm}^3$

20.

Which is the largest mass?

**Student
Response**

1. 10 dg
2. 10 ng
3. 10 cg
4. 10 pg
5. 10 mg