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1.

The heat of combustion of *n*-octane, C_8H_{18}, 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. $\dfrac{1.00\ \text{scruple}}{20.0\ \text{grains}} \times \dfrac{1.54\ \text{grains}}{1.00\ \text{g}} \times \dfrac{453.6\ \text{g}}{1.00\ \text{lb}} \times 25.8\ \text{lb}$

2. $\dfrac{20.0\ \text{grains}}{1.00\ \text{scruple}} \times \dfrac{1.00\ \text{g}}{15.4\ \text{grains}} \times \dfrac{1.00\ \text{grain}}{0.0648\ \text{g}} \times \dfrac{453.6\ \text{g}}{1.00\ \text{lb}} \times 25.8\ \text{lb}$

3. $\dfrac{1.00\ \text{scruple}}{20.0\ \text{grains}} \times \dfrac{15.4\ \text{grains}}{1.00\ \text{g}} \times \dfrac{0.0648\ \text{g}}{1.00\ \text{grain}} \times \dfrac{453.6\ \text{g}}{1.00\ \text{lb}} \times 25.8\ \text{lb}$

4. $\dfrac{1.00\ \text{scruple}}{20.0\ \text{grains}} \times \dfrac{1.00\ \text{grain}}{0.0648\ \text{g}} \times \dfrac{1.00\ \text{kg}}{2.205\ \text{lb}} \times \dfrac{1.00\ \text{lb}}{453.6\ \text{g}} \times \dfrac{1000\ \text{g}}{1\ \text{kg}} \times 25.8\ \text{lb}$

5. $\dfrac{1.00\ \text{scruple}}{20.0\ \text{grains}} \times \dfrac{1.00\ \text{grain}}{0.0648\ \text{g}} \times \dfrac{1.00\ \text{kg}}{2.205\ \text{lb}} \times 25.8\ \text{lb}$

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 μL 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 in^3? Some conversion factors that may be useful are given below:
1.00 barrel = 42.0 gallons
1.00 gallon = 231 in^3
1.00 gallon = 3.78 liters
1.00 rundlet = 6.81 $\times 10^4$ 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 $\times 10^{-4}$ 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 $\dfrac{3.478\,\text{g} \times 1.164\,\text{g}}{2.00\,\text{mL}}$ + 0.402 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. 4.74×10^{13} pm^3
2. 4.74×10^{-23} pm^3
3. 4.74×10^{-35} pm^3
4. 4.74×10^{25} pm^3
5. 4.74×10^{37} 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