Unit I Answers

Pg 19

8. 22 kg
9. a) 17,300 ms   b) 0.00000256 km   c) 5.67 g   d) 0.00513 km
10. 0.0173 L
11. about 1081 beans
12. 11 g/cm^3

Pgs 31-34

1. Chemistry is the study of matter and it's changes.
6. Mass is expressed in grams or kilograms (slugs in the English system), weight is expressed in newtons (pounds in the English system).
10. Density is the ratio of mass to unit of volume. The property of density may be observed without changing the substance.
30. a) 2400 cm   b) 3 L   c) 1.7 kg
31. a) 0.357 L   b) 2.5 x 10^7 mg   c) 35 L   d) 2460 cm^3 e) 2.5 x 10^{-4} g   f) 2.5 x 10^{-7} kg
    g) 1500 ms   h) 10,500 mmol
32. 150,000 m
36. 10.6 g/cm^3 37. 151 g   38. 2.5 x 10^2 mL
46. The mass increases as the volume increases.
47. The slope of each line is the density of the metal.
48. Metal A: about 10.5 g/cm^3; Metal B: about 7.9 g/cm^3
49. Metal A: silver; Metal B: iron

Pg 45

7. a) 373 K   b) 1058 K   c) 273 K   d) 236 K
8. a) 0°C   b) 927 °C   c) –273 °C   d) 273 °C
13. The temperature of the substance will not increase if it is changing state.

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1. A hypothesis is an educated guess, an explanation that has not been well tested. A theory is a thoroughly tested explanation.

2. The scientific method is a system of solving problems based on colleting data, forming explanations, testing the explanations and reworking the explanations to better model the observations.

4. A law is s summary of many observations, often in math form. It does not explain.

5. So that the only thing that is can change it outcome (the difference between the control on the test) is the ONE variable being tested.

6. There is always more than one way to solve a problem. The more complicated the problem the more variations possible for the solution. The scientific method is a method, a technique, not an algorithm.

7. For a hypothesis to become a theory it must survive many different tests (not just the same test over and over).

8. A theory is an explanation. Explanations do not tell us everything. Explanations can become better and more detailed.

9. Rejected hypothesis often give ideas for better explanations as well as providing a record of new tests and results.

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1. Accuracy is how close a single measurement is to the true value. Precision is how close together multiple measurements of the same object are to each other.

2. Scientific notation makes it easier to write very large and small numbers. More than 25 years ago scientific notation also made it possible to use slide rules for multiplication and division.

3. Zeros are significant when they do something besides hold the decimal point away from other digits.

4. The number of significant digits indicates the degree of uncertainty in a measurement.

5. Measurements of the same thing can be very close in value but still vary in measurable amounts from the true value. An example: If one were to make measurements with a ruler that had and end cut off, one might get measurements very close to each other but the true value would be different.

6. a) 2.79 m^2 b) 29.74 g/mL   c) 47.10 g   d) 32.86 L

7. 0.30 J/g K

8. a) 4.42 g/mL   b) 24.78 mm^3 c) 1.4×10^5 kJ/s

9. 5.2×10^3 s

Pgs 66-70

6. A theory is an **explanation** based on observations, many experiments and reasoning. A law is a summary **statement** of many experimental results and observations.

7. Accuracy is how close a single measurement is to the actual value. Precision is the repeatability of a measurement.

8. Significant figures include all of the digits known with certainty as well as one digit that is estimated. Significant figures are the digits that have been measured, including the one that is "read between the lines".

32. 0.069 J/g K   33. 4.8×10^3 J   34. 240 J   35. 13 °C   36. 146 J

47. $1.4 \times 10^6 \text{ m}^3$ 48. 1.43 g/cm^3 49. 9.47×10^{-4} g; 9.47×10^{-7} kg

50. a) 6.59×10^7 m   b) 5.7×10^{-3} km   c) 2.2×10^4 mg   d) 3.7×10^{-6} kg

51. a) 4500 g   b) 0.00605 m   c) 3,115,000 km   d) 0.000 000 019 9 cm

52. a) 8×10^8 m   b) 9.5×10^{-4} m   c) 6.02×10^4 L   d) 1.5×10^{-3} kg

53. a) 98,000 mm   b) 0.000 000 238 m   c) 1115 g   d) 0.000 000 000 15 kg

54. a) 2.6×10^{14} b) 6.42×10^{-7} c) $3.4 \times 10^8 \text{ cm}^2$ d) $3.3 \times 10^{-3} \text{ kg/cm}^3$

55. a) 133 m^2 b) 210 L/min c) 105 m/s d) 0.0013 km^2

56. It has been observed repeatedly and it does not attempt to explain why the sun sets in the west.

57. 76.4 m^3