

CHEM 1
Problem Set Ch. 1

answer key

1. Which of the following statements about phosphorus describe chemical properties? Which describe physical properties?

- a) The common form of phosphorus is white _____
- b) Phosphorus melts at 44.1 °C. _____
- c) Phosphorus catches fire spontaneously in air. _____
- d) Phosphorus can be stored underwater. _____

2. Define the hypothesis, law, and theory.

3. Classify each of the following with a brief explanation as an element, a compound, a homogeneous mixture or a heterogeneous mixture?

- a) sea water _____
- b) helium gas _____
- c) a milkshake _____
- d) sodium chloride (table salt) _____
- e) a bottle of soft drink _____

4. Carry out the following operations and express the answer with the appropriate number of significant figures:

- a) $324.55 - (6104.5/22.3)$
- b) $[(285.3 \times 10^6) - (12.000 \times 10^3)] \times 22.8954$
- c) $(0.0045 \times 30,000.0) + (283 \times 12)$
- d) $869 \times [1255 - (3.45 \times 10^3)]$

5. Carry out the following conversions.

- a) 0.342 mol to mmol.
- b) 7.2×10^{-8} cm to pm.
- c) 42.4 Mg to kg.

6. Perform each of the following conversions:
- 106 °F (the body temperature of many birds) to K and °C.
 - 3410 °C (the melting point of tungsten, the highest for any element) to K and °F.
 - 6100 K (the surface temperature of the sun) to °F and °C.
7. Mercury is the only metal that is a liquid at room temperature. Its density is 13.6 g/mL. How many grams of mercury will occupy a volume of 95.8 mL?
8. An Erlenmeyer flask weighs 121.3 g when empty and 283.2 g when filled with water ($d = 1.00 \text{ g/cm}^3$).
- What is volume of the flask?
 - How much does the flask weigh when filled with carbon tetrachloride ($d = 1.59 \text{ g/cm}^3$)?
9. a) Water has a density of 1.00 g/mL or 1.00 g/cm^3 . What is the mass of 338 dL of water?
- b) A cube of plastic $1.2 \times 10^{-5} \text{ km}$ on a side weighs 1.1g. What is the density of this material? Will it float in water?
- c) Table salt (sodium chloride) has a density of 2.16 g/cm^3 . What volume would 36.2 μg of this salt occupy?
10. The maximum speed limit on rural roads in the United States is 55 mph. What is this speed in km/hr?