

Answers to Chapter 1 Questions

1.10 Physical properties are characteristic properties possessed by substances. A physical property can be measured and used to characterize a pure substance without reference to other substances. A chemical property governs the reactivity of a substance either with other substances or to give other substances. Intensive properties are independent of sample size. Extensive properties depend on sample size. Color and electrical conductivity are intensive properties. Mass and volume are extensive properties.

1.18 Density, being equal to the ratio of the mass to the volume of the sample, is an intensive property. Additionally, the boiling points of the substances could be used to determine the identity of the substance. A chemical property which could be used to distinguish between water and gasoline is the reaction of gasoline with oxygen to produce heat and other products; no reaction occurs between oxygen and water.

1.41 (a) 53

^{131}I (b) 38

^{90}Sr (c) 55

^{137}Ce (d) 9

^{18}F

1.48 Strontium and calcium are in the same Group of the periodic table, so they are expected to have similar chemical properties. Strontium should therefore form compounds that are similar to those of calcium, including the sorts of compounds found in bone.

1.69 From the ratio of phosphorous to chlorine, we see that for every 1.00 g phosphorus, there are 3.43 g chlorine. Dividing the mass of chlorine by 3.43, we find that for every 6.22 g chlorine there will be 1.81 g phosphorus.

$$1.86 (0.0580 \cdot 53.9396 \text{ u}) + (0.9172 \cdot 55.9349 \text{ u}) + (0.0220 \cdot 56.9354 \text{ u}) + (0.0028 \cdot 57.9333 \text{ u}) = 55.85 \text{ u}$$