ANSWER KEY

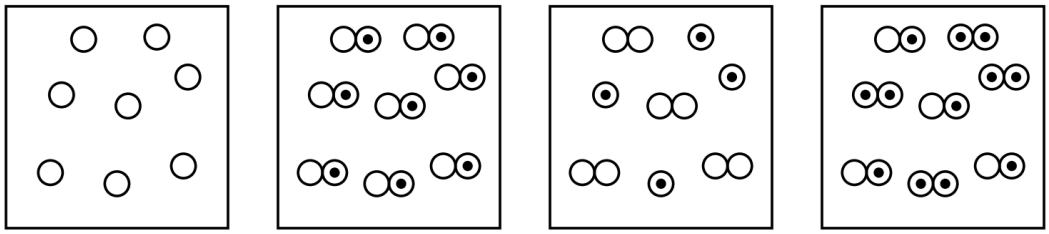
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1.4 Composition of Mixtures

AP Chemistry | ANSWER KEY

Use a periodic table. Show all work with units and correct significant figures.

1. Each circle is an atom. Plain and dotted circles are different elements. Classify each box as a pure element, a pure compound, a mixture of elements, or a mixture of an element and a compound.



A: pure element B: pure compound C: mixture of elements D: mixture of an element and a compound

2. A 3.00 g sample of impure KCl contains 1.30 g of chlorine. The impurity contains no chlorine. Calculate the percent KCl in the sample.

% Cl in KCl = 35.45/74.55 = 47.55%. Mass KCl = 1.30 g ÷ 0.4755 = 2.73 g
% KCl = 2.73 g ÷ 3.00 g × 100 = 91.1%

3. A white powder is pure NaCl, pure KCl, or a mixture of the two. Elemental analysis shows it is 55.0% Cl by mass. Which is it? Justify your answer.

A mixture. Pure KCl is 47.6% Cl and pure NaCl is 60.7% Cl. 55.0% lies between them, which only a mixture of the two can give.

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4. A 10.00 g mixture of NaCl and KCl contains 5.50 g of chlorine. Calculate the mass of NaCl in the mixture.

Let x = mass NaCl. 0.6066x + 0.4755(10.00 − x) = 5.50
0.1311x = 0.745, so x = 5.68 g NaCl (and 4.32 g KCl)

5. A 4.00 g sample of rock is 25.0% Fe_2O_3 by mass, and the rest is SiO_2. Calculate the mass of iron in the sample.

Fe_2O_3: 4.00 g × 0.250 = 1.00 g. % Fe = 2(55.85)/159.70 = 69.94%
1.00 g × 0.6994 = 0.699 g Fe

6. A sample of $CaCO_3$ is contaminated with sand, SiO_2. Will the measured mass percent of calcium be higher or lower than the value for pure $CaCO_3$ (40.04%)? Explain.

Lower. The sand adds mass but no calcium, so the same amount of Ca is divided by a larger total mass.

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