Topic: Chemical compounds

Question: Beryllium fluoride has the molecular formula BeF_2, and it has a molar mass of about 47 g/mol. If the molar mass of beryllium is 9 g/mol and the molar mass of fluorine is 19 g/mol, find the mass of a beryllium fluoride sample containing 228 g of fluorine.

Answer choices:

A 210 g

B 242 g

C 182 g

D 282 g

Solution: D

Based on its molecular formula, one molecule of beryllium fluoride contains 1 beryllium atom and 2 fluorine atoms. Since fluorine has a molar mass of 19 g/mol, one mole of beryllium fluoride contains

$$2(19) = 38 \text{ g}$$

of fluorine. Therefore, since the molar mass of beryllium fluorine is 47 g, we can say that the ratio of the molar mass of the fluorine in any sample of beryllium fluoride to the total molar mass of that sample is

$$\frac{38 \text{ g}}{47 \text{ g}}$$

If we want the total mass x of a sample of beryllium fluoride that contains 228 g of fluorine, we can set up a proportion.

$$\frac{38 \text{ g}}{47 \text{ g}} = \frac{228 \text{ g}}{x}$$

$$\frac{38}{47} = \frac{228 \text{ g}}{x}$$

Cross multiplying, we get

$$38x = (228 \text{ g})(47)$$

$$38x = 10{,}716 \text{ g}$$

$$x = 282 \text{ g}$$

Topic: Chemical compounds

Question: What is the molar mass of H_2O, if the molar mass of hydrogen is 1.00794 g/mol and the molar mass of oxygen is 15.9994 g/mol?

Answer choices:

A 18.01528

B 18.1

C 19.25672

D None of these

Solution: A

Because one molecule of H_2O has two atoms of hydrogen and one atom of oxygen, the mass of one mole of H_2O is

$$2(1.00794) + 15.9994$$

$$2.01588 + 15.9994$$

$$18.01528 \text{ g}$$

So the molar mass of H_2O is 18.01528 g/mol.

Topic: Chemical compounds

Question: Find the mass of hydrogen in a 185 g ammonium carbonate sample, $(NH_4)_2CO_3$, if the molar mass of ammonium carbonate is 96.09 g/mol and the molar mass of hydrogen is 1.00794 g/mol.

Answer choices:

A 4.03176

B 7.76226

C 8.06352

D 15.5245

Solution: D

We can see that one molecule of $(NH_4)_2CO_3$ has 8 atoms of hydrogen because $4 \cdot 2 = 8$. Therefore, the molar mass of hydrogen in one mole of ammonium carbonate is

$$1.00794(8) = 8.06352$$

Now we can set up a proportion which consists of two ratios. The first is the ratio of the molar mass of hydrogen to the molar mass of ammonium carbonate and the second is the ratio of the mass of hydrogen, which we'll call x, to the given mass of the ammonium carbonate sample. Therefore, we have

$$\frac{8.06352}{96.09} = \frac{x}{185}$$

$$96.09x = 185(8.06352)$$

$$x \approx 15.5245 \text{ g}$$